A

Appendix A: TRAFFIC OPERATIONS AND SAFETY REPORT

City of Mississauga

Clarkson Road and Lakeshore Road Intersection Improvements

Traffic Analysis Report

Operations and Microsimulation

Monday, June 6, 2022

B001266

CIMA+

500-5935 Airport Road
Mississauga, ON L4V 1W5
T 905 695 1005 **F** 905 695 0525
cima.ca

Contact

Stephen Keen, P.Eng.
Stephen.Keen@cima.ca
T 905 288-0287, 6834

Engineering for **people**

Table of Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

CIMA+ was retained by the City of Mississauga (the 'City') to conduct an Environmental Assessment (EA) that will evaluate how existing transportation conditions may be improved at the intersections of Lakeshore Road West & Clarkson Road North and Lakeshore Road West & Clarkson Road South. A traffic analysis of the existing and projected traffic conditions is one of the components of this study. This report describes the two components of traffic analysis conducted in support of the EA; Traffic Operations Analysis and Microsimulation Analysis.

The Traffic Operations Analysis included a higher-level review of the existing traffic conditions throughout the study area, as well as the expected impacts of projected traffic along the corridor and intersections under study. The findings of which assisted the project team in identifying potential improvements in development of improvement solutions and the design of the preferred solution.

The Microsimulation Analysis included the detailed analysis of existing and projected traffic conditions to further assist with identifying the potential improvements, and also provide further comparison between potential solutions. This report includes the calibration of the microsimulation model and summarizes the existing conditions and projected results obtained from the AM and PM peak hour models developed by CIMA+ utilizing the microsimulation software PTV VISSIM (version 2021). This microsimulation study aided in the assessment for the potential solutions to the intersections of Lakeshore Road West & Clarkson Road South, and Lakeshore Road West & Clarkson Road North, as part of the EA Study. This analysis includes the following scenarios (alternatives from EA):

- Existing Conditions (2019) – AM & PM;
- Do Nothing Future Conditions (2031 and 2041) AM & PM;
- Alternative Options 5 (2031 and 2041) AM & PM;
- Alternative Solution 4 (2031 and 2041) AM & PM;
- Alternative Solution 2 (2031 and 2041) AM & PM; and
- Alternative Solution 3 (2031 and 2041) AM & PM.

2 Study Area

2.1 Road Network

Lakeshore Road West is a major east-west arterial road traversing the City of Mississauga urban area. Within the EA study area, Lakeshore Road West has a 5-lane cross-section (two lanes per direction + two-way left turn lane). There are four signalized intersections within the study area along Lakeshore Road West, as illustrated in **Figure 1**. The study area intersections include:

- Lakeshore Road West & Clarkson Village Plaza entrance;
- Lakeshore Road West & Clarkson Road South;
- Lakeshore Road West & Clarkson Road North; and
- Lakeshore Road West & Meadow Wood Road.

Figure 1: Study Area

Lakeshore Road West & Clarkson Road North is a four-legged intersection, in which the south leg is the access to the plaza (Clarkson Pump restaurant) and the north leg provides access to Clarkson Road North. Lakeshore Road West & Clarkson Road South is also a four-legged intersection, where the south leg provides access to Clarkson Road South and the north is a one-way southbound exit-only to a drive-thru.[1]

[1] It should be noted that at the time of this report this exit was not in service.

Clarkson Road North and South are classified as major and minor collectors, respectively. The roadway has a 2-lane cross-section, with Clarkson Road North being fully urbanized and Clarkson Road South having a "semi-urban" cross-section. While Clarkson Road mainly serves residential neighbourhoods, the road is of greater importance, as Clarkson Road North is the only north-south connector across a CN railroad between Southdown Road and Lorne Park Road, i.e., an almost 3km long section of Lakeshore Road. Meadow Wood Road is a north-south 2-lane cross-section local roadway. It forms a three-legged signalized intersection with Lakeshore Road West, where the south leg provides access to residential areas. There are two commercial driveways present on the north side of Lakeshore Road West and directly across from the Meadow Wood Road, which are not controlled by the traffic signal.

The land use surrounding the study area is predominantly residential along Clarkson Road North and South, while Lakeshore Road West presents characteristics of a commercial area with a plaza on the north side and other small restaurants/business on both north and south sides. A gas station with 2 access points is present on the north side of Lakeshore Road West between the intersections of Clarkson Road South and Clarkson Road North. The current posted speed limit on Lakeshore Road West and Clarkson Road is 40 km/h.[2]

2.2 Cycling and Pedestrian Network

Sidewalks are present, within the study area, on the north and south side of Lakeshore Road West and on the east and west side of Clarkson Road North and Clarkson Road South. The sidewalks on the north side of Lakeshore Road West and both sides of Clarkson Road North and Clarkson Road South are located between 0 (no buffer) and 4.5 metres from the edge of the through lanes. Sidewalks on the south side of Lakeshore Road West are located between 3.5 and 7 metres from the edge of the through lanes. All sidewalks within the study area are between 1.5 to 4.2 metres wide, which conforms to the Accessibility of Ontarians with Disabilities Act (AODA) requirements[3] and were generally in good condition.[4]

Each signalized intersection within the study area has crosswalks on all approaches. They are zebra painted crosswalks that range between 2.0 and 3.25 metres in width, with tactile plates in place. The unsignalized intersections within the study area along

[2] It is important to note that the posted speed limit on Lakeshore Road West was reduced from 50 km/h to 40 km/h approximately between October 12, 2020 and October 26, 2020.

[3] O.Reg. 191/11 – Integrated Accessibility Standards, Part IV.1 80.23

[4] City staff indicated that the City's requirements for curb facing sidewalks is a minimum of 1.8 metres, preferably 2 metres. However those dimensions refers to new construction and in such locations in which the available right-of-way allows for the increased width

Clarkson Road South and Clarkson Road North do not have painted crosswalks on any approaches. During the field investigation, it was also observed that obstacles were directly aligned with some crosswalks (as illustrated in **Figure 2**).

NE quadrant at Clarkson Rd S

SE quadrant at Clarkson Rd N

Figure 2: Obstacles Aligned with Crosswalks

This was the case on the northeast quadrant at Clarkson Road South (signal pole) and southeast quadrant at Clarkson Road North (controller cabinet). The entrance to the crosswalk at both locations is less than 1.5 metres due to these obstructions, however, the sidewalks along Lakeshore Road West at these intersections are at least 1.5 metres wide. These obstacles may impose difficulty for users with wheelchairs and other mobility devices to complete the crossing (may require maneuvering around).

Pedestrian signal heads are provided at all signalized intersections in the study area, with the north/south crossings requiring the use of a pushbutton in order to call the pedestrian phase. The pedestrian push buttons at each of the intersections within the study area do not comply with the requirements outlined in the Accessibility of Ontarians with Disabilities Act (AODA). An example of the existing pedestrian push buttons at an intersection is shown in **Figure 3**.

Figure 3: Non-AODA Compliant Pedestrian Push Button

Further discussion regarding safety of the existing pedestrian network is provided in the Performance Safety Report associated with this study.

Based on the 2019 traffic counts provided by the City, the pedestrian volumes observed within the study area are low.[5] The highest number of pedestrian crossings occur at the intersections of Plaza Entrance and Clarkson Road North, both during the PM peak hour. The total number of crossings at each signalized intersection within the study area are summarized below in **Table 1**.

[5] Although the SOW 3.2. Transportation and Traffic Analysis stated that a weekend sensitivity analysis/count to make sure the weekday peak periods are higher than weekends was required, due to the extraordinary circumstances generated by the COVID crisis – and the consequent effects of the imposed lockouts in pedestrian movements, counts were not completed.

Table 1: Pedestrian Volumes at Signalized Intersections Within the Study Area

Intersection	Peak Hour	Pedestrian Volumes	
		Total Number of Crossings	Individual Crossing with Highest Number of Crossings / Volume
Lakeshore Rd W & Plaza entrance	AM	20	North Crossing / 8
	PM	54	East Crossing / 18
Lakeshore Rd W & Clarkson Rd S	AM	27	North Crossing / 13
	PM	45	North Crossing / 22
Lakeshore Rd W & Clarkson Rd N	AM	29	North Crossing / 11
	PM	54	South Crossing / 20
Lakeshore Rd W & Meadow Wood Rd[6]	AM	25	North Crossing / 16
	PM	37	North Crossing / 25

Existing pedestrian performance along the study corridor was evaluated using the level of service (LOS) criteria from York Region's Transportation Mobility Plan Guidelines[7] as shown in **Table 2**.

These guidelines provide a simplified method for evaluating pedestrian LOS compared to the methodology outlined in the Highway Capacity Manual (which requires an extensive amount of data). A target LOS of B or better was assumed for both Segment and Intersection categories.[8] Based on the existing characteristics described previously. **Table 2** summarizes the existing LOS throughout the study area.

[6] Since the north crossing is a continuation of the sidewalk along Lakeshore Road there is no crosswalk and pedestrian signal heads are not present.

[7] These Level of Service criteria was also completed for a previous assignment for the City of Mississauga in 2018 (Class Environmental Assessment Study for Burhamthorpe Road West).

[8] City has clarified that a target LOS C is acceptable but had concerns with classification of some facilities like Clarkson Road South.

Table 2: Pedestrian Level of Service Criteria

LOS	Segment	Intersection
A	≥ 2.0 m sidewalk with minimum 3.5 m buffer including planting and edge zone; or ≥ 3.0 m multi-use path	• ≥ 2.0 m sidewalk with minimum 3.5 m buffer including planting and edge zone; or ≥ 3.0 m multi-use path • Pedestrian signal head with sufficient pedestrian clearance time[9] • Clearly delineated cross-walk
B	≥ 1.5 m sidewalk with minimum 1.0 m buffer including edge zone; or < 3.0 m multi-use path	• ≥ 1.5 m sidewalk with minimum 1.0 m buffer including edge zone; or < 3.0 m multi-use path • Pedestrian signal head with sufficient pedestrian clearance time[9] • Clearly delineated cross-walk
C	≥ 1.8[10] m curb-faced sidewalk (no buffer)	• ≥ 1.8 m curb-faced sidewalk (no buffer) • Pedestrian signal head with sufficient pedestrian clearance time[9] • Clearly delineated cross-walk
D	< 1.5 m sidewalk or < 1.8[10] m curb-faced sidewalk (no buffer)	• < 1.5 m sidewalk or 1.8 m curb-faced sidewalk (no buffer) • Pedestrian signal head with sufficient pedestrian clearance time[9] • No clearly delineated cross-walk
E	Paved shoulder or no sidewalk provision	• Paved shoulder or no sidewalk provision • No pedestrian signal head • No clearly delineated cross-walk
F	No sidewalk provision	• No sidewalk provision • No pedestrian signal head • No clearly delineated cross-walk

[9] 1.2 m per second walking speed

[10] LOS criteria modified to account for minimum 1.8 m width per the City of Mississauga Pedestrian Master Plan proposed standards.

Table 3: Pedestrian Level of Service Within the Study Area

Location	Level of Service
Lakeshore Rd W & Plaza entrance	B
Lakeshore Rd W Between Plaza entrance & Clarkson Rd S	B
Lakeshore Rd W & Clarkson Rd S	D
Lakeshore Rd W Between Clarkson Rd S & Clarkson Rd N	B
Lakeshore Rd W & Clarkson Rd N	D
Lakeshore Rd W Between Clarkson Rd N & Meadow Wood Rd	B
Lakeshore Rd W & Meadow Wood Rd[3]	B[11]
Clarkson Rd S Between Lakeshore Rd W & Pattinson Cres	D
Clarkson Rd S & Pattinson Crescent	D
Clarkson Rd S Between Pattinson Cres & Valentine Gardens	C
Clarkson Rd S & Valentine Gardens	D[12]
Clarkson Rd S Between Valentine Gardens & Matena Ave	C
Clarkson Rd S & Matena Ave	D
Clarkson Rd N Between Lakeshore Rd W & Pengilley Pl	C
Clarkson Rd N & Pengilley Pl	D[13]
Clarkson Rd N Between Pengilley Pl & Fellen Pl	C
Clarkson Rd N & Fellen Pl	D[14]
Clarkson Rd N Between Fellen Place & 1111 Clarkson Rd	F
Clarkson Rd N & 1111 Clarkson Rd	F

Two signalized intersections along Lakeshore Road West present a LOS lower than the target of C or better, both due to the reduced effective sidewalk width when entering the crosswalk. As mentioned earlier, the entrance to the crosswalk at both locations is obstructed by either a signal pole or controller cabinet. To achieve the target LOS for these intersections, the entrance to the crosswalk should be widened to a minimum of 1.5 metres.

Six unsignalized intersections and one segment along Clarkson Road South and Clarkson Road North present a LOS lower than the target of C or better, all due to the lack of a sidewalk and/or clearly delineated crosswalks on the pedestrian approaches.

[11] Sidewalk terminates heading south along the west side of Meadow Wood Road beyond the influence area of the intersection. However, this segment is outside of the study area limits and was not considered as part of the multimodal LOS review

[12] Sidewalk terminates heading east along the south side of Valentine Gardens beyond the influence area of the intersection. However, this segment is outside of the study area limits and was not considered as part of the multimodal LOS review.

[13] Sidewalk terminates heading east along the south side of Pengilley Place beyond the influence area of the intersection. However, this segment is outside of the study area limits and was not considered as part of the multimodal LOS review.

[14] Sidewalk terminates heading west along the north side of Fellen Place beyond the influence area of the intersection. However, this segment is outside of the study area limits and was not considered as part of the multimodal LOS review

To achieve the target LOS for these intersections, provide a sidewalk with a minimum width of 1.5 m where one is missing and/or clearly delineated crosswalks on all pedestrian approaches.

No dedicated bicycle facilities are provided on Lakeshore Road West within the study area, resulting in bicyclists having to share the road with vehicular traffic. The roadway has painted sharrows and Wc-19 / Wc-19t 'Share the Road' (side-by-side operation) signs. Additionally, no bicycle provision is available along both Clarkson Road South and Clarkson Road North.

The bicycle facilities within the study area were assessed following the processes described in OTM Book 18 – Cycling Facilities, which considers AADT and 85th percentile speeds. It is important to note that the evaluation used – Desirable Cycling Facility Pre-Selection Nomograph – only considers two-lane roads, which is applicable along Clarkson Road North and Clarkson Road South. However, the assessment presented below assumes this process to be applicable to a five-lane road cross-section as well.

For Lakeshore Road West, based on OTM Book 18 – Cycling Facilities Nomograph (**Figure 4**), a separated facility such as separate bicycle lanes, buffered paved shoulders, or in-boulevard active transportation pathway would be desirable, especially considering future growth in traffic volumes.[15] As for Clarkson Road South and Clarkson Road North, based on OTM Book 18 – Cycling Facilities Nomograph (**Figure 5**), a designated cycling operating space such as paved shoulders or exclusive bicycle lanes would be desirable on Clarkson Road North, and a shared roadway could be considered on Clarkson Road South.[16]

[15] 2006 Average Annual Daily Traffic for Lakeshore Road West, obtained from the Mississauga Network Screening datasheet, ranges from 23,000 to 30,000; 85th percentile speed, obtained through a speed study completed on October 28, 2020 was found to be 56 km/h for the eastbound direction and 57 km/h for the westbound direction

[16] Average Annual Daily Traffic for Clarkson Road North and Clarkson Road South, obtained from the City's midblock report 2018 identifies volumes of approximately 6800 and 1200, respectively; 85th percentile speed is assumed to be 50 km/h based on a posted speed limit of 40 km/h

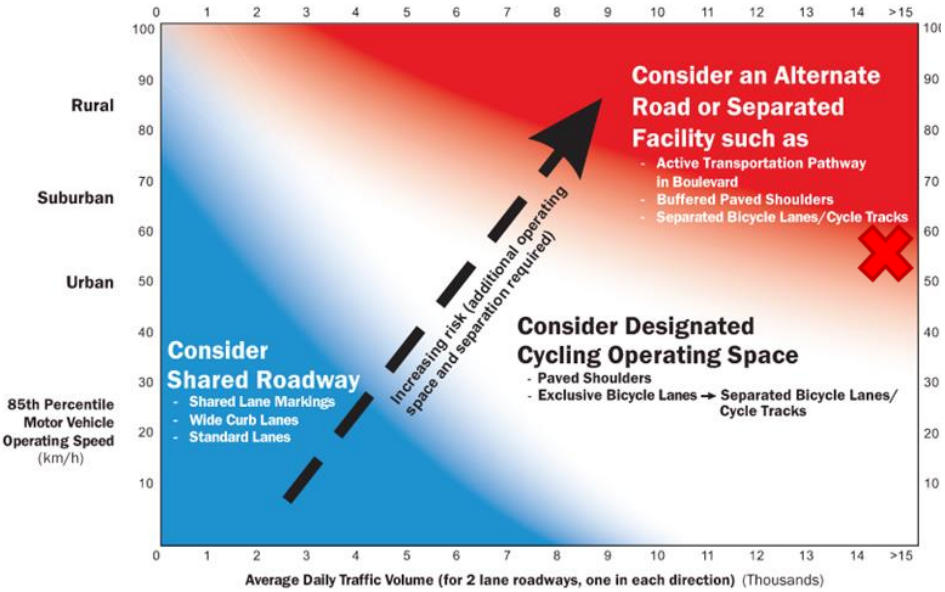


Figure 4: Desirable Cycling Facility Nomograph (Lakeshore Roade West)[17]

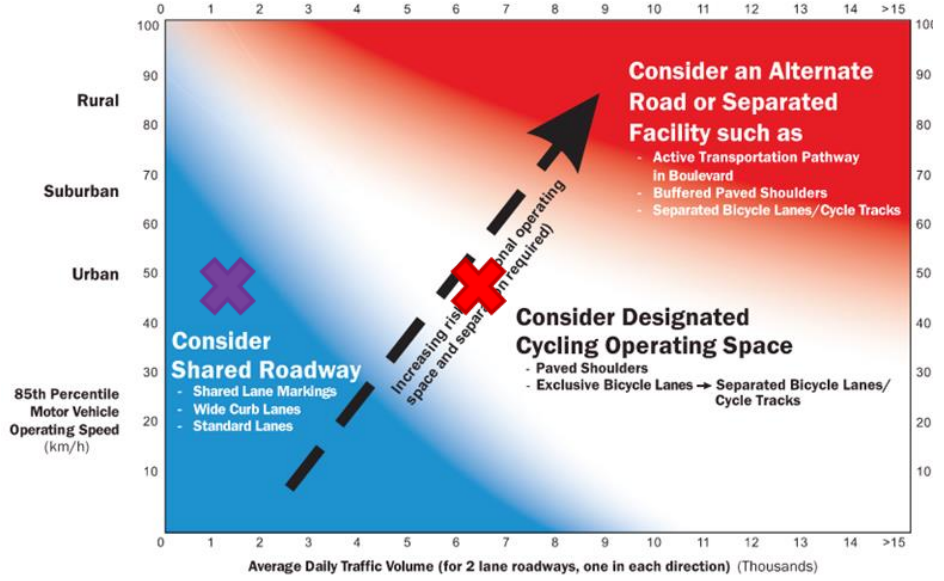


Figure 5: Desirable Cycling Facility Nomograph (Clarkson Road South (purple) and Clarkson Road North (red))[11]

The bicycle performance along the corridor was evaluated using the following LOS criteria from York Region's Transportation Mobility Plan Guidelines, as outlined in **Table** 4. It should be noted that the Guidelines consider the desired width of 1.8 m as well as the suggested minimum of 1.5 m, as described in OTM Book 18 – Cycling Facilities, to estimate the LOS.

[17] OTM Book 18 Cycling Facilities (2013), Figure 3.3 page 3

A target LOS of C or better was assumed for both Segment and Intersection categories. Based on the existing characteristics described previously, **Table** 5 summarizes the LOS throughout the study area.

Table 4: Bicycle Level of Service Criteria

Level of Service	Segment	Intersection
A	Separated cycling facilities (e.g. cycle tracks, multi-use path)	Separated cycling facilities Bicycle box or clearly delineated bicycle treatment or bicycle signal head
B	≥ 1.8 m dedicated cycling facilities (e.g. bicycle lanes with and without buffer)	> 1.8 m dedicated cycling facilities (e.g. bicycle lanes with and without buffer), Bicycle box, clearly delineated bicycle treatment or bicycle signal head
C	< 1.8 m dedicated cycling facilities with no buffer	< 1.8 m dedicated cycling facilities with no buffer, Bicycle box, clearly delineated bicycle treatment or bicycle signal head
D	≤ 1.5 m bicycle lane with no buffer	≤ 1.5 m bicycle lane and no buffer Bicycle treatment
E	Shared facilities (e.g. signed routes, sharrows or paved shoulder with minimum 1.2 m in constrained area)	Shared facilities (e.g. signed routes, sharrows or paved shoulder with minimum 1.2 m in constrained area) No clearly delineated bicycle treatment
F	No bicycle provision	No bicycle provision

Table 5: Bicycle Level of Service Within the Study Area

Location	Level of Service
Lakeshore Rd W & Plaza entrance	E
Lakeshore Rd W Between Plaza entrance & Clarkson Rd S	E
Lakeshore Rd W & Clarkson Rd S	E
Lakeshore Rd W Between Clarkson Rd S & Clarkson Rd N	E
Lakeshore Rd W & Clarkson Rd N	E
Lakeshore Rd W Between Clarkson Rd N & Meadow Wood Rd	E
Lakeshore Rd W & Meadow Wood Rd	E
Clarkson Rd S Between Lakeshore Rd W & Pattinson Cres	F
Clarkson Rd S & Pattinson Crescent	F
Clarkson Rd S Between Pattinson Cres & Valentine Gardens	F
Clarkson Rd S & Valentine Gardens	F
Clarkson Rd S Between Valentine Gardens & Matena Ave	F
Clarkson Rd S & Matena Ave	F
Clarkson Rd N Between Lakeshore Rd W & Pengilley Pl	F
Clarkson Rd N & Pengilley Pl	F
Clarkson Rd N Between Pengilley Pl & Fellen Pl	F
Clarkson Rd N & Fellen Pl	F
Clarkson Rd N Between Fellen Place & 1111 Clarkson Rd	F
Clarkson Rd N & 1111 Clarkson Rd	F

As detailed in **Table 5**, all locations present a LOS lower than the target of C or better due to the absence of dedicated bicycle facilities, resulting in a LOS of E or F. To

achieve the target LOS for these locations, consideration may be given to providing dedicated cycling facilities throughout the study area. Additionally, at intersections, improvements such as bike boxes, clearly delineated bicycle treatments, or bicycle signals can be considered.

2.3 Transit Service

Based on Mississauga transit (MiWay) information, bus Route 23 – Lakeshore is the only east-west transit line serving the Lakeshore Road corridor. No north-south transit lines operate within the study area.

Route 23 – Lakeshore operates east-west along Lakeshore Road West, approximately every 15 minutes on weekdays from 4:20 AM until 2:00 AM and approximately every 20 minutes on weekends from 5:00 AM (Saturday) / 7:45 AM (Sunday) until 1:20 AM (Saturday) / 10:45 PM (Sunday). The location of existing bus stops along Lakeshore Road West within the study area are illustrated in **Figure** 6. The distance between bus stops ranges from 250 to 320 m for all stops.

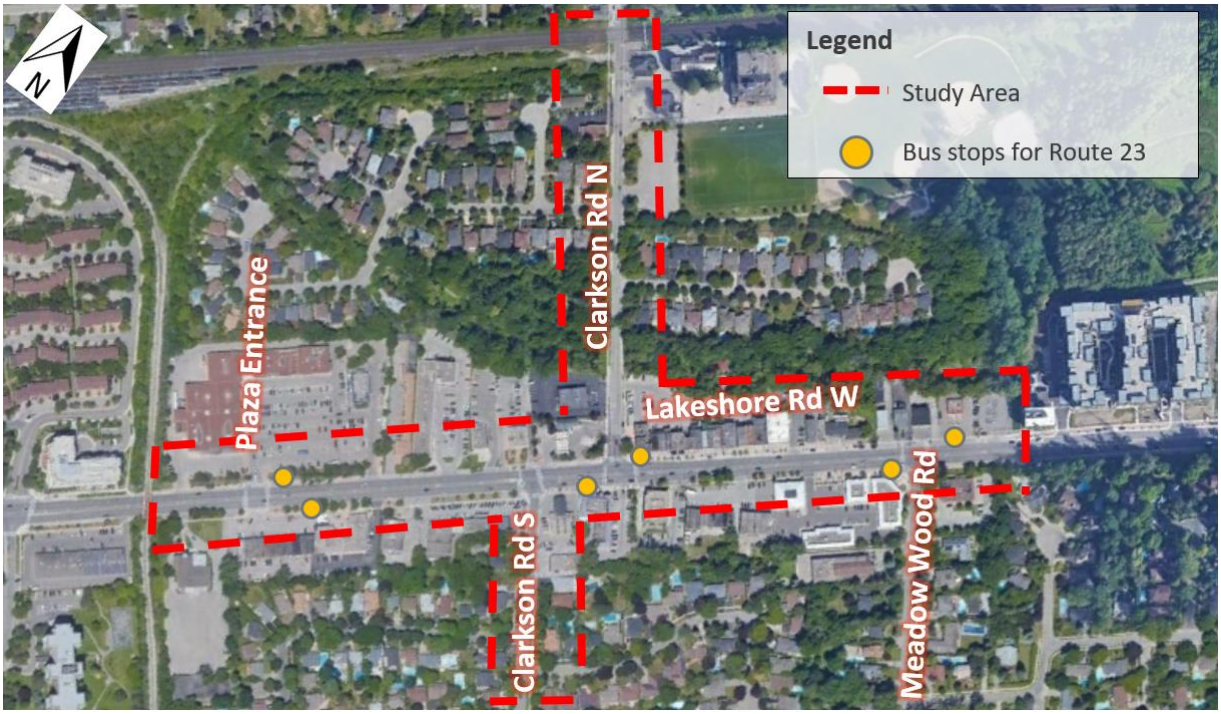


Figure 6: Existing Route 23 Bus Stops Within the Study Area

The transit performance along the corridor was evaluated using the LOS criteria from York Region's Transportation Mobility Guidelines in **Table** 6. A target LOS of C or better was assumed for Access to Transit Stops and Transit Headways, and a LOS of D or better for the Intersection Approach (typical for general traffic operations).

Table 6: Transit Level of Service Criteria

Level of Service	Access to Transit Stops	Transit Headways	Intersection Approach (transit or curb lanes)	
			Delay (seconds/veh)	v/c ratio
A	90% within ≤ 200 m	≤ 5 minutes	≤ 10	0 to 0.60
B	90% within ≤ 500 m and 70% within ≤ 200 m	> 5-10 minutes	> 10-20	0.61 to 0.70
C	90% within ≤ 500 m and 50% within ≤ 200 m	> 10-15 minutes	> 20-35	0.71 to 0.80
D	100% within ≤ 600 m	> 15-20 minutes	> 35-55	0.81 to 0.90
E	100% within ≤ 800 m	> 20-30 minutes	> 55-80	0.91 to 1.00
F	100% > 800 m	> 30 minutes	> 80	> 1.00

The transit level of service was evaluated considering the access points to Lakeshore Road West from the surrounding neighbourhoods (i.e. intersections with cross streets) and is summarized in **Table** 7.

Table 7: Transit Level of Service Within the Study Area

Transit Stop Location	Direction	Access to Transit Stops	Transit Headways	Intersection Approach (transit or curb lanes)
		LOS	LOS	LOS
Lakeshore Rd W West of Clarkson Rd (Plaza entrance)	Eastbound	A	D	A (A)
	Westbound	A		A (A)
Lakeshore Rd W & Clarkson Rd N	Eastbound	A		A (A)
	Westbound	A		A (A)
Lakeshore Rd W & Meadow Wood Rd	Eastbound	A		A (A)
	Westbound	A		A (A)

Legend: AM (PM)

Based on the foregoing, all locations present a LOS worse than the target of C or better for Transit Headways. In order to improve transit service in the study area to meet the target LOS for Transit Headways, consideration may be given to reduce the transit headway to 15 minutes on weekends.

2.4 Available data

The City provided the turning movement counts (TMCs) and Signal Timing Reports for the four signalized intersections in the study area. The available data is summarized below in **Table** 8. For future conditions (2031 and 2041), EMME plots were provided to CIMA+ by the City which were used to estimate the traffic growth and projected future turning movement counts in the study area.

Table 8: Provided TMC Data

Intersection	Collection Date	AM Peak Hour	PM Peak Hour
Lakeshore Rd W @ Plaza Entrance	Dec 17, 2019	08:00 - 09:00	16:45 - 17:45
Lakeshore Rd W @ Clarkson Rd S	Dec 17, 2019	08:00 - 09:00	16:45 - 17:45
Lakeshore Rd W @ Clarkson Rd N	Dec 17, 2019	08:00 - 09:00	16:45 - 17:45
Lakeshore Rd W @ Meadow Wood Rd	Dec 17, 2019	08:00 - 09:00	16:30 - 17:30

3 Traffic Operations Analysis

3.1 Existing Traffic Conditions

3.1.1 Existing Traffic Volumes

Turning Movement Counts (TMC) for both the AM and PM peak hours under existing conditions are summarized in **Appendix A**. The TMCs, indicate that the AM Peak Hour occurs between 8:00 and 9:00, and the PM Peak Hour occurs between 16:45 and 17:45 (corridor peak hours).

TMCs were not provided for the unsignalized intersections within the study area. Therefore, the number of residential units were estimated using Google Maps, and the volumes were calculated using ITE Trip Generation Manual, 10th Edition. The trip distribution of these volumes was completed using the distribution observed on the TMC counts and the EMME data provide by the City, at the intersections of Lakeshore Road West & Clarkson Road North and Lakeshore Road West & Clarkson Road South. A summary of the calculated trips is summarized below in[18] **Table 9**. Complete volumes during existing conditions can be found in **Appendix B**.

It should be noted that the most recent traffic signal timings provided by the City were used to represent existing conditions.

[18] Trip distribution also considered the "Exit Only" current conditions for all identified roads.

Table 9: Trip Generation Volumes for Unsignalized Intersections

Intersection	Land Use Code (LUC)	Number of Units / Area (sq ft)	AM			PM		
			In	**Out**	**Total**	**In**	**Out**	**Total**
Fellen Pl	210	66	13	39	52	43	25	68
Pengilley Pl	210	29	6	19	25	20	11	31
Pattinson Cres	210	27	6	18	24	18	11	29
Valentine Grdns	210	31	7	20	27	21	12	33
Matena Ave	210	24	5	16	22	16	10	26
1111 Clarkson Rd	712	3000 sq ft	5	1	6	2	5	7

3.1.2 Existing Intersection Capacity Analysis

Intersection capacity analysis was undertaken using Synchro/SimTraffic software and following procedures described in the Highway Capacity Manual (HCM). The analysis primarily focuses on performance measures such as level-of-service (LOS), volume to capacity (v/c) ratio, and 95th percentile queues.

LOS is a qualitative measure of operational performance and is based on control delay. The LOS criteria for unsignalized and signalized intersections is shown in **Table 10** and **Table 11**, respectively.

The v/c ratio is the ratio between traffic volumes and the capacity of an intersection movement. A v/c ratio greater than 1.0 indicates that the movement is operating over capacity.

The 95th Percentile Queue is the queue length that has only a 5 percent probability of being exceeded during the analysis period. It is industry practice and accepted methodology to use the 95th percentile queue length for design and operational analysis purposes.

Table 10: LOS Criteria for Unsignalized Intersections

LOS	Expected Delay (seconds/vehicle)	Traffic Flow Characteristics
A	0 – 10	Very Good
B	> 10 – 15	Good
C	> 15 – 25	Typically preferred planning objective
D	> 25 – 35	Typically acceptable
E	> 35 – 50	Undesirable; potentially unstable traffic flow
F	> 50	Failing movements may impede traffic flow

Table 11: LOS Criteria for Signalized Intersections

LOS	Control Delay (seconds/vehicle)	Traffic Flow Characteristics
A	0 – 10	Very Good
B	> 10 – 20	Good
C	> 20 – 35	Typically preferred planning objective
D	> 35 – 55	Typically acceptable
E	> 55 – 80	Undesirable; potentially unstable traffic flow
F	> 80	Failing movements may impede traffic flow

Existing intersection operations are summarized in **Table 12**. Detailed Synchro/SimTraffic Reports can be found in **Appendix D**.

Table 12: Existing Intersection Operations

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	Lakeshore Road W & Plaza Entrance (Signalized)					
EB	EBL	25	2.3 (5.0)	0.07 (0.22)	A (A)	16 (24)
	EBT/R	190	2.7 (5.6)	0.29 (0.49)	A (A)	53 (87)
WB	WBL	25	1.3 (3.0)	0.02 (0.09)	A (A)	8 (16)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	WBT/R	220	1.7 (3.4)	0.31 (0.39)	A (A)	23 (46)
NB	NBL/T/R	15	59.7 (55.2)	0.01 (0.13)	E (E)	12 (18)
SB	SBL/T	15	61.0 (61.2)	0.15 (0.55)	E (E)	15 (35)
	SBR	15	59.9 (54.6)	0.03 (0.08)	E (D)	16 (24)
Overall		**-**	**4.7 (9.4)**	**0.29 (0.5)**	**A (A)**	**-**
	Lakeshore Road W & Clarkson Rd S (Signalized)					
EB	EBT/R	220	3.8 (4.9)	0.31 (0.52)	A (A)	59 (68)
WB	WBL	25	0.9 (2.9)	0.09 (0.21)	A (A)	18 (19)
	WBT	55	1.2 (1.5)	0.32 (0.39)	A (A)	44 (23)
NB	NBL/T/R	110	62.7 (62.4)	0.46 (0.42)	E (E)	36 (34)
SB	SBL/T/R	15	60.5 (58.8)	0.26 (0.10)	E (E)	24 (15)
Overall		**-**	**6.9 (5.9)**	**0.33 (0.51)**	**A (A)**	**-**
	Lakeshore Road W & Clarkson Rd N (Signalized)					
EB	EBL	20	3.9 (14.3)	0.32 (0.55)	A (B)	21 (21)
	EBT/R	55	2.7 (2.0)	0.28 (0.45)	A (A)	45 (71)
WB	WBL	20	4.1 (2.6)	0.02 (0.03)	A (A)	8 (9)
	WBT/R	230	6.5 (4.6)	0.38 (0.44)	A (A)	50 (49)
NB	NBL/T/R	15	55.1 (55.7)	0.12 (0.26)	E (E)	19 (23)
SB	SBL/T	145	69.5 (69.4)	0.68 (0.70)	E (E)	46 (48)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	SBR	48	55.1 (54.2)	0.12 (0.12)	E (D)	27 (28)
Overall		**-**	**13.0 (11.2)**	**0.42 (0.58)**	**B (B)**	**-**
	Lakeshore Road W & Meadow Wood Road (Signalized)					
EB	EBT/R	230	2.3 (4.6)	0.28 (0.49)	A (A)	28 (40)
WB	WBL	20	3.2 (6.5)	0.09 (0.13)	A (A)	15 (15)
	WBT	400	3.8 (7.3)	0.30 (0.39)	A (A)	47 (70)
NB	NBL/R	195	67.7 (52.1)	0.63 (0.24)	E (D)	52 (34
Overall		**-**	**7.7 (7.5)**	**0.34 (0.45)**	**A (A)**	**-**
	Clarkson Road S & Pattinson Crescent (Unsignalized)					
EB	EBL/R	180	9.2 (9.4)	9.2 (9.6)	A (A)	10 (10)
NB	NBL/T	25	0.2 (0.7)	0.2 (0.0)	A (-)	7 (9)
SB	SBT/R	110	0.0 (0.0)	0.0 (0.0)	- (-)	0 (0)
Overall		**-**	**1.0 (0.8)**	**1.0 (0.5)**	**A (A)**	**-**
	Clarkson Road S & Valentine Gardens (Unsignalized)					
WB	WBL/R	190	9.2 (9.3)	9.2 (8.7)	A (A)	12 (9)
NB	NBT/R	40	0.0 (0.0)	0.0 (0.0)	- (-)	5 (3)
SB	SBL/T	25	0.3 (0.9)	0.3 (2.0)	A (A)	2 (3)
Overall		**-**	**1.1 (1.0)**	**1.1 (1.6)**	**A (A)**	**-**
	Clarkson Road S & Matena Avenue (Unsignalized)					
EB	EBL/R	198	9.2 (9.3)	9.2 (9.2)	A (A)	11 (10)
NB	NBL/T	90	0.3 (0.7)	0.3 (0.0)	A (A)	5 (2)
SB	SBT/R	40	0.0 (0.0)	0.0 (0.0)	- (-)	0 (0)
Overall		**-**	**0.9 (0.8)**	**0.9 (0.7)**	**A (A)**	**-**
	Clarkson Road N & Pengilley Place (Unsignalized)					
WB	WBL/R	220	11.7 (12.6)	11.7 (12.6)	B (B)	12 (10)
NB	NBT/R	145	0.0 (0.0)	0.0 (0.0)	- (-)	16 (10)
SB	SBL/T	55	0.1 (0.4)	0.1 (0.4)	A (A)	2 (0)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
Overall		**-**	**0.4 (0.4)**	**0.4 (0.4)**	**A (A)**	**-**
	Clarkson Road N & Fellen Place (Unsignalized)					
EB	EBL/R	50	11.7 (12.5)	11.7 (12.5)	B (B)	14 (13)
NB	NBL/T	55	0.2 (0.7)	0.2 (0.7)	A (A)	6 (9)
SB	SBT/R	60	0.0 (0.0)	0.0 (0.0)	- (-)	0 (0)
Overall		**-**	**0.9 (0.8)**	**0.9 (0.8)**	**A (A)**	**-**
	Clarkson Road N & 1111 Clarkson Road (Unsignalized)					
WB	WBL/R	100	12.9 (12.5)	11.7 (9.2)	B (A)	2 (7)
NB	NBT/R	60	0.0 (0.0)	0.0 (0.0)	- (-)	0 (0)
SB	SBL/T	65	0.1 (0.0)	0.1 (0.0)	A (-)	2 (0)
Overall		**-**	**0.1 (0.1)**	**0.4 (0.1)**	**A (A)**	**-**

Based on the results provided above, all intersections within the study area operate below capacity, with the highest v/c ratio present on the southbound through/left-turn movement at the intersection of Lakeshore Road West & Clarkson Rd North during the PM peak hour.

The northbound through/left-turn/right-turn movement and southbound right-turn movement at the intersection of Lakeshore Road West & Plaza Entrance present long queues that extend beyond the provided storage length during the PM peak hour. Both queues are not expected to interfere with the intersection operations as these are private access driveways.

The southbound left/through/right-turn movement at the intersection of Lakeshore Road West & Clarkson Rd South present long queues that extend beyond the provided storage length during the AM peak hour. The southbound queues are not expected to interfere with the intersection operations as this is a private access driveway. In addition, it is important to note that this north leg it is now an unoccupied store. Therefore, no vehicles were observed during the field investigation.

The eastbound left-turn movement and northbound through/left-turn/right-turn movement at the intersection of Lakeshore Road West & Clarkson Road North present queues that extend beyond the available storage length during AM and PM peak hours. The northbound queues are not expected to interfere with the intersection operations, as this is a private access driveway. The eastbound left-turn queues were observed to operate better than reported in Synchro/SimTraffic, presumably due to drivers being

more aggressive when making the turn than the modelled behaviour. During the field investigation, it was observed that the turning vehicles would clear the intersection at the end of every cycle length. In addition, the eastbound through/right-turn movement also presents long queues during the PM peak hour. Similar to the eastbound left-turn movement, no queue spillback was observed and all through vehicles would clear the intersection at the end of every cycle length.

3.2 Future Traffic Conditions

Projected traffic volumes for the horizon years of 2031 and 2041, were estimated using the EMME data provided by the City for the same horizon years and 2016; as well as the 2019 TMC counts within the study area. The projected traffic for 2031 was estimated by calculating the volume difference (absolute growth) between the EMME 2031 volumes and EMME 2016 volumes and adding it to the 2019 TMC counts. Similarly, the projected traffic for 2041 was estimated by calculating the volume difference (absolute growth) between the EMME 2041 volumes and EMME 2031 volumes and adding it to the 2031 projected traffic volumes. These calculations were applied along Lakeshore Road West, Clarkson Road North, Clarkson Road South and Meadow Wood Road. Calculations can be found in **Appendix C**.

It was assumed that the unsignalized intersections that are part of the study area are not expected to have a change in volume since they are “No Exit” roads, with the exception of 1111 Clarkson Road North which will be a private access to the proposed development. Based on information provided by the City, 1111 Clarkson Road North will have a completely built development by 2031, consisting of 136 townhouse units. ITE Trip Generation Manual, 10th Edition, was used to estimate the new trips that will be generated by the development. A total of 46 vehicles are expected to be generated during the AM peak with a 26% of vehicles entering and 74% exiting. 60 vehicles are expected to be generated during the PM peak, with 60% of vehicles entering and 40% exiting. These trips were distributed following the same methodology described in Section 3.1.1.

It is important to note that volume balancing was performed for 2031 and 2041 horizon years in order to maintain a similar balance as existing conditions. Complete volumes can be found in **Appendix B**.

Similar to the analysis of existing conditions, intersection capacity analysis was undertaken using procedures described in the Highway Capacity Manual (HCM). The analysis primarily focuses on performance measures such as level-of-service (LOS), volume to capacity (v/c) ratio, and 95th percentile queues. The results for each of the horizon years are described in the following sections.

3.2.1 Do-Nothing

This section summarizes the results for the expected traffic operations during the horizon years of 2031 and 2041 but with no improvements to the existing characteristics of the study area.

3.2.1.1 2031

Do-Nothing – 2031 scenario traffic operations are summarized in **Table 13**. Detailed Synchro/SimTraffic reports can be found in **Appendix D.**

Table 13: Do Nothing - 2031 Intersection Operations

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	Lakeshore Road W & Plaza Entrance (Signalized)					
EB	EBL	25	2.5 (5.8)	0.09 (0.27)	A (A)	15 (31)
	EBT/R	190	2.9 (6.2)	0.34 (0.56)	A (A)	66 (92)
WB	WBL	25	1.3 (3.5)	0.02 (0.11)	A (A)	5 (19)
	WBT/R	220	1.8 (3.5)	0.36 (0.41)	A (A)	33 (54)
NB	NBL/T/R	15	59.7 (55.3)	0.01 (0.14)	E (E)	9 (18)
SB	SBL/T	15	61.0 (61.3)	0.15 (0.55)	E (E)	14 (35)
	SBR	15	59.9 (55.5)	0.03 (0.17)	E (E)	18 (23)
Overall		**-**	**4.7 (9.6)**	**0.34 (0.55)**	**A (A)**	**-**
	Lakeshore Road W & Clarkson Rd S (Signalized)					
EB	EBT/R	220	6.5 (5.9)	0.37 (0.60)	A (A)	74 (81)
WB	WBL	25	1.5 (4.6)	0.13 (0.28)	A (A)	19 (21)
	WBT	55	2.1 (1.6)	0.39 (0.41)	A (A)	60 (27)
NB	NBL/T/R	110	71.6 (63.8)	0.75 (0.54)	E (E)	41 (36)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
SB	SBL/T/R	15	53.0 (57.6)	0.17 (0.09)	D (E)	18 (17)
Overall		-	**10.9 (6.8)**	**0.44 (0.59)**	**B (A)**	-
	Lakeshore Road W & Clarkson Rd N (Signalized)					
EB	EBL	20	19.7 (133.6)	0.57 (1.07)	B (F)	21 (19)
	EBT/R	55	3.2 (2.3)	0.34 (0.49)	A (A)	64 (87)
WB	WBL	20	5.1 (3.3)	0.03 (0.04)	A (A)	9 (9)
	WBT/R	230	9.0 (6.2)	0.49 (0.53)	A (A)	51 (78)
NB	NBL/T/R	15	53.1 (54.9)	0.13 (0.32)	D (D)	19 (25)
SB	SBL/T	145	70.2 (71.4)	0.72 (0.73)	E (E)	54 (58)
	SBR	48	53.2 (53.6)	0.14 (0.19)	D (D)	30 (42)
Overall		-	**15.3 (24.6)**	**0.61 (1.04)**	**B (C)**	-
	Lakeshore Road W & Meadow Wood Road (Signalized)					
EB	EBT/R	230	2.5 (5.0)	0.34 (0.56)	A (A)	39 (48)
WB	WBL	20	4.0 (7.5)	0.14 (0.17)	A (A)	20 (19)
	WBT	400	4.5 (7.9)	0.37 (0.46)	A (A)	63 (75)
NB	NBL/R	195	67.9 (54.1)	0.66 (0.33)	E (D)	55 (37)
Overall		-	**7.9 (8.3)**	**0.40 (0.52)**	**A (A)**	-
	Clarkson Road S & Pattinson Crescent (Unsignalized)					
EB	EBL/R	180	9.6 (9.4)	0.02 (0.02)	A (A)	11 (9)
NB	NBL/T	25	0.1 (0.6)	0.0 (0.0)	A (-)	15 (6)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
SB	SBT/R	110	0.0 (0.0)	0.05 (0.07)	- (-)	- (3)
Overall		**-**	**0.7 (0.8)**	**-**	**A (A)**	**-**
	Clarkson Road S & Valentine Gardens (Unsignalized)					
WB	WBL/R	190	9.8 (9.4)	0.03 (0.01)	A (A)	14 (9)
NB	NBT/R	40	0.0 (0.0)	0.11 (0.05)	- (-)	11 (4)
SB	SBL/T	25	0.2 (0.9)	0.0 (0.02)	A (A)	- (-)
Overall		**-**	**0.8 (0.9)**	**-**	**A (A)**	**-**
	Clarkson Road S & Matena Avenue (Unsignalized)					
EB	EBL/R	198	9.6 (9.3)	0.02 (0.01)	A (A)	10 (9)
NB	NBL/T	90	0.1 (0.6)	0.0 (0.0)	A (A)	13 (4)
SB	SBT/R	40	0.0 (0.0)	0.06 (0.04)	- (-)	- (6)
Overall		**-**	**0.6 (0.7)**	**-**	**A (A)**	**-**
	Clarkson Road N & Pengilley Place (Unsignalized)					
WB	WBL/R	220	13.7 (16.0)	0.05	B (C)	13 (12)
NB	NBT/R	145	0.0 (0.0)	0.27	- (-)	- (8)
SB	SBL/T	55	0.1 (0.4)	0.0	A (A)	- (-)
Overall		**-**	**0.4 (0.3)**	**-**	**A (A)**	**-**
	Clarkson Road N & Fellen Place (Unsignalized)					
EB	EBL/R	50	13.4 (14.8)	0.09 (0.07)	B (B)	13 (13)
NB	NBL/T	55	0.2 (0.6)	0.01 (0.02)	A (A)	3 (15)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
SB	SBT/R	60	0.0 (0.0)	0.19 (0.21)	- (-)	- (-)
Overall		**-**	**0.8 (0.7)**	**-**	**A (B)**	**-**
	Clarkson Road N & 1111 Clarkson Road (Unsignalized)					
WB	WBL/R	100	14.0 (16.0)	0.08 (0.07)	B (C)	15 (11)
NB	NBT/R	60	0.0 (0.0)	0.29 (0.35)	- (-)	- (11)
SB	SBL/T	65	0.2 (0.7)	0.01 (0.02)	A (A)	- (-)
Overall		**-**	**0.7 (0.7)**	**-**	**A (A)**	**-**

Based on the results provided above, all intersections within the study area are expected to operate below capacity, with the exception of the intersection of Lakeshore Road West & Clarkson Road North. This intersection is expected to operate above capacity during the PM peak hour with a v/c ratio of 1.04, which can be attributed to the eastbound left-turn movement expected to operate with a v/c ratio of 1.07 and vehicular delays of approximately 134 seconds.

The eastbound left-turn movement, southbound shared through/left-turn movement and northbound through/left-turn/right-turn movement at the intersection of Lakeshore Road West & Plaza Entrance present long queues that extend beyond the provided storage length during the PM peak hour. The north and south queues are not expected to interfere with the intersection operations, as these are private access driveways. Similarly, the eastbound left-turn lane should not affect intersection operations, as this is a two-way left-turn lane, which can potentially accommodate the queue length increase.

The southbound left/through/right-turn movement at the intersection of Lakeshore Road West & Clarkson Rd South is expected to have long queues that extend beyond the provided storage length during the AM and PM peak hour. The southbound queues are not expected to interfere with the intersection operations as this is a private access driveway. The westbound through queues are also expected to exceed the provided storage length by 5 metres. This represents a spillback of vehicular traffic onto the adjacent intersection of Lakeshore Road West & Clarkson Road North

The eastbound through movement and northbound through/left-turn/right-turn movement at the intersection of Lakeshore Road West & Clarkson Road North is

expected to have queues that extend beyond the available storage length during AM and PM peak hours. The northbound queues are not expected to interfere with the intersection operations, as this is a private access driveway. The eastbound through queues are expected to exceed the storage length by 5 metres in the AM peak and by 32 metres in the PM peak hour. This represents a spillback of vehicular traffic onto the adjacent intersection of Lakeshore Road West & Clarkson Road South. The queues could potentially block right-turning vehicles originating from Clarkson Road South, as well as any exiting vehicles heading eastbound from the gas station located on the north side of Lakeshore Road West, between Clarkson Road North and Clarkson Road South. In addition, the eastbound left-turn queues are also expected to exceed the available storage length by 1 metre. Following a review of the SimTraffic simulations, it was observed that the queue of the eastbound vehicles turning left at the intersection was starving the eastbound through movements. Therefore, eastbound left-turn queues may be longer than reported.

3.2.1.2 2041

This section summarizes the results for the expected traffic operations during the horizon year of 2041, but with no improvements to the existing characteristics of the study area. Do-Nothing – 2031 scenario traffic operations are summarized in **Table 14**. Detailed Synchro/SimTraffic reports can be found in **Appendix D**.

Table 14: Do Nothing - 2041 Intersection Operations

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	Lakeshore Road W & Plaza Entrance (Signalized)					
EB	EBL	25	2.6 (9.5)	0.11 (0.37)	A (A)	16 (35)
	EBT/R	190	3.1 (8.2)	0.38 (0.60)	A (A)	81 (75)
WB	WBL	25	1.4 (4.3)	0.03 (0.13)	A (A)	9 (12)
	WBT/R	220	1.8 (4.4)	0.37 (0.49)	A (A)	27 (64)
NB	NBL/T/R	15	59.7 (51.9)	0.01 (0.14)	E (D)	11 (18)
SB	SBL/T	15	61.0 (65.8)	0.15 (0.69)	E (E)	13 (38)
	SBR	15	59.9 (53.1)	0.04 (0.26)	E (D)	19 (28)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
Overall		**-**	**4.8 (11.5)**	**0.36 (0.61)**	**A (B)**	**-**
	Lakeshore Road W & Clarkson Rd S (Signalized)					
EB	EBT/R	220	8.3 (5.9)	0.43 (0.62)	A (A)	79 (87)
WB	WBL	25	2.0 (5.6)	0.13 (0.31)	A (A)	19 (21)
	WBT	55	2.6 (2.4)	0.40 (0.47)	A (A)	53 (35)
NB	NBL/T/R	110	75.9 (65.0)	0.82 (0.57)	E (E)	40 (36)
SB	SBL/T/R	15	50.4 (57.1)	0.15 (0.09)	D (E)	25 (17)
Overall		**-**	**13.0 (6.9)**	**0.50 (0.61)**	**B (A)**	**-**
	Lakeshore Road W & Clarkson Rd N (Signalized)					
EB	EBL	20	27.8 (270.8)	0.63 (1.42)	C (F)	22 (18)
	EBT/R	55	3.6 (2.7)	0.38 (0.51)	A (A)	77 (91)
WB	WBL	20	5.9 (3.7)	0.02 (0.05)	A (A)	10 (9)
	WBT/R	230	10.7 (8.0)	0.51 (0.60)	B (A)	82 (97)
NB	NBL/T/R	15	50.8 (51.8)	0.11 (0.30)	D (D)	19 (25)
SB	SBL/T	145	69.2 (74.9)	0.74 (0.81)	E (E)	57 (78)
	SBR	48	51.5 (54.3)	0.17 (0.50)	D (D)	33 (63)
Overall		**-**	**17.2 (42.0)**	**0.66 (1.33)**	**B (D)**	**-**
	Lakeshore Road W & Meadow Wood Road (Signalized)					
EB	EBT/R	230	2.7 (5.3)	0.38 (0.60)	A (A)	38 (52)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
WB	WBL	20	4.4 (8.4)	0.16 (0.20)	A (A)	21 (14)
	WBT	400	4.7 (8.70	0.37 (0.52)	A (A)	63 (80)
NB	NBL/R	195	68.1 (53.0)	0.67 (0.29)	E (D)	43 (62)
Overall		**-**	**7.9 (8.4)**	**0.42 (0.54)**	**A (A)**	**-**
	Clarkson Road S & Pattinson Crescent (Unsignalized)					
EB	EBL/R	180	9.6 (9,5)	0.02 (0.02)	A (A)	10 (10)
NB	NBL/T	25	0.1 (0.6)	0.0 (0.0)	A (-)	15 (6)
SB	SBT/R	110	0.0 (0.0)	0.05 (0.07)	- (-)	- (6)
Overall		**-**	**0.7 (0.8)**	**-**	**A (A)**	**-**
	Clarkson Road S & Valentine Gardens (Unsignalized)					
WB	WBL/R	190	10.0 (9.4)	0.03 (0.01)	B (A)	13 (8)
NB	NBT/R	40	0.0 (0.0)	0.13 (0.05)	- (-)	14 (3)
SB	SBL/T	25	0.3 (0.9)	0.0 (0.02)	A (A)	- (5)
Overall		**-**	**0.7 (0.9)**	**-**	**A (A)**	**-**
	Clarkson Road S & Matena Avenue (Unsignalized)					
EB	EBL/R	198	9.6 (9.3)	0.02 (0.01)	A (A)	12 (5)
NB	NBL/T	90	0.1 (0.6)	0.0 (0.0)	A (-)	31 (-)
SB	SBT/R	40	0.0 (0.0)	0.05 (0.04)	- (-)	- (-)
Overall		**-**	**0.6 (0.7)**	**-**	**A (A)**	**-**
	Clarkson Road N & Pengilley Place (Unsignalized)					
WB	WBL/R	220	14.6 (18.6)	0.05 (0.04)	B (C)	13 (10)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
NB	NBT/R	145	0.0 (0.0)	0.29 (0.39)	- (-)	- (-)
SB	SBL/T	55	0.1 (0.4)	0.0 (0.01)	A (A)	- (24)
Overall		**-**	**0.4 (0.3)**	**-**	**A (A)**	**-**
	Clarkson Road N & Fellen Place (Unsignalized)					
EB	EBL/R	50	14.6 (17.4)	0.1 (0.09)	B (C)	13 (12)
NB	NBL/T	55	0.2 (0.6)	0.01 (0.02)	A (A)	6 (12)
SB	SBT/R	60	0.0 (0.0)	0.24 (0.27)	- (-)	- (12)
Overall		**-**	**0.8 (0.7)**	**-**	**A (B)**	**-**
	Clarkson Road N & 1111 Clarkson Road (Unsignalized)					
WB	WBL/R	100	15.0 (18.6)	0.09 (0.09)	B (C)	15 (14)
NB	NBT/R	60	0.0 (0.0)	0.3 (0.38)	- (-)	6 (-)
SB	SBL/T	65	0.2 (0.6)	0.01 (0.02)	A (A)	- (8)
Overall		**-**	**0.7 (0.7)**	**-**	**A (A)**	**-**

Similar to the Do-Nothing – 2031 scenario, the intersection of Lakeshore Road West & Clarkson Road North is expected to operate above capacity during the PM peak hour with a v/c ratio of 1.33, which can be attributed to the eastbound left-turn movement expected to operate with a v/c ratio of 1.42 and vehicular delays of approximately 271 seconds.

The eastbound left-turn movement, northbound through/left-turn/right-turn movement and southbound shared through/left-turn movement at the intersection of Lakeshore Road West & Plaza Entrance are expected to present long queues that extend beyond the provided storage length during the PM peak hour. The southbound right-turn queues are also expected to exceed the storage length by 4 metres and 13 metres during AM peak and PM peak, respectively. However, the queues on the north and south approaches are not expected to interfere with the intersection operations as these are

private accesses. Similarly, the eastbound left-turn lane should not affect intersection operations as this is a two-way left-turn lane, which can potentially accommodate the queue length increase.

Similar to the Do-Nothing – 2031 scenario, the southbound left/through/right-turn queues at the intersection of Lakeshore Road West & Clarkson Rd South are expected to exceed the storage length by 10 metres and 2 metres during AM peak and PM peak hours, respectively. However, these queues are not expected to interfere with the intersection operations as this is a private access driveway.

The southbound shared through/left-turn movement and northbound through/left-turn/right-turn movement at the intersection of Lakeshore Road West & Clarkson Road North are expected to present long queues that extend beyond the provided storage length during the AM and PM peak hour. The eastbound left-turn queues are also expected to exceed the provided storage length by 2 metres during the AM peak hour.; while the southbound right-turn queues would exceed the storage length by 15 metres during the PM peak. Following a review of the SimTraffic simulations, it was observed that the queue of the eastbound vehicles turning left at the intersection was starving the eastbound through movements, as shown in **Figure 8**.Therefore, eastbound left-turn queues may be longer than reported.

However, the queues on the north and south approaches are not expected to interfere with the intersection operations as these are private accesses.

Finally, the AM westbound left-turn queues at the intersection of Lakeshore Road West & Meadow Wood Road are expected to exceed the available storage length by 1 metre. However, this is a two-way left-turn lane, which can potentially accommodate this exceeding queue length.

A screenshot for the SimTraffic simulation is shown in **Figure 7** and **Figure 8** for the AM and PM peak hours, respectively for the intersections of Clarkson Road.

Figure 7: 2041 - Do Nothing AM

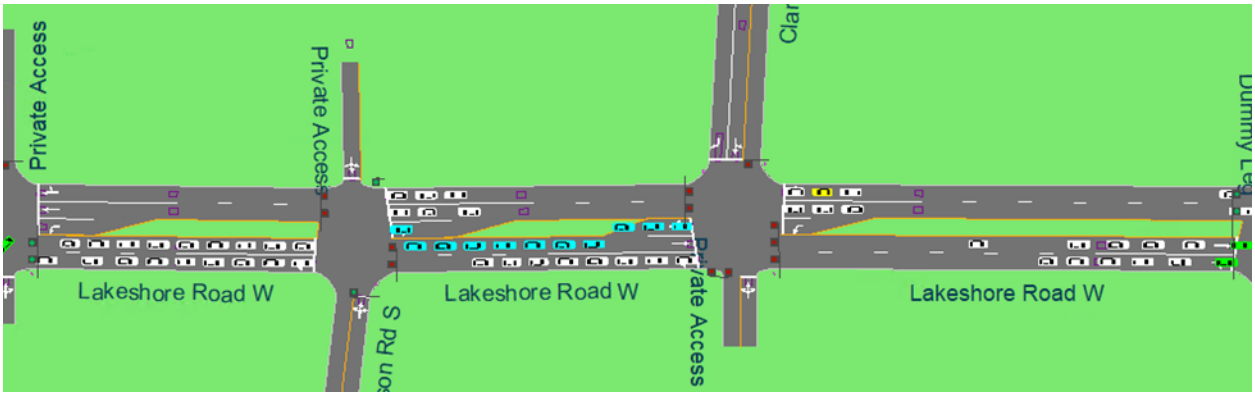


Figure 8: 2041 - Do Nothing PM

3.2.2 Re-alignment of Clarkson Road North and South

A modification of the Clarkson Road intersections involving the realignment of Clarkson Road North through the Esso gas station was proposed. This option removes the current offset of the two Clarkson intersections and turns them into a single four-legged intersection (**Figure 9**). The location of the south leg of Clarkson Road North and the north leg of Clarkson Road South are unchanged from the existing conditions. However, under this alternative, they are changed from signalized legs to full moves unsignalized driveways.

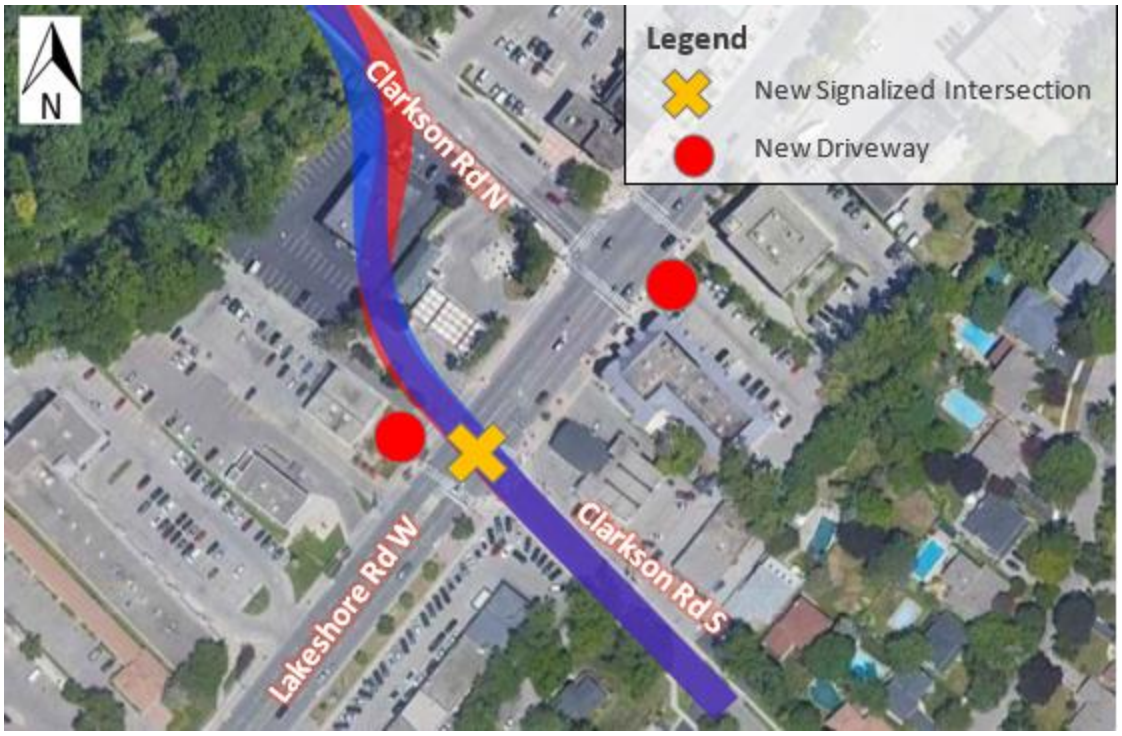


Figure 9: Clarkson Road North Re-Alignment

The volumes from the Do-nothing scenario were re-distributed to ensure that the same number of trips going in and out of the intersections remain unchanged. For example, the volume of EBL vehicles at Clarkson Road North were adjusted knowing that some of the NBR vehicles at Clarkson Road South would make this turn. Total volumes can be found in **Appendix B**.

It is important to note that cycle lengths were not changed and only splits were optimized. Lane configurations along Lakeshore Road West and Clarkson Road North/South were kept as existing conditions but with the re-alignment present. The eastbound left at the new intersection of Clarkson Road has a permissive-protected phasing, which the movement currently has under existing conditions at the intersection of Clarkson Road North. Pedestrian crosswalks are present on all legs of the new intersection.

3.2.2.1 2031

This section summarizes the results for the expected traffic operations during the horizon year of 2031, with re-alignment changes to the Clarkson intersections. Traffic operations for the Clarkson Re-alignment– 2031 scenario are summarized in **Table 15**. Results are only provided for the new intersection of Lakeshore Road West & Clarkson Road as queues and volumes have changed from the Do-Nothing scenario. All other

intersections within the study area are expected to operate similar to Do-Nothing Future Conditions. Detailed Synchro/SimTraffic reports can be found in **Appendix D**.

Table 15: Clarkson Re-Alignment - 2031 Intersection Operations

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	Lakeshore Road W & Clarkson Rd (Signalized)					
EB	EBL	50	5.3 (28.4)	0.51 (0.75)	A (C)	20 (19)
	EBT/R	220	3.7 (4.1)	0.30 (0.51)	A (A)	45 (39)
WB	WBL	25	7.2 (13.4)	0.09 (0.20)	A (B)	14 (29)
	WBT/R	230	11.2 (17.5)	0.48 (0.63)	B (B)	60 (49)
NB	NBL/T/R	110	93.9 (57.2)	**0.90** (0.52)	F (E)	49 (43)
SB	SBL/T	145	92.3 (81.9)	**0.87** (0.82)	F (F)	54 (57)
	SBR	48	48.6 (51.2)	0.13 (0.12)	D (D)	31 (31)
Overall		**-**	**22.0 (19.1)**	**0.60 (0.78)**	**C (B)**	**-**

During this scenario, the northbound and southbound through/left-turn movements at the new intersection of Lakeshore Road West & Clarkson Rd North/Clarkson Road South are expected to operate close to capacity with v/c ratios of 0.90 and 0.87 during the AM peak, respectively. However, queues are not expected to exceed the available storage length for any movement at this intersection. Following a review of the SimTraffic simulations, it was observed that the queue of the southbound vehicles turning left at the intersection was starving the southbound through and right-turn movements. Therefore, the high v/c ratios can be attributed to the delays experienced by the southbound through and right-turning vehicles.

In comparison to the Do-Nothing – 2031 scenario, this new intersection carries a higher volume of vehicles given the combination of the two Clarkson intersections. However, by implementing the re-alignment, the expected queues for the eastbound through and left turn movements do not exceed the provided storage length, which is the case for the Do-Nothing scenario.

3.2.2.2 2041

This section summarizes the results for the expected traffic operations during the horizon year of 2041, with re-alignment changes to the Clarkson intersections. Traffic operations for the Clarkson Re-alignment– 2041 scenario are summarized in **Table 16**. Results are only provided for the new intersection of Lakeshore Road West & Clarkson Road as queues and volumes have changed from the Do-Nothing scenario. All other intersections within the study area are expected to operate similar to Do-Nothing Future Conditions. Detailed Synchro/SimTraffic reports can be found in **Appendix D**.

Table 16: Clarkson Re-Alignment - 2041 Intersection Operations

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	Lakeshore Road W & Clarkson Rd (Signalized)					
EB	EBL	50	9.0 (54.3)	0.57 (**0.88**)	A (D)	21 (25)
	EBT/R	220	5.5 (5.1)	0.36 (0.53)	A (A)	47 (38)
WB	WBL	25	9.8 (17.2)	0.09 (0.23)	A (B)	14 (20)
	WBT/R	230	14.8 (26.2)	0.53 (0.79)	B (C)	41 (44)
NB	NBL/T/R	110	81.7 (52.1)	**0.87** (0.43)	F (D)	60 (54)
SB	SBL/T	145	89.1 (88.4)	**0.88** (**0.89**)	F (F)	56 (73)
	SBR	48	46.0 (48.3)	0.16 (0.16)	D (D)	42 (47)
Overall		-	**23.9 (26.8)**	**0.65 (0.90)**	**C (C)**	-

As expected, during the 2041 horizon year the intersection continue to present high v/c ratios in the northbound and southbound through/left-turn movements at the new intersection of Lakeshore Road West & Clarkson Rd North/Clarkson Road South during the AM peak. In addition, during the PM peak hour the southbound through/left-turn movement is expected to also present a high v/c ratio (0.89), along with the eastbound left-turning movement (0.88). However, queues are not expected to exceed the available storage length. It is important to note that the high v/c ratios expected in the shared southbound through/left-turn movement can be attributed to the delay experienced by the through movements, given there are high volumes turning left.

In comparison to the Do-Nothing – 2041 scenario, this new intersection carries a higher volume of vehicles given the combination of the two Clarkson intersections. However, by implementing the re-alignment, the expected queues for the eastbound through, left turn and northbound movements do not exceed the provided storage length as shown in **Figure 10**, which is the case for the Do-Nothing scenario.

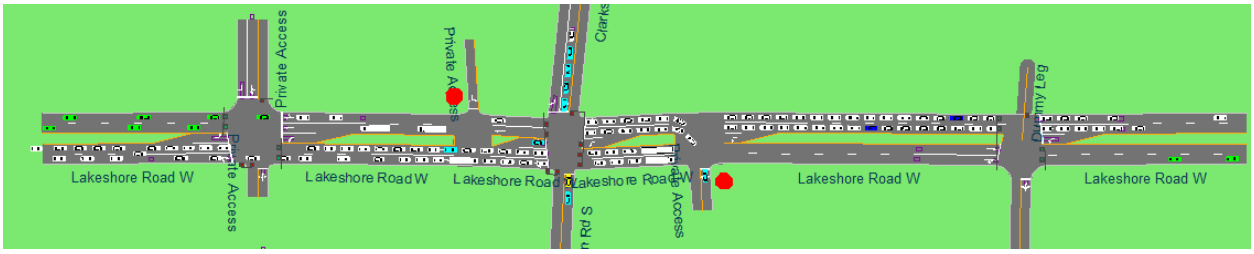


Figure 10: 2041 - Re-Alignment AM

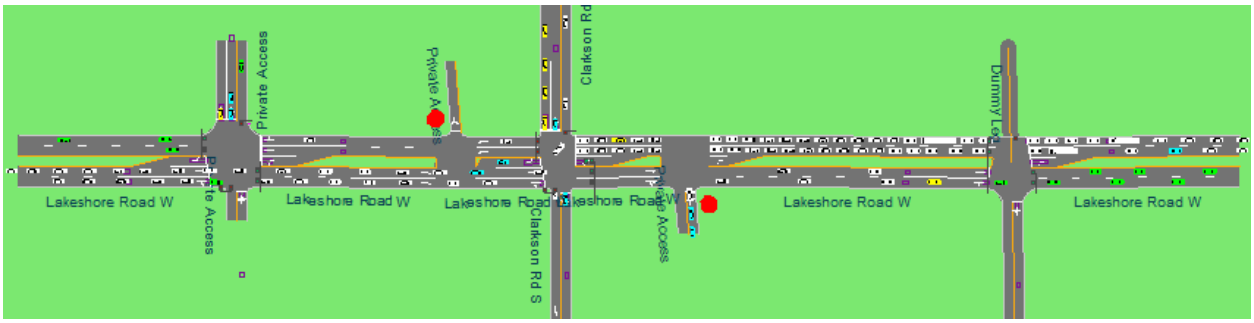


Figure 11: 2041 - Re-Alignment PM

3.2.3 Left Prohibition at Clarkson Road North

The third alternative proposed is the prohibition of the EBL movement at the intersection of Lakeshore Road West & Clarkson Road North. Through this alternative, vehicles originated from the west with destinations along Clarkson Road North would have to use other routes such as Southdown Road (west of the study area) or Lorne Park Road (east of the study area). For this analysis, it was assumed that all vehicles travelling eastbound would access Clarkson Road North via Lorne Park Road.[19] The removal of the eastbound left-turn allows the extension of the westbound left-turn storage length at the intersection of Lakeshore Road West & Clarkson Road South to be the entire intersection length (**Figure 11**).

It is important to note that cycle lengths were not changed and only splits were optimized. Pedestrian crosswalks remain unchanged from existing conditions.

[19] City's suggestion regarding amore realistic route to access Clarkson Road North via Hartland Drive/Balsam Avenue, however this will require to relocate traffic to local roads

Figure 12: Left-Turn Prohibition at Clarkson Road North

3.2.3.1 2031

This section summarizes the results for the expected traffic operations during the horizon year of 2031, with left-turn prohibition at Clarkson Road North. Traffic operations for this scenario are summarized in **Table 17**. Results are only provided for the intersections of Lakeshore Road West & Clarkson Road North and Lakeshore Road West & Clarkson Road South, as queues and volumes have changed from the Do-Nothing scenario. Detailed Synchro/SimTraffic reports can be found in **Appendix D**.

Table 17: Left-Turn Prohibition at Clarkson Road North – 2031 Intersection Operations

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	Lakeshore Road W & Clarkson Rd S (Signalized)					
EB	EBT/R	220	6.5 (5.9)	0.37 (0.60)	A (A)	63 (72)
WB	WBL	55	3.6 (5.6)	0.13 (0.28)	A (A)	26 (23)
	WBT	55	5.6 (2.3)	0.39 (0.41)	A (A)	66 (27)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
NB	NBL/T/R	110	71.6 (63.8)	0.75 (0.54)	E (E)	42 (29)
SB	SBL/T/R	15	53.0 (57.6)	0.17 (0.09)	D (E)	20 (19)
Overall		**-**	**12.5 (7.0)**	**0.44 (0.59)**	**B (A)**	**-**
	Lakeshore Road W & Clarkson Rd N (Signalized)					
EB	EBT/R	55	3.5 (2.7)	0.42 (0.62)	A (A)	40 (33)
WB	WBL	20	2.9 (2.4)	0.03 (0.07)	A (A)	13 (12)
	WBT/R	230	3.9 (2.8)	0.43 (0.47)	A (A)	45 (35)
NB	NBL/T/R	15	53.1 (54.9)	0.13 (0.32)	D (D)	21 (24)
SB	SBL/T	145	70.2 (71.4)	0.72 (0.73)	E (E)	51 (52)
	SBR	48	54.7 (55.7)	0.28 (0.38)	D (E)	33 (32)
Overall		**-**	**11.9 (9.8)**	**0.47 (0.64)**	**B (A)**	**-**

Results for this scenario at the intersection of Lakeshore Road West & Clarkson Road South are very similar to the ones obtained for the Do-Nothing – 2031 scenario, with the exception of shorter queues for the westbound left-turn movement due to the increase in storage length and the westbound through movement during the AM peak hour.

Operations at the intersection of Lakeshore Road West & Clarkson Road North are expected to improve in comparison to the Do-Nothing – 2031 scenario, due to the eastbound left-turn prohibition. This prohibition also alleviates the eastbound through queues, which are not expected to exceed the available storage length.

3.2.3.2 2041

This section summarizes the results for the expected traffic operations during the horizon year of 2041, with left-turn prohibition at Clarkson Road North. Traffic operations for this scenario are summarized in **Table 18**.

Results are only provided for the intersections of Lakeshore Road West & Clarkson Road North and Lakeshore Road West & Clarkson Road South, as queues and volumes have changed from the Do-Nothing scenario. Detailed Synchro/SimTraffic reports can be found in **Appendix D**.

Table 18: Left-Turn Prohibition at Clarkson Road North – 2041 Intersection Operations

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	Lakeshore Road W & Clarkson Rd S (Signalized)					
EB	EBT/R	220	8.3 (5.9)	0.43 (0.62)	A (A)	78 (77)
WB	WBL	55	4.8 (6.6)	0.13 (0.31)	A (A)	19 (16)
	WBT	55	7.0 (3.3)	0.40 (0.47)	A (A)	35 (66)
NB	NBL/T/R	110	75.9 (65.0)	0.82 (0.57)	E (E)	40 (41)
SB	SBL/T/R	15	50.4 (57.1)	0.15 (0.09)	D (E)	16 (23)
Overall		**-**	**14.9 (7.3)**	**0.50 (0.61)**	**B (A)**	**-**
	Lakeshore Road W & Clarkson Rd N (Signalized)					
EB	EBT/R	55	3.9 (3.4)	0.48 (0.66)	A (A)	38 (54)
WB	WBL	20	3.3 (3.0)	0.04 (0.08)	A (A)	9 (10)
	WBT/R	230	4.4 (3.3)	0.44 (0.54)	A (A)	34 (46)
NB	NBL/T/R	15	50.8 (51.8)	0.11 (0.30)	D (D)	23 (16)
SB	SBL/T	145	69.2 (74.9)	0.74 (0.81)	E (E)	52 (53)
	SBR	48	55.5 (60.8)	0.50 (0.67)	E (E)	44 (41)
Overall		**-**	**13.1 (12.0)**	**0.52 (0.69**	**B (B)**	**-**

Results for this scenario at the intersection of Lakeshore Road West & Clarkson Road South are very similar to the ones obtained for the Do-Nothing – 2041 scenario, with the

exception of shorter queues for the westbound left-turn movement due to the increase in storage length, as shown in **Figure 13** and **Figure 14**.

Operations at the intersection of Lakeshore Road West & Clarkson Road North are expected to improve in comparison to the Do-Nothing – 2041 scenario, due to the eastbound left-turn prohibition. This prohibition also alleviates the eastbound through queues, which are not expected to exceed the available storage length.

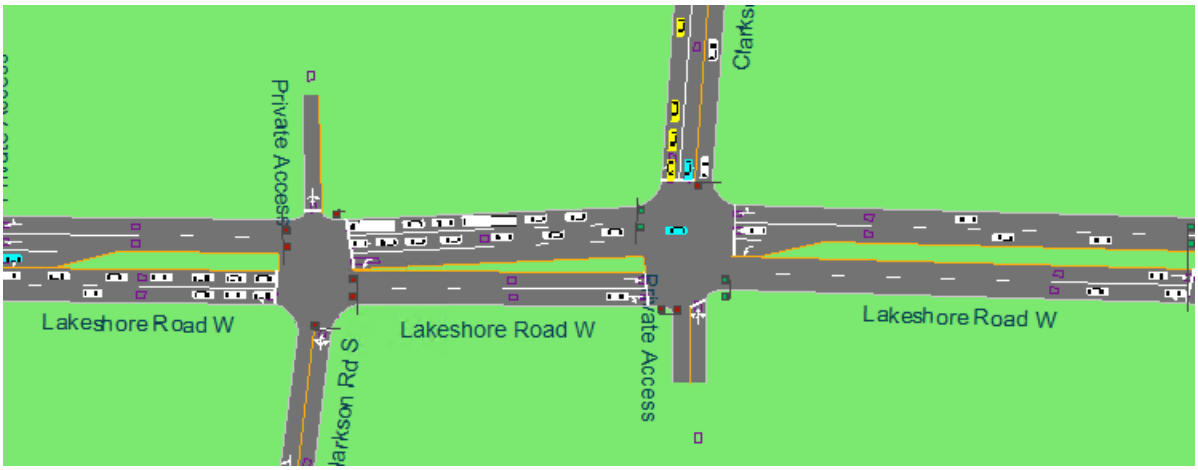


Figure 13: 2041 - Left Prohibition at Clarkson Road North AM

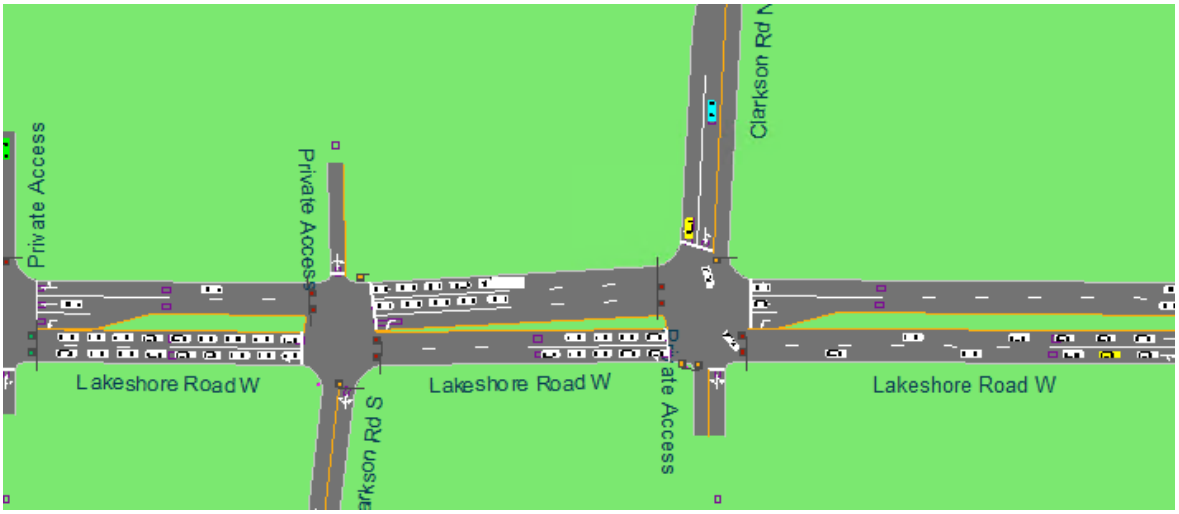


Figure 14: 2041 - Left Prohibition at Clarkson Road North PM

3.2.4 Widening of Lakeshore Road West

This alternative evaluates the widening of Lakeshore Road West between the intersection of Clarkson Road South and Clarkson Road North. By doing so, adjacent left-turn lanes can be implemented for the eastbound left-turn at Clarkson Road North and the westbound left-turn at Clarkson Road North. This represents a increase in

storage lengths from 20 metres to approximately 55 metres, which is the distance between both Clarkson intersections (**Figure 15**).

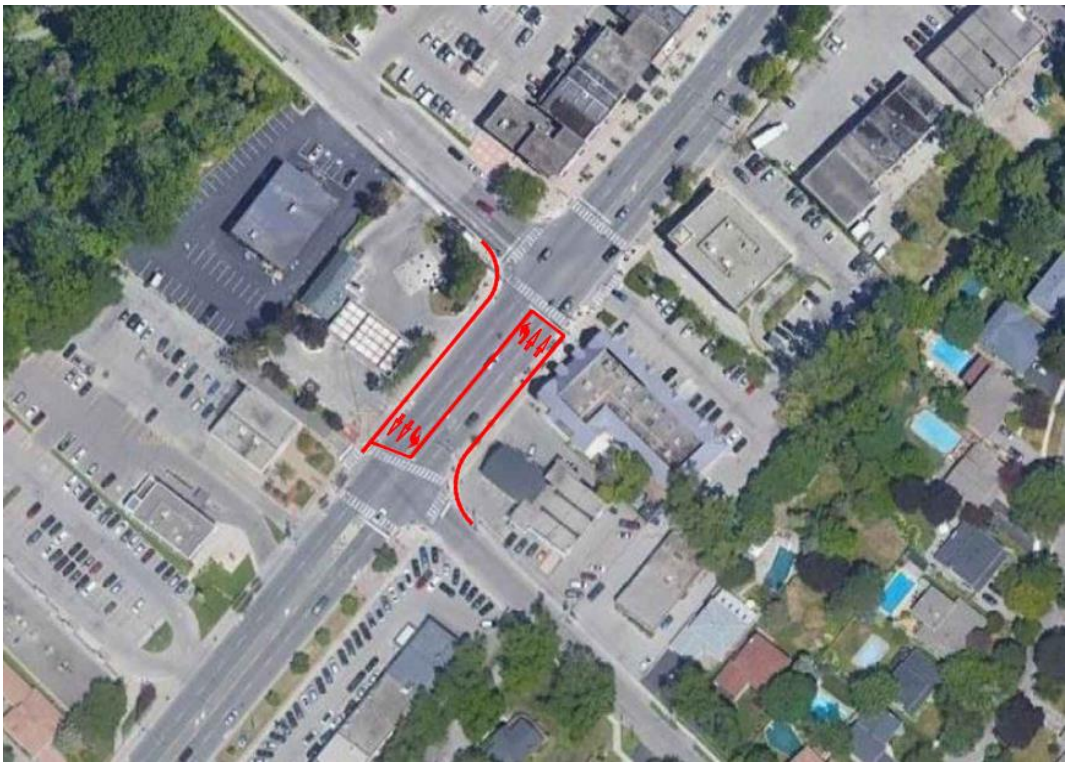


Figure 15: Lakeshore Road West Widening - Adjacent Left-turn Lanes

3.2.4.1 2031

This section summarizes the results for the expected traffic operations during the horizon year of 2031, with the widening of Lakeshore Road West between Clarkson Road North and Clarkson Road South. Traffic operations for this scenario are summarized in **Table 19**. Results are only provided for the intersections of Lakeshore Road West & Clarkson Road North and Lakeshore Road West & Clarkson Road South, as queues and volumes have changed from the Do-Nothing scenario. Detailed Synchro/SimTraffic reports can be found in **Appendix D**.

Table 19: Lakeshore Widening – 2031 Intersection Operations

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	Lakeshore Road W & Clarkson Rd S (Signalized)					
EB	EBT/R	220	6.5 (5.9)	0.37 (0.60)	A (A)	73 (92)
WB	WBL	55	1.5 (4.6)	0.13 (0.28)	A (A)	20 (53)
	WBT	55	2.1 (1.6)	0.39 (0.41)	A (A)	52 (48)
NB	NBL/T/R	110	71.6 (63.8)	0.75 (0.54)	E (E)	42 (37)
SB	SBL/T/R	15	53.0 (57.6)	0.17 (0.09)	D (E)	22 (23)
Overall		-	**10.9 (6.8)**	**0.44 (0.59)**	**B (A)**	-
	Lakeshore Road W & Clarkson Rd N (Signalized)					
EB	EBL	55	19.7 (133.6)	0.57 (1.07)	B (F)	56 (73)
	EBT/R	55	3.2 (2.3)	0.34 (0.49)	A (A)	54 (105)
WB	WBL	20	5.1 (3.3)	0.03 (0.04)	A (A)	7 (10)
	WBT/R	230	9.0 (6.2)	0.49 (0.53)	A (A)	89 (83)
NB	NBL/T/R	15	53.1 (54.9)	0.13 (0.32)	D (D)	18 (23)
SB	SBL/T	145	70.2 (71.4)	0.72 (0.73)	E (E)	49 (58)
	SBR	48	53.2 (53.6)	0.14 (0.19)	D (D)	35 (35)
Overall		-	**15.3 (24.6)**	**0.61 (1.04)**	**B (C)**	-

Results for this scenario at the intersection of Lakeshore Road West & Clarkson Road South are very similar to the ones obtained for the Do-Nothing – 2031 scenario, with the

exception of shorter queues for the westbound left-turn movement due to the increase in storage length and the westbound through movement during the AM peak hour.

In the same way, traffic operations at the intersection of Lakeshore Road West & Clarkson Road North are expected to be similar to the results obtained for the Do-Nothing – 2031 scenario, with longer queues at the eastbound left-turn movement, but shorter queues at the eastbound through movement. This can be attributed to the SimTraffic simulation observations described in **Section 3.2.1.1** where the eastbound left-turn queues were starving the eastbound through movements. Therefore, the eastbound left-turn queues expected for the Do-Nothing scenario may be longer than reported, meaning the longer queues reported for this new proposed alternative are a more accurate representation of the expected queues now that the storage length has been extended and the lane starvation has been reduced.

3.2.4.2 2041

This section summarizes the results for the expected traffic operations during the horizon year of 2041, with the widening of Lakeshore Road West between Clarkson Road North and Clarkson Road South. Traffic operations for this scenario are summarized in **Table 20.** Results are only provided for the intersections of Lakeshore Road West & Clarkson Road North and Lakeshore Road West & Clarkson Road South, as queues and volumes have changed from the Do-Nothing scenario. Detailed Synchro/SimTraffic reports can be found in **Appendix D**.

Table 20: Lakeshore Widening – 2041 Intersection Operations

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
	Lakeshore Road W & Clarkson Rd S (Signalized)					
EB	EBT/R	220	8.3 (5.9)	0.43 (0.62)	A (A)	82 (84)
WB	WBL	55	2.0 (5.6)	0.13 (0.31)	A (A)	20 (23)
	WBT	55	2.6 (2.4)	0.40 (0.47)	A (A)	46 (32)
NB	NBL/T/R	110	75.9 (65.0)	0.82 (0.57)	E (E)	41 (37)
SB	SBL/T/R	15	50.4 (57.1)	0.15 (0.09)	D (E)	24 (18)

Direction / Movement		Storage (m)	Delay	v/c ratio	LOS	95th Percentile Queue (m)
Overall		**-**	**13.0 (6.9)**	**0.50 (0.61)**	**B (A)**	**-**
	Lakeshore Road W & Clarkson Rd N (Signalized)					
EB	EBL	55	27.8 (270.8)	0.63 (1.42)	C (F)	48 (69)
	EBT/R	55	3.6 (2.7)	0.38 (0.51)	A (A)	36 (37)
WB	WBL	20	5.9 (3.7)	0.03 (0.05)	A (A)	10 (11)
	WBT/R	230	10.7 (8.0)	0.51 (0.60)	B (A)	83 (96)
NB	NBL/T/R	15	50.8 (51.8)	0.11 (0.30)	D (D)	19 (25)
SB	SBL/T	145	69.2 (74.9)	0.74 (0.81)	E (E)	54 (66)
	SBR	48	51.5 (54.3)	0.17 (0.50)	D (D)	43 (51)
Overall		**-**	**17.2 (42.0)**	**0.66 (1.33)**	**B (D)**	**-**

Results for this scenario at the intersection of Lakeshore Road West & Clarkson Road South are very similar to the ones obtained for the Do-Nothing – 2041 scenario, with the exception of shorter queues for the westbound left-turn movement due to the increase in storage length and the westbound through movement as seen in both **Figure 16** and **Figure 17**.

In the same way, traffic operations at the intersection of Lakeshore Road West & Clarkson Road North are expected to be similar to the results obtained for the Do-Nothing – 2041 scenario, with longer queues at the eastbound left-turn movement, but shorter queues at the eastbound through movement, as seen in Figure 17. This can be attributed to the SimTraffic simulation observations described in **Section 3.2.1.2**, where the eastbound left-turn queues were starving the eastbound through movements. Therefore, the eastbound left-turn queues expected for the Do-Nothing scenario may be longer than reported, meaning the longer queues reported for this new proposed alternative are a more accurate representation of the expected queues now that the storage length has been extended and the lane starvation has been reduced.

Figure 16: 2041 - Widening of Lakeshore Road West AM

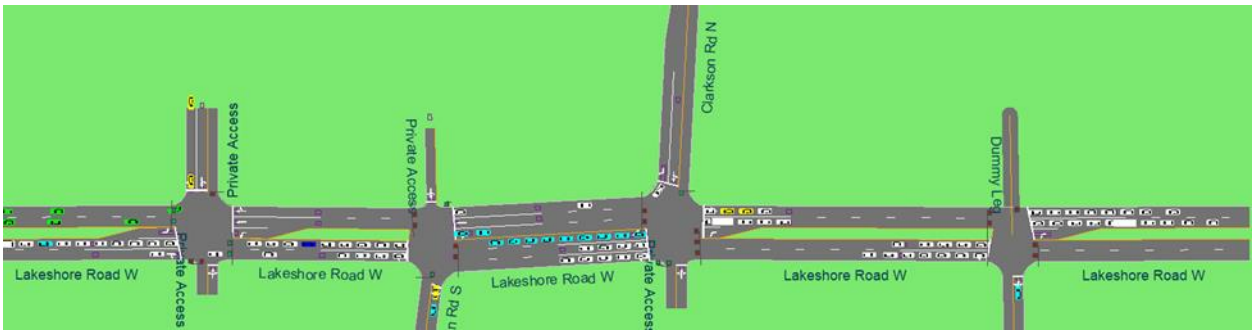


Figure 17: 2041 - Widening of Lakeshore Road West PM

3.2.5 Future Cycling and Pedestrian Operations

CIMA+ reviewed the City of Mississauga's May 2019 Lakeshore Road Transportation Master Plan (Lakeshore Connecting Communities Study) and Implementation Strategy report and the 2018 Mississauga Cycling Master Plan to determine any pedestrian/cycling improvements within the study area that have been proposed prior to this study.

The Lakeshore Road Transportation Master Plan and Implementation Strategy report proposed two preferred right-of-way (ROW) alternatives along Lakeshore Road West within the study area. The first preferred ROW alternative is for the segment between the nearby CN Railway Crossing to the west of the study area and Clarkson Road South (**Figure 18**). The second preferred ROW alternative is for the segment between Clarkson Road South and Meadow Wood Road (**Figure 19**).

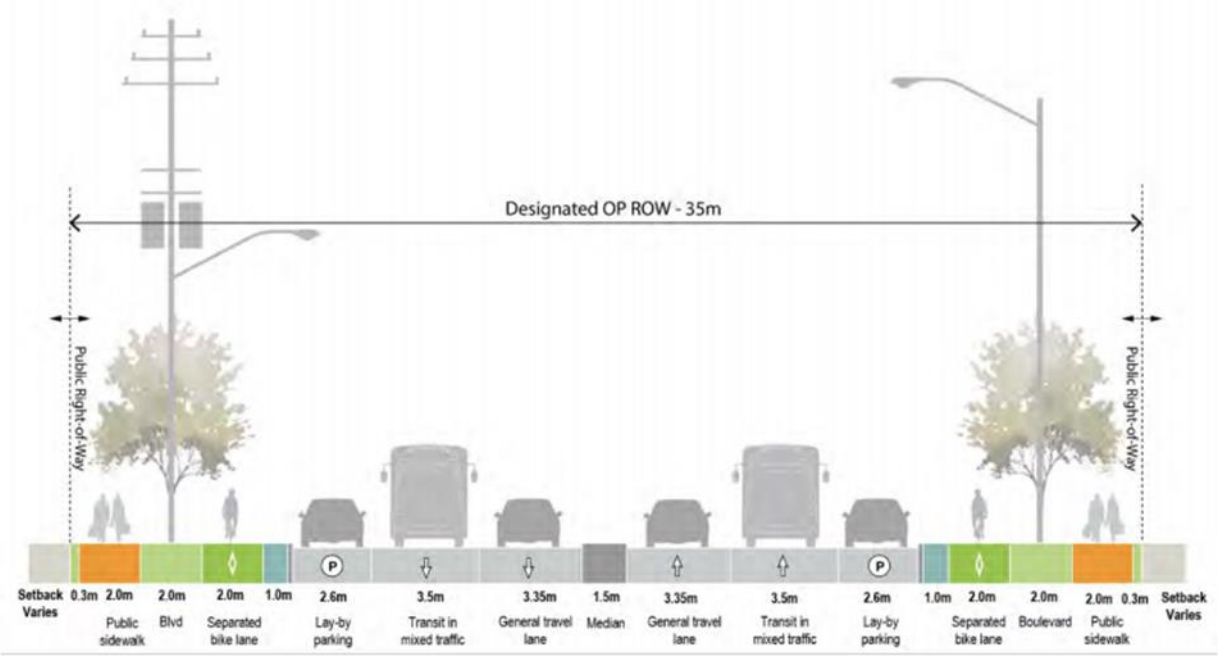


Figure 18: Preferred ROW Alternative (CN Railway Crossing to Clarkson Road South)

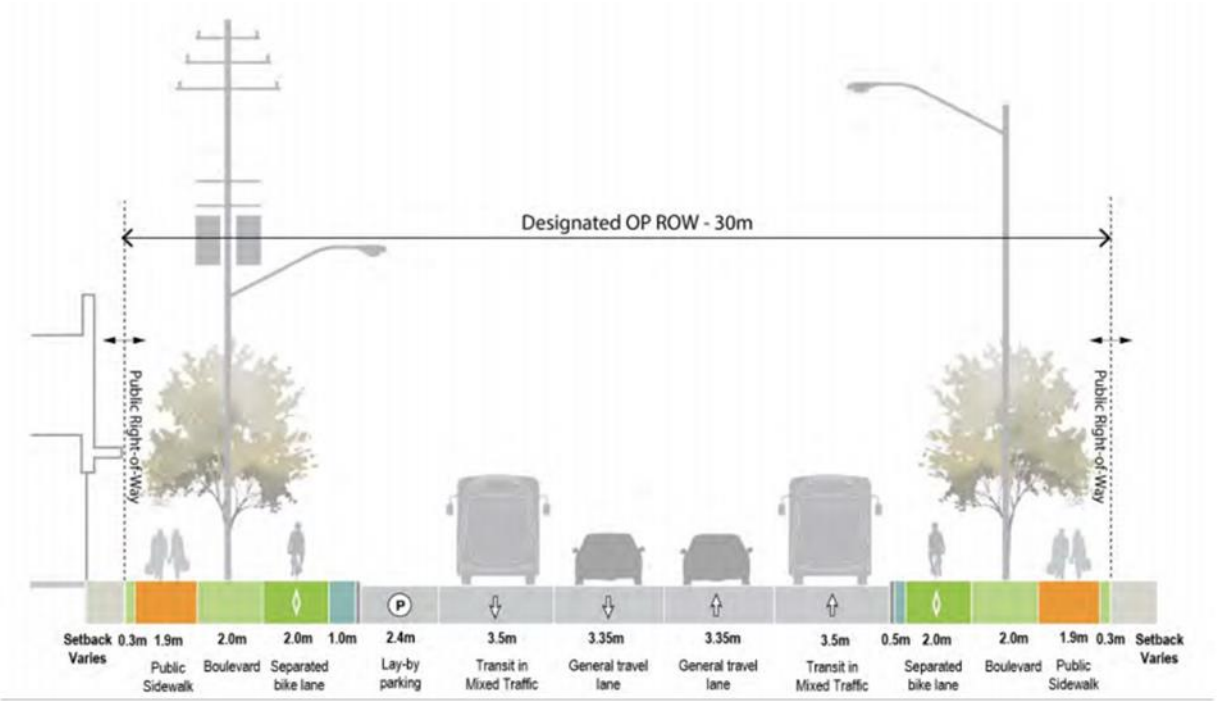


Figure 19: Preferred ROW Alternative (Clarkson Road South to Meadow Wood Road)

The 2018 Mississauga Cycling Master Plan indicates that shared routes (i.e. where bicycles share the roadway with cars) are proposed along Clarkson Road South and Clarkson Road North. Additionally, the Mississauga Cycling Master Plan also states that cycle tracks/separated bike lanes are proposed along Lakeshore Road West within the

study area, which supports the proposed ROW alternatives previously detailed from the Lakeshore Road Transportation Master Plan and Implementation Strategy report. The Cycling Master Plan also states that intersection treatments (i.e. bike boxes, green pavement markings, pavement markings through intersections, etc.) are to be provided on all future bicycle facilities to indicate correct positioning and ROW for cyclists and motorists.

It is important to note that these two documents reviewed by CIMA+ did not indicate any proposed pedestrian-related improvements to the Clarkson Road South and Clarkson Road North corridors. However, as noted below, it is assumed improvements are made to sidewalks at the intersections in conjunction with the roadway improvements.

Changes to the pedestrian and bicycle level of service expected because of the proposed improvements are summarized in **Table 21** and **Table 22**.

Table 21: Projected Pedestrian Level of Service Within the Study Area (if the Lakeshore Connecting Communities TMP Study were to be implemented)

Location	Level of Service
Lakeshore Rd W & Plaza entrance	A
Lakeshore Rd W Between Plaza entrance & Clarkson Rd S	B
Lakeshore Rd W & Clarkson Rd S	B[20]
Lakeshore Rd W Between Clarkson Rd S & Clarkson Rd N	B
Lakeshore Rd W & Clarkson Rd N	B[21]
Lakeshore Rd W Between Clarkson Rd N & Meadow Wood Rd	B
Lakeshore Rd W & Meadow Wood Rd[6]	B
Clarkson Rd S Between Lakeshore Rd W & Pattinson Cres	C
Clarkson Rd S & Pattinson Crescent	D
Clarkson Rd S Between Pattinson Cres & Valentine Gardens	C
Clarkson Rd S & Valentine Gardens	D
Clarkson Rd S Between Valentine Gardens & Matena Ave	C
Clarkson Rd S & Matena Ave	D
Clarkson Rd N Between Lakeshore Rd W & Pengilley Pl	C
Clarkson Rd N & Pengilley Pl	D
Clarkson Rd N Between Pengilley Pl & Fellen Pl	C
Clarkson Rd N & Fellen Pl	D

[20] It is expected that the LOS will improve to B if the proposed improvements are implemented and the entrance to the crosswalk in the northeast quadrant is widened to a minimum of 1.5 metres (as mentioned previously in the Cycling and Pedestrian Network section).

[21] It is expected that the LOS will improve to B if the proposed improvements are implemented and the entrance to the crosswalk in the southeast quadrant is widened to a minimum of 1.5 metres (as mentioned previously in the Cycling and Pedestrian Network section).

Location	Level of Service
Clarkson Rd N Between Fellen Place & 1111 Clarkson Rd	F
Clarkson Rd N & 1111 Clarkson Rd	F

Table 22: Projected Bicycle Level of Service Within the Study Area

Location	Level of Service
Lakeshore Rd W & Plaza entrance	A
Lakeshore Rd W Between Plaza entrance & Clarkson Rd S	A
Lakeshore Rd W & Clarkson Rd S	A
Lakeshore Rd W Between Clarkson Rd S & Clarkson Rd N	A
Lakeshore Rd W & Clarkson Rd N	A
Lakeshore Rd W Between Clarkson Rd N & Meadow Wood Rd	A
Lakeshore Rd W & Meadow Wood Rd	A
Clarkson Rd S Between Lakeshore Rd W & Pattinson Cres	E
Clarkson Rd S & Pattinson Crescent	E
Clarkson Rd S Between Pattinson Cres & Valentine Gardens	E
Clarkson Rd S & Valentine Gardens	E
Clarkson Rd S Between Valentine Gardens & Matena Ave	E
Clarkson Rd S & Matena Ave	E
Clarkson Rd N Between Lakeshore Rd W & Pengilley Pl	E
Clarkson Rd N & Pengilley Pl	E
Clarkson Rd N Between Pengilley Pl & Fellen Pl	E
Clarkson Rd N & Fellen Pl	E
Clarkson Rd N Between Fellen Place & 1111 Clarkson Rd	E
Clarkson Rd N & 1111 Clarkson Rd	E

3.2.6 Future Transit Operations

In the City of Mississauga's May 2019 Lakeshore Road Transportation Master Plan and Implementation Strategy report, it states that the existing local service (Route 23) is expected to be maintained within the study area but peak frequency will be doubled in the future.

As mentioned previously in **Section 3.2.5**, the proposed preferred right-of-way (ROW) alternatives along Lakeshore Road West within the study area, detailed in **Figure 18** and **Figure 19**, include four lanes with buses running in mixed traffic.

Expected changes to the transit level of service as a result of doubling the peak frequency of Route 23 is summarized in **Table 23**.

Table 23: Projected Transit Level of Service Within the Study Area

Transit Stop Location	Direction	Access to Transit Stops	Transit Headways	Intersection Approach (transit or curb lanes)
		LOS	LOS	LOS
Lakeshore Rd W West of Clarkson Rd (Plaza entrance)	Eastbound	A	B	A (A)
	Westbound	A		A (A)
Lakeshore Rd W & Clarkson Rd N	Eastbound	A		A (A)
	Westbound	A		A (A)
Lakeshore Rd W & Meadow Wood Rd	Eastbound	A		A (A)
	Westbound	A		A (A)

Legend: AM (PM)

4 Microsimulation Analysis

4.1 Existing Conditions

4.1.1 Existing Volumes

It should be noted that several notable volume imbalances between intersections were identified, most likely due to unsignalized driveways located in between intersections. Therefore, the AM and PM peak hour TMCs were balanced for microsimulation analysis. Volume was balanced along through movements only to maintain the left-turn and right-turn movements. Existing TMC volume are shown in **Figure 20**. The balanced AM and PM peak hour volumes are shown in **Figure 21**. These are the volumes that were used as the input volume for the microsimulation model.

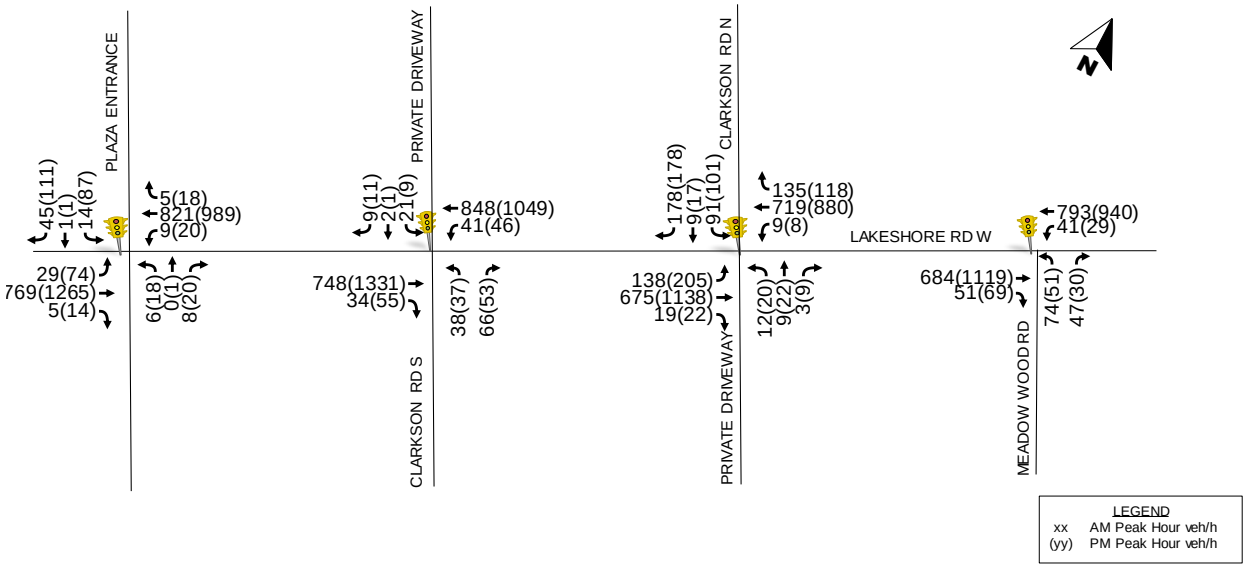


Figure 20: Existing AM and PM Peak Hour Volumes (Provided by the City)

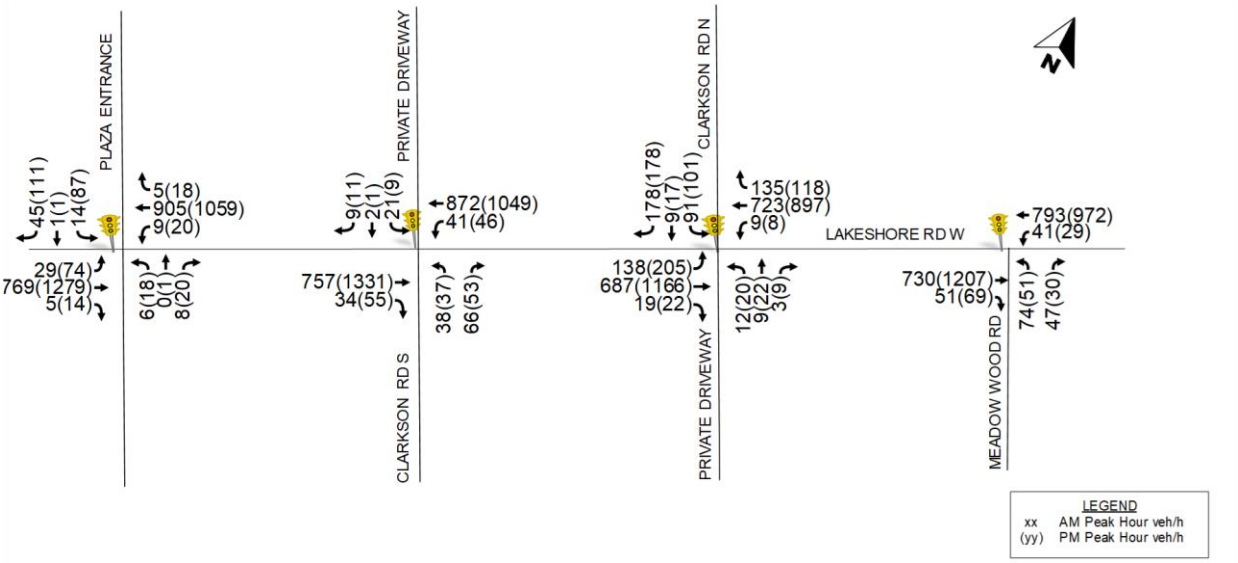


Figure 21: Balanced Existing AM and PM Hour Volumes (Model Input)

4.1.2 Model Development

The model road geometry was developed using Bing aerial maps in the Vissim software. Measurements of lane widths from Google Earth as well as speed limits gathered from Street view were used for the model development. Conflict areas were coded for all movements that overlapped pedestrian crosswalks and unprotected movements (e.g. a conflict rule was coded where a permitted left-turn was opposed by a through movement or pedestrian crosswalk, etc.). The vehicle turn speeds and acceleration/deceleration parameters coded in the model are shown below in **Table 24**. Current signal timing plans (provided by the City) were coded for each study area intersection using Vissim's RBC (Ring-Barrier Controller) signal module.

Table 24: Assumed Vehicle Turn Speeds and Acceleration/Deceleration by Type

Vehicle Type	Right-turn	Left-turn	Deceleration	Max. Acceleration
Car	25 km/h	30 km/h	-3.0 m/s^2	3.0 m/s^2
HGV	12 km/h	25 km/h	-1.25 m/s^2	2.5 m/s^2

4.1.3 Model Calibration & Validation

The models developed for both the AM and PM peak hours, were simulated 10 times with random seed increments of 1 to account for random arrival of vehicle from the average results of multiple simulation runs (using different random seeds) is then used for model calibration/validation.

For calibration purposes, two metrics were used to validate the results of the Vissim model for the existing conditions: 1) traffic volumes and 2) travel times. For traffic volumes, the GEH statistic was calculated to compare simulated volumes versus observed counts. The GEH Statistic is an empirical formula that is used in traffic modelling to compare two sets of traffic volumes by considering both relative and absolute differences. The GEH statistic is described by the equation below:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

Where, M is the hourly traffic volume from the model and C is the hourly traffic count.

Table 25 summarizes the observed volume (based on TMC counts), simulated volume (based on results of 10 Vissim microsimulation runs for each peak hour) and the calculated GEH statistic for each movement as well as for total intersection volume. Comparing observed volumes to simulated volumes, the GEH values calculated at less than 5.0 for all movements, is an indication that the AM and PM peak hour models are reasonably regenerating observed traffic volumes.

Table 25: Volume Calibration for Existing Conditions AM (PM)

Movement	AM(PM)		
	Volume (veh/h)		GEH
	Observed	Simulated	
Lakeshore Rd W/Plaza Entrance Intersection			
EBL	29(74)	27(73)	0.4(0.1)
EBT	769(1279)	769(1278)	0(0)
EBR	5(14)	6(15)	0.4(0.3)
WBL	9(20)	7(19)	0.7(0.2)
WBT	905(1059)	891(1043)	0.5(0.5)
WBR	5(18)	6(18)	0.4(0)
NBL	6(18)	5(18)	0.4(0)
NBT	0(1)	0(0)	0(1.4)
NBR	8(20)	9(19)	0.3(0.2)
SBL	14(87)	13(90)	0.3(0.3)
SBT	1(1)	1(1)	0(0)
SBR	45(111)	46(110)	0.1(0.1)
Total	1796(2702)	1779(2674)	0.4(0.3)
Lakeshore Rd W/Clarkson Rd S Intersection			
EBT	757(1331)	756(1325)	0(0.2)
EBR	34(55)	34(54)	0(0.1)

Movement	AM(PM)		
	Volume (veh/h)		GEH
	Observed	Simulated	
WBL	41(46)	41(46)	0(0)
WBT	872(1049)	863(1036)	0.3(0.4)
NBL	38(37)	36(35)	0.3(0.3)
NBR	66(53)	67(53)	0.1(0)
SBL	21(9)	23(8)	0.4(0.3)
SBT	2(1)	3(2)	2.4(0.8)
SBR	9(11)	9(11)	3(0)
Total	1840(2592)	1830(2570)	0.2(0.4)
Lakeshore Rd W/Clarkson Rd N Intersection			
EBL	138(205)	131(183)	0.6(1.6)
EBT	687(1166)	682(1155)	0.2(0.3)
EBR	19(22)	21(24)	0.4(0.4)
WBL	9(8)	10(9)	0.3(0.3)
WBT	723(897)	717(888)	0.2(0.3)
WBR	135(118)	138(120)	0.3(0.2)
NBL	12(20)	12(21)	0(0.2)
NBT	9(22)	9(23)	0(0.2)
NBR	3(9)	3(10)	0(0.3)
SBL	91(101)	94(100)	0.3(0.1)
SBT	9(17)	8(17)	0.3(0)
SBR	178(178)	177(176)	0.1(0.2)
Total	2013(2763)	2002(2725)	0.2(0.7)
Lakeshore Rd W/Meadow Wood Rd Intersection			
EBT	730(1207)	719(1198)	0.4(0.3)
EBR	51(69)	59(72)	1.1(0.4)
WBL	41(29)	40(27)	0.2(0.4)
WBT	793(972)	790(971)	0.1(0)
NBL	74(51)	76(53)	0.2(0.3)
NBR	47(30)	46(29)	0.1(0.2)
Total	1736(2358)	1730(2349)	0.1(0.2)

Table 26 shows the travel time validation completed for the existing conditions model. Observed data was collected by extracting historical Google Map travel time data, using the Google API tool for the AM and PM peak hours. The travel time routes used for travel time validation are described in the figure below.

Figure 22: Travel Time Route Diagram

From the table, the model is considered validated as the majority modelled travel times are within 15% of the observed data.

Table 26: Travel Time Validation

Travel Time Direction		AM Peak			PM Peak		
		Observed Data (s)	Model Output (s)	Change (%)	Observed Data (s)	Model Output (s)	Change (%)
EB	Lakeshore	70	68	3%	83	71	14%
WB	Lakeshore	74	68	8%	89	71	20%
NB	Clarkson	68	70	-4%	80	79	2%
SB	Clarkson	65	55	16%	73	84	-15%

4.1.4 Existing Conditions Operations

Table 27 below highlights the traffic operations for the study area intersections in existing conditions. Volume, Delay (s), LOS and 95th percentile queues (m) are reported for each movement. For 95th percentile queue, the maximum queue from each of the 10 runs was manually calculated to get the 95th percentile maximum queue. The existing operations are similar to that generated by the Synchro / SimTraffic model previously reported in the Traffic Operations Memo dated August 6, 2020. The following movements are observed approaching or exceeding available capacity:

Lakeshore Rd W & Plaza Entrance

- The northbound left-turn movement is operating with a LOS of E during the AM and PM peak hours.
- The southbound left-turn movement is operating with a LOS of E during the PM peak hour.

Lakeshore Rd W & Clarkson Rd S

- The northbound left-turn movement is operating with a LOS of E during the AM and PM peak hours.
- The southbound left-turn movement is operating with a LOS of E during the AM and PM peak hours.
- The southbound through movement is operating with a LOS of E during the PM peak hour.

Lakeshore Rd W & Clarkson Rd N

- The eastbound left-/through and right-turn movements have a 95th percentile queue that is exceeding available storage in the PM Peak hour.
- The northbound left-turn movement is operating with a LOS of E during the PM peak hour.
- The northbound through movement is operating with a LOS of E during the AM and PM peak hours.
- The southbound left-turn and the southbound through movements are operating with a LOS of E in the AM peak hour and a LOS of F in the PM peak hour.
- The southbound right-turn movement has a 95th percentile queue that is exceeding available storage in the PM peak hour.

Lakeshore Rd W & Meadow Wood Rd

- The northbound left-turn movement is operating with a LOS of E during the AM and PM peak hours

Table 27: Simulated Intersection Performance Summary for Existing Conditions AM (PM)

Movement	Volume (veh/h)	Ave Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Lakeshore Rd W/Plaza Entrance Intersection (signalized)					
EBL	27(73)	12(1)	7(18)	8(15)	A(B)
EBT	769(1278)	3(9)	45(96)	3(7)	A(A)

Movement	Volume (veh/h)	Ave Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
EBR	6(15)	9(9)	46(97)	2(8)	A(A)
WBL	7(19)	5(0)	0(7)	6(17)	A(B)
WBT	891(1043)	3(5)	38(56)	3(5)	A(A)
WBR	6(18)	25(5)	39(57)	2(5)	A(A)
NBL	5(18)	0(2)	10(19)	60(55)	**E(E)**
NBT	0(0)	0(2)	11(20)	0(5)	A(A)
NBR	9(19)	0(2)	11(20)	10(17)	A(B)
SBL	13(90)	40(9)	13(44)	55(61)	D**(E)**
SBT	1(1)	0(9)	13(44)	43(39)	D(D)
SBR	46(110)	8(9)	13(45)	7(8)	A(A)
Total	1779(2674)	-	-	4(9)	A(A)
Lakeshore Rd W/Clarkson Rd S Intersection (signalized)					
EBT	756(1325)	3(4)	39(74)	3(4)	A(A)
EBR	34(54)	6(4)	40(75)	3(3)	A(A)
WBL	41(46)	7(1)	11(17)	9(22)	A(C)
WBT	863(1036)	2(2)	32(33)	2(2)	A(A)
NBL	36(35)	55(6)	40(42)	55(65)	**E(E)**
NBR	67(53)	30(6)	41(42)	22(30)	C(C)
SBL	23(8)	75(1)	19(13)	57(62)	**E(E)**
SBT	3(2)	53(1)	19(13)	39(64)	D**(E)**
SBR	9(11)	40(1)	20(14)	20(17)	B(B)
Total	1830(2570)	-	-	**5(5)**	**A(A)**
Lakeshore Rd W/Clarkson Rd N Intersection (signalized)					
EBL	131(183)	11(2)	19**(45)**	10(14)	A(B)
EBT	682(1155)	3(2)	36**(78)**	3(2)	A(A)
EBR	21(24)	4(1)	38**(80)**	3(2)	A(A)
WBL	10(9)	15(0)	5(6)	7(10)	A(B)
WBT	717(888)	6(4)	69(76)	5(4)	A(A)
WBR	138(120)	5(4)	70(77)	5(4)	A(A)
NBL	12(21)	0(4)	18(26)	50(61)	D**(E)**
NBT	9(23)	0(4)	18(26)	59(59)	**E(E)**
NBR	3(10)	0(5)	18(27)	13(27)	B(C)
SBL	94(100)	64(45)	51(230)	58(148)	**E(F)**
SBT	8(17)	52(45)	51(230)	63(169)	**E(F)**
SBR	177(176)	10(46)	51**(231)**	8(16)	A(B)

Movement	Volume (veh/h)	Ave Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Total	2002(2725)	-	-	**8(12)**	**A(B)**
Lakeshore Rd W/Meadow Wood Rd Intersection (signalized)					
EBT	719(1198)	3(3)	32(51)	3(3)	A(A)
EBR	59(72)	4(3)	33(51)	3(3)	A(A)
WBL	40(27)	7(0)	12(10)	7(11)	A(B)
WBT	790(971)	4(2)	47(47)	4(3)	A(A)
NBL	76(53)	53(7)	51(44)	59(64)	**E(E)**
NBR	46(29)	30(8)	52(45)	37(36)	D(D)
Total	1730(2349)	-	-	**7(5)**	**A(A)**

4.2 Do Nothing Future Conditions

The following sections outlines the operations of the Do Nothing Future Conditions scenarios for AM and PM peak hours and for the 2031 and 2041 future horizon years. For the Do Nothing Future Conditions scenarios, the volumes were updated, however the geometry and signal timing plans remained the same. Similar to the analysis of existing conditions, intersection capacity analysis was undertaken using procedures described in the Highway Capacity Manual (HCM). The analysis primarily focuses on performance measures such as level-of-service (LOS), delay (s), and 95th percentile queues. The results for each of the horizon years are described in the following sections.

4.2.1 Do Nothing Volumes

Projected traffic volumes for the horizon years of 2031 and 2041, were estimated using the EMME data provided by the City for the same horizon years and 2016; as well as the 2019 TMC counts within the study area. The projected traffic for 2031 was estimated by calculating the volume difference (absolute growth) between the EMME 2031 volumes and EMME 2016 volumes and adding it to the 2019 TMC counts. Similarly, the projected traffic for 2041 was estimated by calculating the volume difference (absolute growth) between the EMME 2041 volumes and EMME 2031 volumes and adding it to the 2031 projected traffic volumes. These calculations were applied along Lakeshore Road West, Clarkson Road North, Clarkson Road South and Meadow Wood Road. It is important to note that volume balancing was performed for 2031 and 2041 horizon years as input to Vissim needs to be fully balanced to get accurate results. The following **Figure 23** and **Figure 24** highlight the balanced 2031

and 2041 Do Nothing Future Conditions volumes applied to these scenarios in the Vissim model.

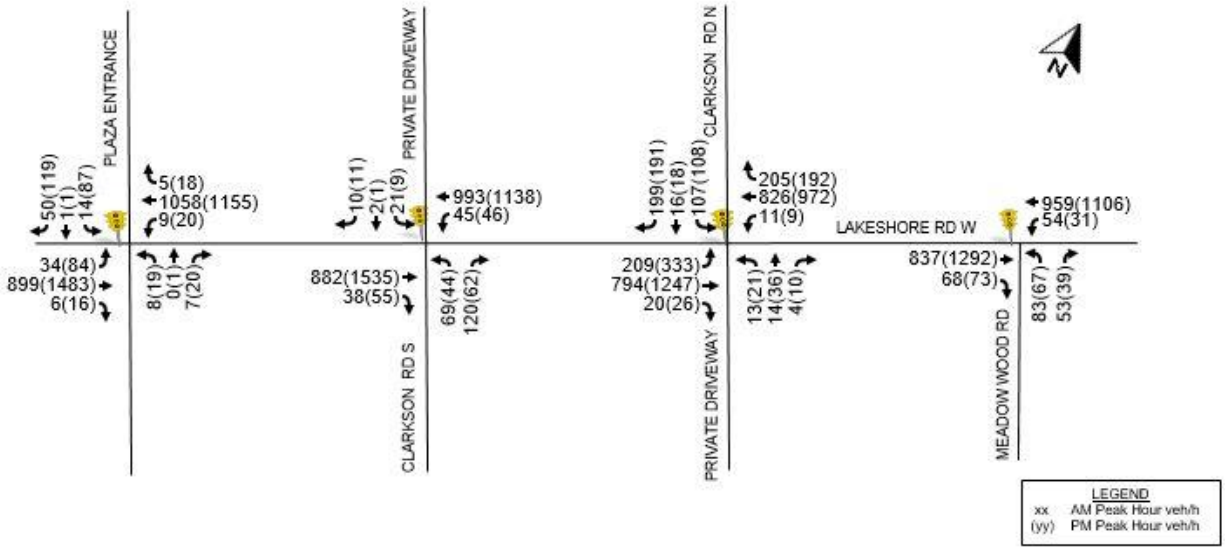


Figure 23: Future 2031 Do Nothing AM and PM Peak Hour Volumes

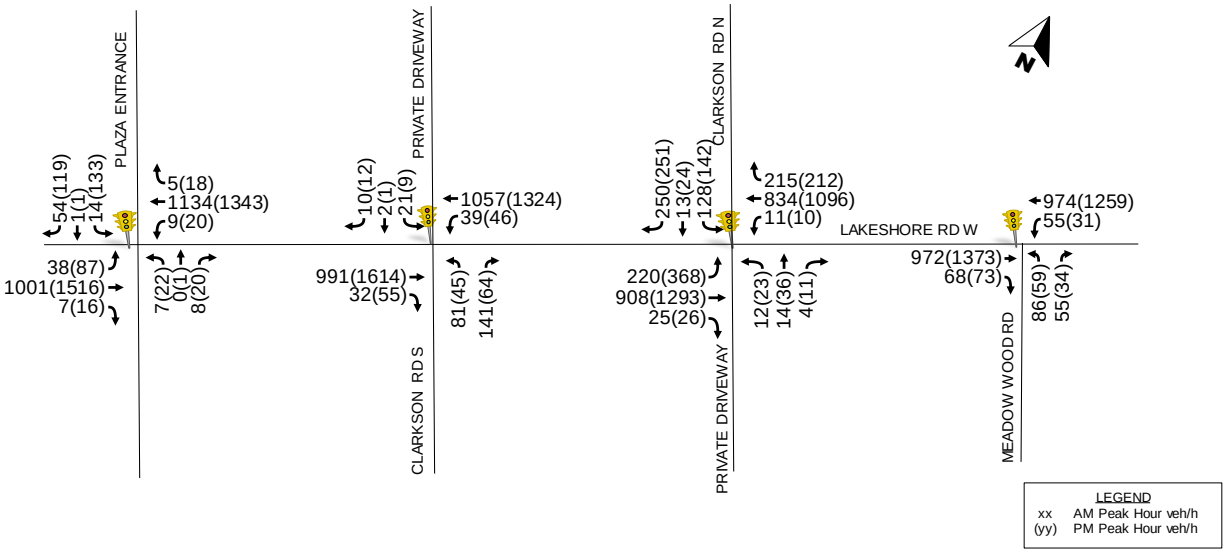


Figure 24: Future 2041 Do Nothing AM and PM Peak Hour Volumes

4.2.2 Do Nothing Results

Table 28 and **Table 29** highlight the traffic operations for Lakeshore Rd W & Clarkson Rd S and Lakeshore Rd W & Clarkson Rd N intersections in 2031 and 2041. The following movements are observed approaching or exceeding available capacity:

Lakeshore Rd W & Clarkson Rd S

- The eastbound through movement is expected to operate with a LOS of E in the PM peak hour in 2031 and with a LOS of F in the PM peak hour in 2041. The 95th percentile queue length shows that during the 2031 and 2041 PM peak, the queue is expected to spill back into the upstream intersection (Lakeshore/Plaza Entrance).
- The westbound left-turn movement is expected to operate with a LOS of F in the PM peak in 2031 and in 2041. The 95th percentile queue lengths show that the queue is expected to block the through moving traffic and causing queue spill back as well into the upstream intersection.
- The northbound movement is expected to operate with a LOS of F in the PM peak hour in 2031 and in 2041 with the 95th percentile queue longer than 200m in the PM peak hour in 2031 and 300m in the PM peak hour in 2041.

Lakeshore Rd W & Clarkson Rd N

- The eastbound left turn movement is expected to operate with a LOS of F in the PM peak hour in 2031 and in 2041. The 95th percentile queue of 85m is expected to exceed the available storage and block the eastbound through movement traffic in the PM peak period in 2031 and 2041
- The eastbound through/right-turn movement is expected to be blocked by the eastbound left-turn movement and the resulting queue is expected to spill back to the upstream intersection (Lakeshore/Clarkson South). It should be noted that the eastbound traffic through this intersection may be metered at the upstream intersection (Lakeshore Rd W & Clarkson Rd S).
- The westbound through movement is expected to have a 95th percentile queue of over 260m in the PM peak hour in 2031 and 2041, which is expected to spill back to the upstream intersection (Lakeshore/Meadow Wood).
- The shared southbound left-turn/through movement is expected to operate with a LOS of E in the AM peak hour and a LOS of F in the PM peak hour in 2031 and in 2041.
- The southbound right-turn movement is operating with a LOS of F in the PM peak hour in 2031 and in 2041. The southbound left-turn/through movement is expected to have a long queue and subsequently block the southbound right-turn movement from entering the right-turn storage lane.

Table 28: Simulated Intersection Performance Summary for Do-nothing Model in 2031 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Lakeshore Rd W/Clarkson Rd S Intersection (signalized)					
EBT	875(1277)	3(82)	51(**254**)	4(56)	A**(E)**
EBR	37(45)	2(82)	52(**256**)	3(39)	A(D)
WBL	44(32)	0(27)	12**(97)**	13(318)	B**(F)**
WBT	980(1058)	2(23)	33**(97)**	2(3)	A(A)
NBL	64(40)	13(37)	71(**211**)	59(184)	**E(F)**
NBR	120(59)	13(37)	71(**212**)	33(157)	C**(F)**
SBL	22(8)	2(2)	19(18)	54(89)	D**(F)**
SBT	2(2)	2(2)	19(18)	47(78)	D**(E)**
SBR	10(11)	1(2)	20(18)	16(35)	B(C)
Total	2155(2533)	-	-	**7(33)**	**A(C)**
Lakeshore Rd W/Clarkson Rd N Intersection (signalized)					
EBL	191(239)	3(29)	43**(86)**	16(104)	B**(F)**
EBT	781(1038)	2(9)	38**(84)**	3(6)	A(A)
EBR	22(23)	2(9)	39**(85)**	3(6)	A(A)
WBL	12(9)	0(0)	6(6)	9(34)	A(C)
WBT	817(911)	7(58)	91(**268**)	7(30)	A(C)
WBR	207(188)	7(59)	92(**269**)	6(16)	A(B)
NBL	14(19)	2(14)	19(75)	56(92)	**E(F)**
NBT	13(35)	2(14)	19(75)	50(104)	D**(F)**
NBR	5(10)	2(15)	20(76)	23(47)	C(D)
SBL	110(101)	13(143)	56(**272**)	58(259)	**E(F)**
SBT	15(16)	13(143)	56(**272**)	57(254)	**E(F)**
SBR	198(174)	13(**144**)	57**(272)**	9(101)	A**(F)**
Total	2383(2763)	-	-	**10(42)**	**A(D)**

Table 29: Simulated Intersection Performance Summary for Do-nothing Model in 2041 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Lakeshore Rd W/Clarkson Rd S Intersection (signalized)					
EBT	985(1128)	4(147)	68(**254**)	4(82)	A**(F)**
EBR	32(38)	4(148)	69(**256**)	3(45)	A(D)
WBL	38(20)	0(45)	16**(97)**	16(820)	B**(F)**
WBT	1044(1155)	2(35)	39**(97)**	2(5)	A(A)
NBL	77(37)	16(81)	82(**301**)	57(298)	**E(F)**
NBR	140(57)	16(82)	82(**302**)	34(296)	C**(F)**
SBL	22(8)	2(2)	20(13)	54(90)	D**(F)**
SBT	2(2)	2(2)	20(13)	47(62)	D**(E)**
SBR	10(13)	1(2)	20(13)	16(21)	B(C)
Total	2350 (2456)	-	-	**8(51)**	**A(D)**
Lakeshore Rd W/Clarkson Rd N Intersection (signalized)					
EBL	204(204)	3(50)	50**(86)**	17(139)	B**(F)**
EBT	894(908)	3(11)	45**(84)**	3(7)	A(A)
EBR	27(18)	2(11)	47**(85)**	3(5)	A(A)
WBL	11(10)	0(0)	6(5)	10(36)	B(D)
WBT	822(1000)	7(105)	96(**268**)	8(43)	A(D)
WBR	218(206)	8(106)	98(**269**)	6(22)	A(C)
NBL	13(20)	2(22)	19(145)	55(166)	D**(F)**
NBT	14(33)	2(22)	19(145)	51(123)	D**(F)**
NBR	5(12)	2(23)	20(146)	16(108)	B**(F)**
SBL	130(102)	15(**250**)	58(**274**)	57(288)	**E(F)**
SBT	10(16)	15(**250**)	58(**274**)	69(290)	**E(F)**
SBR	252(178)	15(**251**)	59**(275)**	10(180)	B**(F)**
Total	2591(2707)	-	-	**10(59)**	**A(E)**

5 Solution 1 – Realign Clarkson Road North

The following sections outline the development and a summary of traffic operations of the Solution 1 configuration considered for AM and PM peak hours and for 2031 and 2041 future horizon years. For the Solution 1 scenarios, the volumes were updated, the geometry was updated based on provided drawings and the signal timing plans were optimized.

5.1 Solution 1 Model Development

The Vissim model for the preferred alternative scenario was prepared utilizing the Realign Clarkson Rd North - Solution 1 configuration from the EA, shown below in **Figure 25**. Furthermore, the existing, signalized intersection of Lakeshore Rd W and Clarkson Rd N is expected to be decommissioned and therefore was removed from the model.

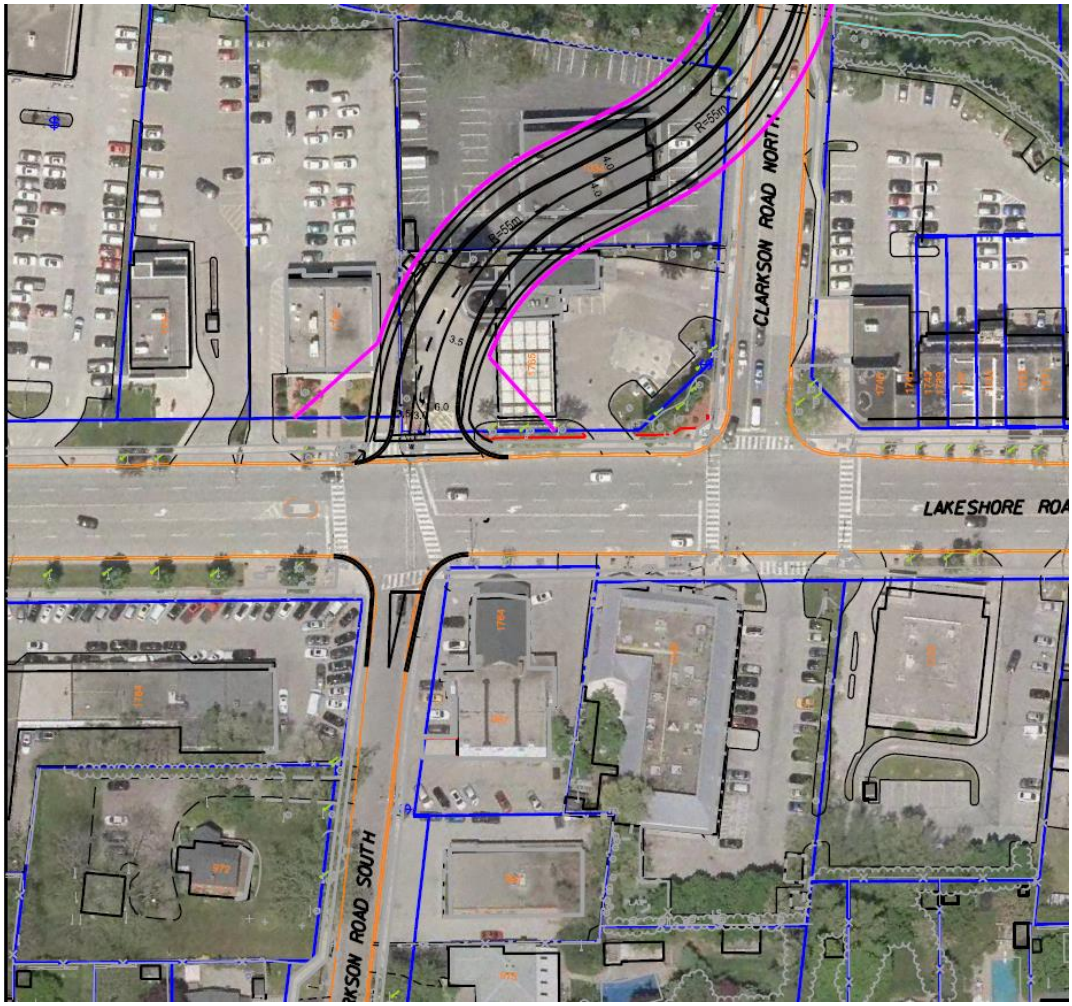


Figure 25: Solution 1 Drawing

5.2 Solution 1 Volumes

Using the Do Nothing Future Conditions (2031 & 2041) balanced volumes as a base, an assumption on the percentage of vehicles travelling from Clarkson Road South to Clarkson Road North and from Clarkson Road North to Clarkson Road south was made in order to estimate volumes for Solution 1. Without any other observed data for this particular movement, this assumption was made based on the percentage of vehicles at each turning movement. The following **Figure 26** and **Figure 27** highlight the balanced 2031 and 2041 Solution 1 volumes used in the Vissim model.

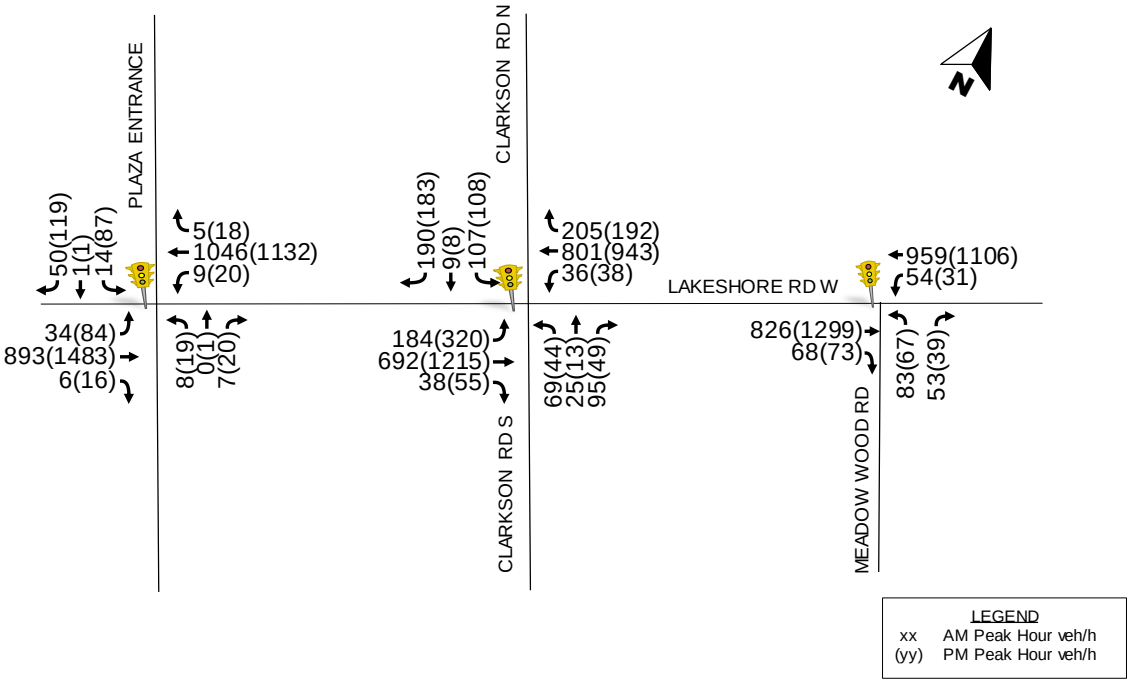


Figure 26: Future 2031 Solution 1 AM and PM Peak Hour Volumes

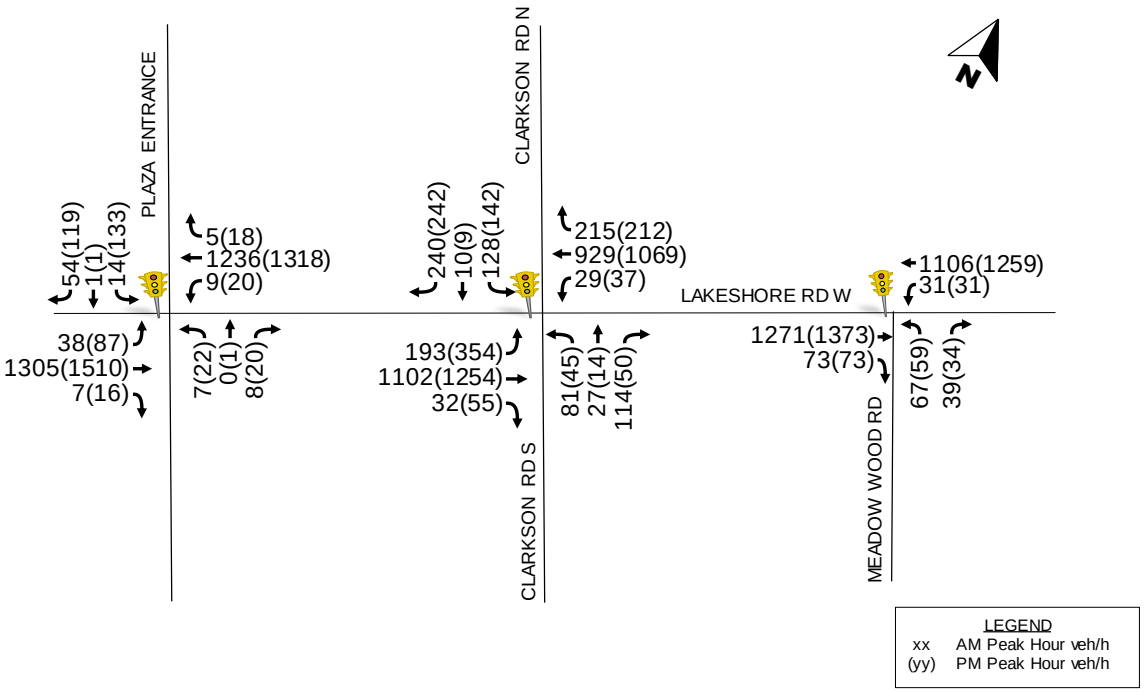


Figure 27: Future 2041 Solution 1 AM and PM Peak Hour Volumes

5.3 Solution 1 Results

Table 30 and **Table 31** highlight the traffic operations for Solution 1 in the future horizon years 2031 and 2041. The intersection with the new alignment is expected to operate at an overall acceptable level of service in 2031 and 2041 with no failing movement and queue spillback issues are not expected to be critical for this alternative as the upstream signalized intersections are more than 200m away from this intersection. The following movements may approach capacity at the realigned Lakeshore Rd W & Clarkson Rd S/N intersection:

- The northbound left-turn movement is expected to operate with a LOS of E in the AM peak hour in 2031.
- The southbound left-turn movement is expected to operate with a LOS of E in the PM peak hour in 2031 and 2041.
- The southbound through movement is expected to operate with a LOS of E in the PM peak hour in 2031 and 2041.

Table 30: Simulated Intersection Performance Summary for Solution 1 in 2031 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Lakeshore Rd W/Clarkson Rd S/Clarkson N Intersection (signalized)					
EBL	184(318)	1(7)	30(62)	9(18)	A(B)
EBT	684(1208)	2(7)	39(95)	3(6)	A(A)
EBR	37(54)	2(7)	41(96)	3(5)	A(A)
WBL	36(35)	0(0)	7(13)	9(21)	A(C)
WBT	792(928)	7(11)	94(106)	7(9)	A(A)
WBR	207(197)	7(11)	96(108)	7(9)	A(A)
NBL	64(41)	7(4)	52(31)	56(53)	**E**(D)
NBT	24(15)	0(0)	33(18)	7(3)	A(A)
NBR	95(49)	1(1)	33(19)	10(9)	A(A)
SBL	111(108)	11(12)	82(76)	52(56)	D**(E)**
SBT	1(8)	2(5)	34(63)	55(57)	D**(E)**
SBR	196(183)	3(5)	36(64)	11(16)	B(B)
Total	**2429(3145)**	**-**	**-**	**10(11)**	**A(B)**

Table 31: Simulated Intersection Performance Summary for Solution 1 in 2041 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Lakeshore Rd W/Clarkson Rd S/Clarkson N Intersection (signalized)					
EBL	190(354)	2(18)	37(102)	14(31)	B(C)
EBT	1103(1248)	4(9)	70(102)	4(7)	A(A)
EBR	32(53)	4(9)	71(103)	3(7)	A(A)
WBL	28(37)	0(0)	7(13)	15(21)	B(C)
WBT	920(1049)	11(16)	112(127)	9(11)	A(B)
WBR	221(219)	11(16)	114(128)	8(11)	A(B)
NBL	76(42)	8(4)	62(26)	54(52)	D(D)
NBT	25(16)	1(0)	46(17)	8(2)	A(A)
NBR	114(50)	2(1)	48(18)	12(8)	B(A)
SBL	127(140)	15(19)	99(113)	54(57)	D**(E)**
SBT	8(10)	7(11)	82(108)	51(60)	D**(E)**
SBR	243(243)	8(12)	83(109)	18(23)	B(C)
Total	**3087(3457)**	-	-	**11(5)**	**B(A)**

6 Solution 2 – Widen Lakeshore Road West and Provide 'Side-by-Side' Left-Turn Lanes

The following sections outlines the development and a summary of traffic operations of the Option 7 configuration considered for AM and PM peak hours and for 2031 and 2041 future horizon years. Under Solution 2, Lakeshore Road West is widened to allow for adjacent left-turn lanes between Clarkson Road North and Clarkson Road South. For the Solution 2 scenarios, the geometry was updated based on provided drawings. The same volumes and signal timing plans as the Do Nothing Future Conditions scenario were used for the Solution 2 model.

6.1 Solution 2 Model Development

The Vissim model for the widening scenario was prepared utilizing the Solution 2 from the EA, shown below in **Figure 28**.

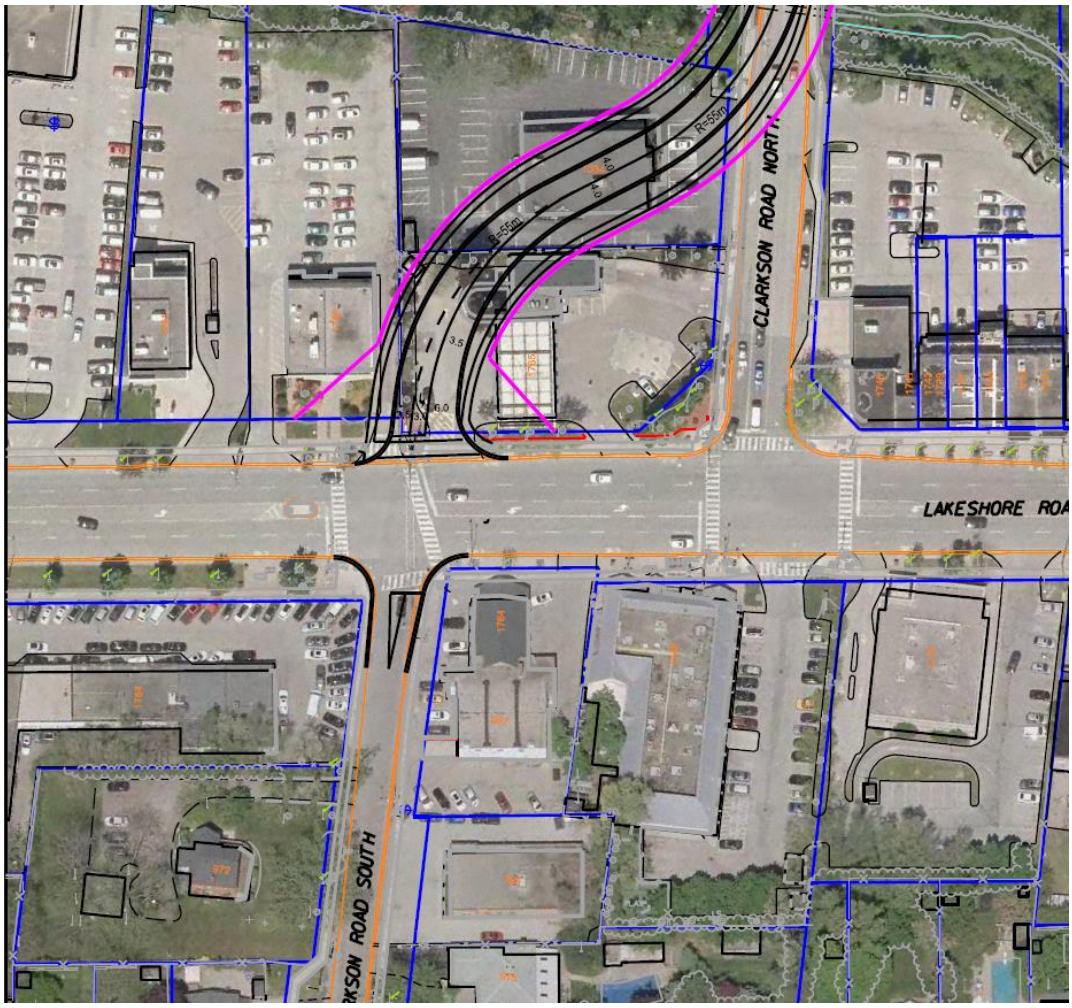


Figure 28: Solution 2 Drawing

Figure 29: Solution 1 Drawing

6.2 Solution 2 Volumes

Given that the lane configuration did not change much in this scenario, the Do Nothing Future Conditions (2031 & 2041) balanced volumes were used. The following **Figure 7** and **Figure 8** highlight the 2031 and 2041 Solution 2 volumes used in the Vissim model.

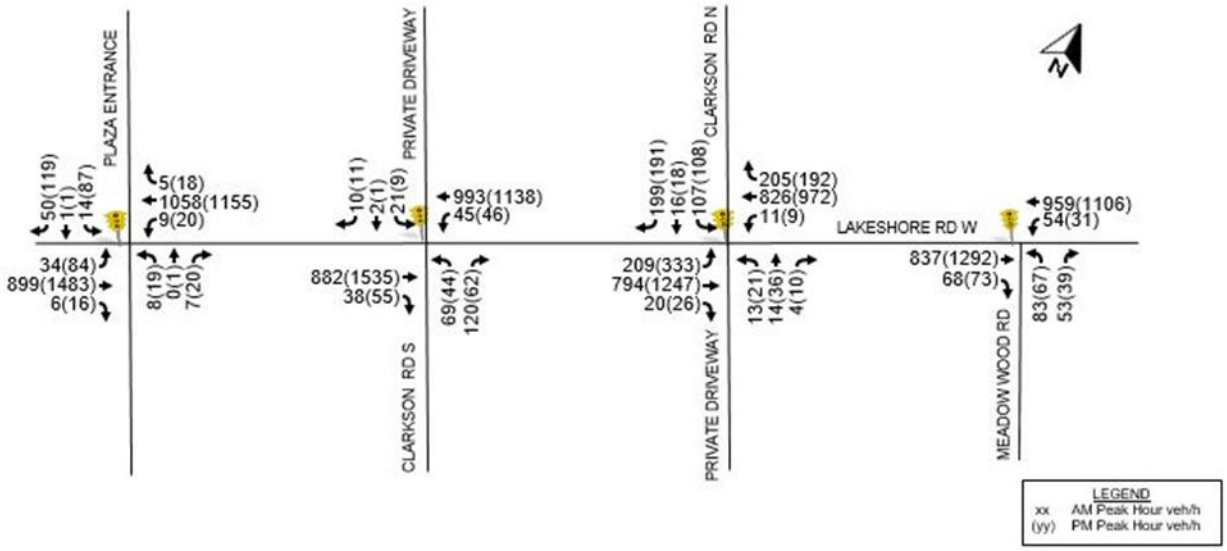


Figure 30: Future 2031 Solution 2 AM and PM Peak Hour Volumes

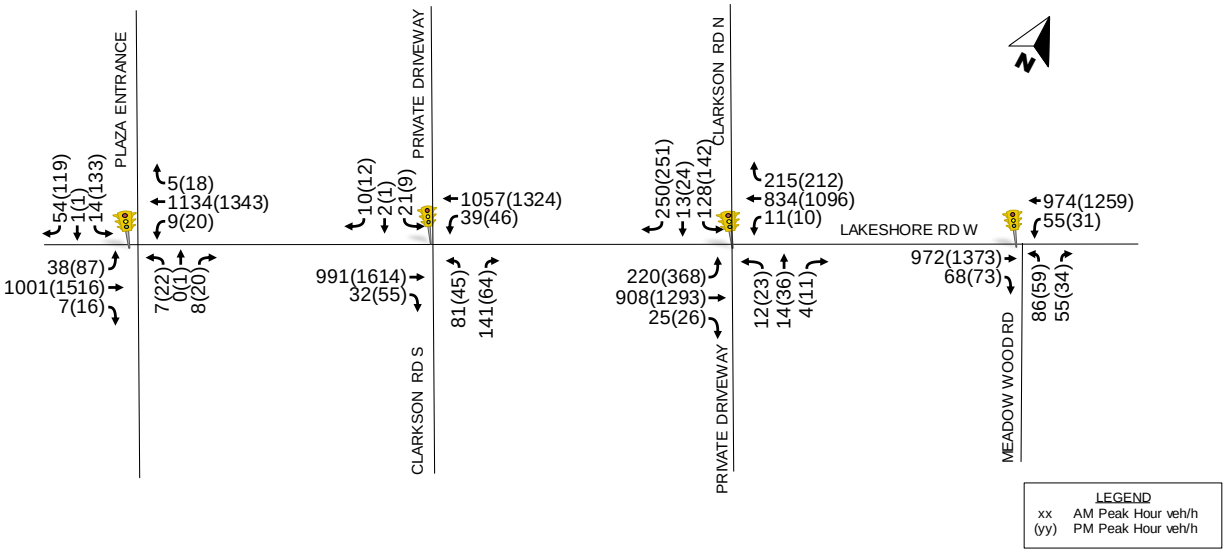


Figure 31: Future 2041 Solution 2 AM and PM Peak Hour Volumes

6.3 Solution 2 Results

Table 12 and **Table 13** highlight the traffic operations for the Solution 2 results in the future horizon years 2031 and 2041. The following movements are expected to approach capacity:

Lakeshore Rd W & Clarkson Rd S

- The northbound left-turn movement is expected to operate with a LOS of E in the AM peak hour in 2031 and in 2041.
- The southbound movement is expected to operate with a LOS of E in the PM peak hour in 2031 and in 2041. It is expected to operate with a LOS of E in the AM peak hour in 2041.
- Queue spillback was observed at the eastbound through movement (cause by the eastbound left-turn movement at Lakeshore Rd W & Clarkson Rd N). The 95th percentile queue of the eastbound through is expected to be over 180m in the PM peak in 2041, however this is not expected to spill into the upstream signalized intersection.

Lakeshore Rd W & Clarkson Rd N

- The eastbound left turn is expected to have a 95th percentile queue of 82m in the PM peak period in 2031 and 2041, this queue is expected to spill back to the eastbound through movement and the upstream intersection of Lakeshore Rd W & Clarkson Rd S.
- The shared southbound left-turn/through movement is expected to operate with a LOS of E in the AM and PM peak hour in 2031 and in 2041. In 2041 the PM peak 95th percentile queue for this movement is expected to exceed 90m and block the southbound right-turn movement.

Table 32: Simulated Intersection Performance Summary for Solution 2 in 2031 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Lakeshore Rd W/Clarkson Rd S Intersection (signalized)					
EBT	874(1524)	2(7)	52(124)	3(5)	A(A)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
EBR	38(57)	2(6)	53(124)	3(4)	A(A)
WBL	47(48)	8(7)	44(40)	20(26)	C(C)
WBT	955(1101)	8(7)	44(40)	2(2)	A(A)
NBL	64(41)	12(6)	69(39)	57(53)	**E**(D)
NBR	120(63)	13(6)	71(41)	30(25)	C(C)
SBL	22(8)	2(1)	19(13)	53(55)	D**(E)**
SBT	2(2)	2(1)	19(13)	46(62)	D**(E)**
SBR	10(11)	1(1)	20(13)	15(15)	B(B)
Total	**2133(2856)**	**-(-)**	**-(-)**	**7(6)**	**A(A)**
Lakeshore Rd W/Clarkson Rd N Intersection (signalized)					
EBL	214(340)	4(12)	44(**82**)	11(22)	B(C)
EBT	783(1232)	4(12)	44(**82**)	3(2)	A(A)
EBR	19(26)	3(4)	49(**91**)	1(1)	A(A)
WBL	12(9)	0(0)	7(6)	13(23)	B(C)
WBT	815(953)	6(9)	94(107)	6(8)	A(A)
WBR	206(197)	7(10)	95(109)	6(7)	A(A)
NBL	14(21)	2(5)	19(31)	60(54)	**E**(D)
NBT	13(37)	2(5)	19(31)	49(51)	D(D)
NBR	5(12)	2(5)	20(32)	19(24)	B(C)
SBL	110(109)	22(22)	52(55)	58(57)	**E(E)**
SBT	15(17)	0(0)	52(55)	55(60)	D**(E)**
SBR	198(191)	16(16)	54(56)	8(9)	A(A)
Total	**2402(3147)**	**-(-)**	**-(-)**	**9(10)**	**A(A)**

Table 33: Simulated Intersection Performance Summary for Solution 2 in 2041 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Lakeshore Rd W/Clarkson Rd S Intersection (signalized)					
EBT	982(1609)	3(22)	70(**181**)	4(10)	A(A)
EBR	34(57)	3(18)	71(**182**)	3(5)	A(A)
WBL	41(46)	9(7)	44(35)	23(28)	C(C)
WBT	1020(1283)	9(7)	44(35)	3(2)	A(A)
NBL	76(42)	15(6)	81(43)	56(55)	**E**(D)
NBR	139(66)	16(6)	83(45)	33(28)	C(C)
SBL	22(9)	2(1)	20(12)	54(49)	D(D)
SBT	2(2)	2(1)	20(12)	46(43)	D(D)
SBR	10(13)	1(0)	20(13)	14(12)	B(B)
Total	**2328(3126)**	**-(-)**	**-(-)**	**8(8)**	**A(A)**
Lakeshore Rd W/Clarkson Rd N Intersection (signalized)					
EBL	222(376)	5(27)	46(**82**)	12(37)	B(D)
EBT	900(1286)	5(27)	46(**82**)	3(2)	A(A)
EBR	23(26)	4(11)	54(**92**)	1(2)	A(A)
WBL	11(10)	0(0)	6(7)	13(32)	B(C)
WBT	822(1073)	7(15)	91(127)	7(11)	A(B)
WBR	219(219)	7(16)	92(128)	6(10)	A(A)
NBL	13(23)	2(5)	19(32)	55(56)	**E(E)**
NBT	14(37)	2(5)	19(32)	51(48)	D(D)
NBR	5(13)	2(6)	19(33)	16(27)	B(C)
SBL	129(143)	24(28)	62(98)	56(58)	**E(E)**
SBT	10(23)	0(0)	62(98)	66(59)	**E(E)**
SBR	252(252)	18(22)	63(99)	9(11)	A(B)
Total	**2618(3481)**	**-(-)**	**-(-)**	**9(13)**	**A(B)**

7 Solution 3 – Prohibit EB Left Turn at Clarkson Road North, and Use “Laneway”

The following sections outlines the development and a summary of traffic operations of the Solution 3 configuration considered for AM and PM peak hours and for 2031 and 2041 future horizon years. Under Solution 3, a new unsignalized intersection with stop control on the side-street will be implemented north of the intersection of Clarkson Rd N and Lakeshore Rd W, acting as a connection to a newly implemented north approach to the intersection of Clarkson Rd S and Lakeshore Rd W. Doing so allows the relocation of the eastbound left-turn from the Clarkson Rd N to Clarkson Rd S. This increases available storage for both the relocated eastbound and existing Clarkson Rd S westbound left-turn. For the Solution 3 scenarios, the volumes were updated based on the new geometry, and the geometry was updated based on provided drawings. Signal timing plans were optimized to account for the model changes.

7.1 Solution 3 Model Development

The Vissim model for Solution 3 was prepared utilizing the Solution 3 configuration from the EA, shown below in **Figure 32**. As part of the Solution 3 model, the unsignalized intersection north of the intersection of Clarkson Rd N and Lakeshore Rd W is included as part of the analysis.

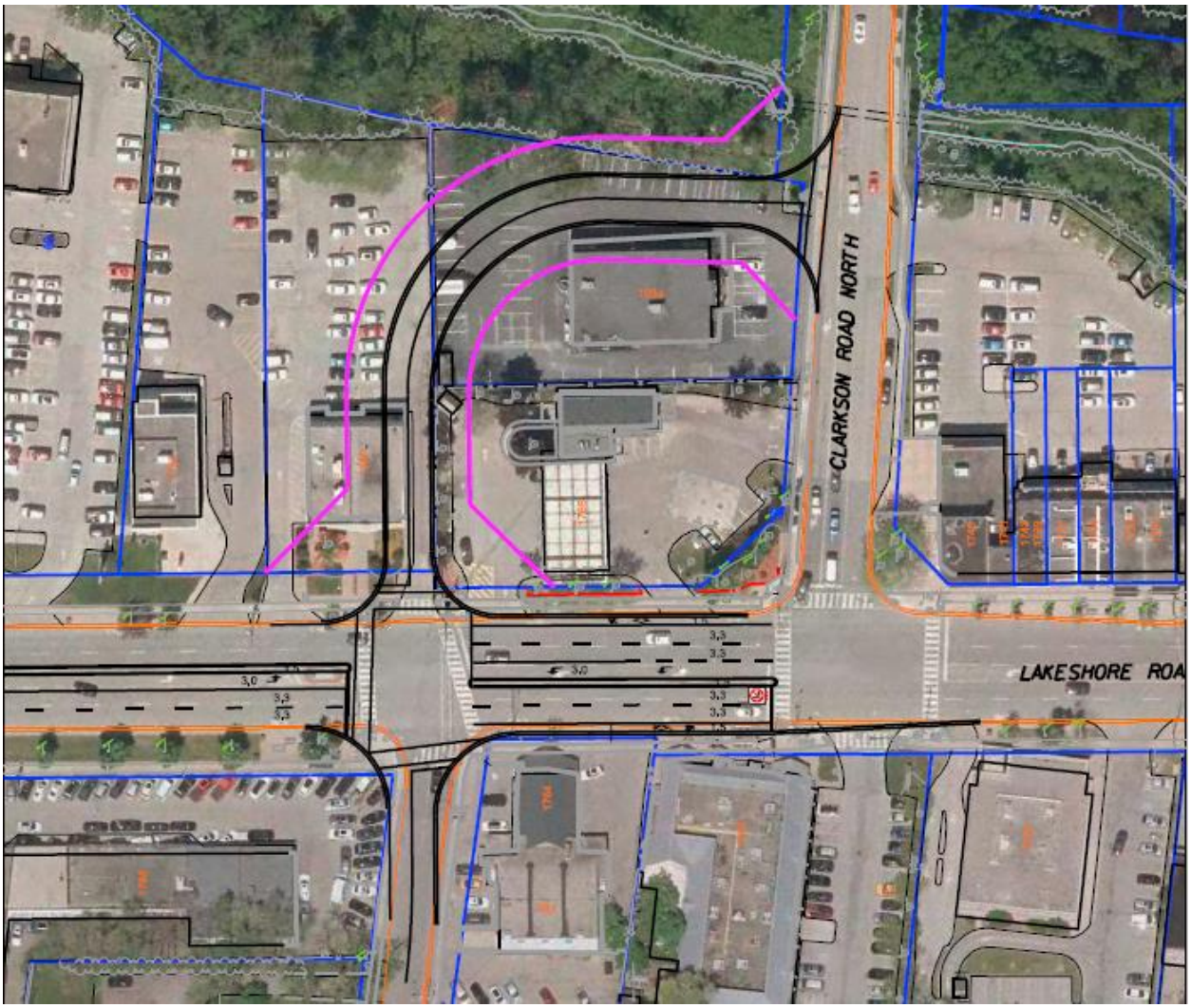


Figure 32: Solution 3 Drawing

7.2 Solution 3 Volumes

Using the Do Nothing Future Conditions (2031 & 2041) balanced volumes as a base, an assumption was made on how many vehicles would use the new road as an alternative route from the existing southbound right-turn movement at Clarkson Rd N & Lakeshore Rd W. All the eastbound left-turn volumes at Clarkson Rd N & Lakeshore Rd W were diverted to Clarkson Rd S & Lakeshore Rd W. The following **Figure 33** and **Figure 34** highlight the balanced 2031 and 2041 Solution 3 volumes used in the Vissim model.

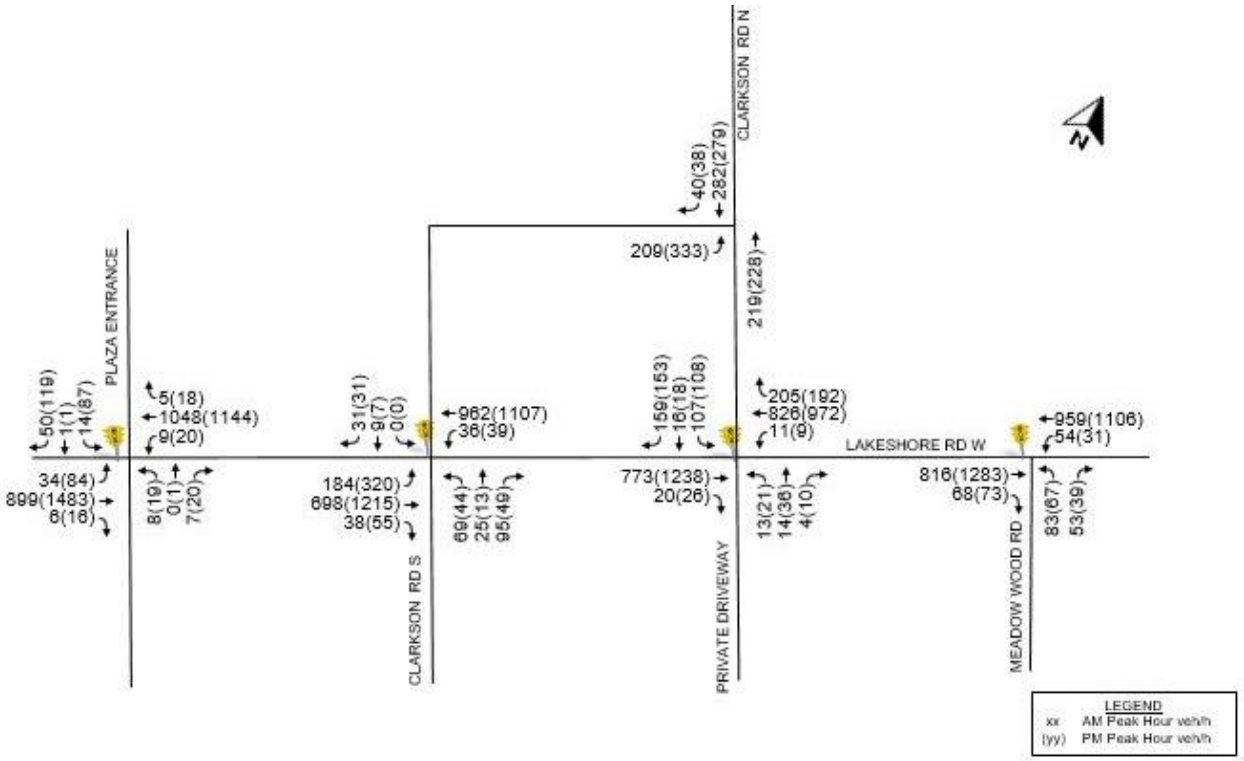


Figure 33: Future 2031 Solution 3 AM and PM Peak Hour Volumes

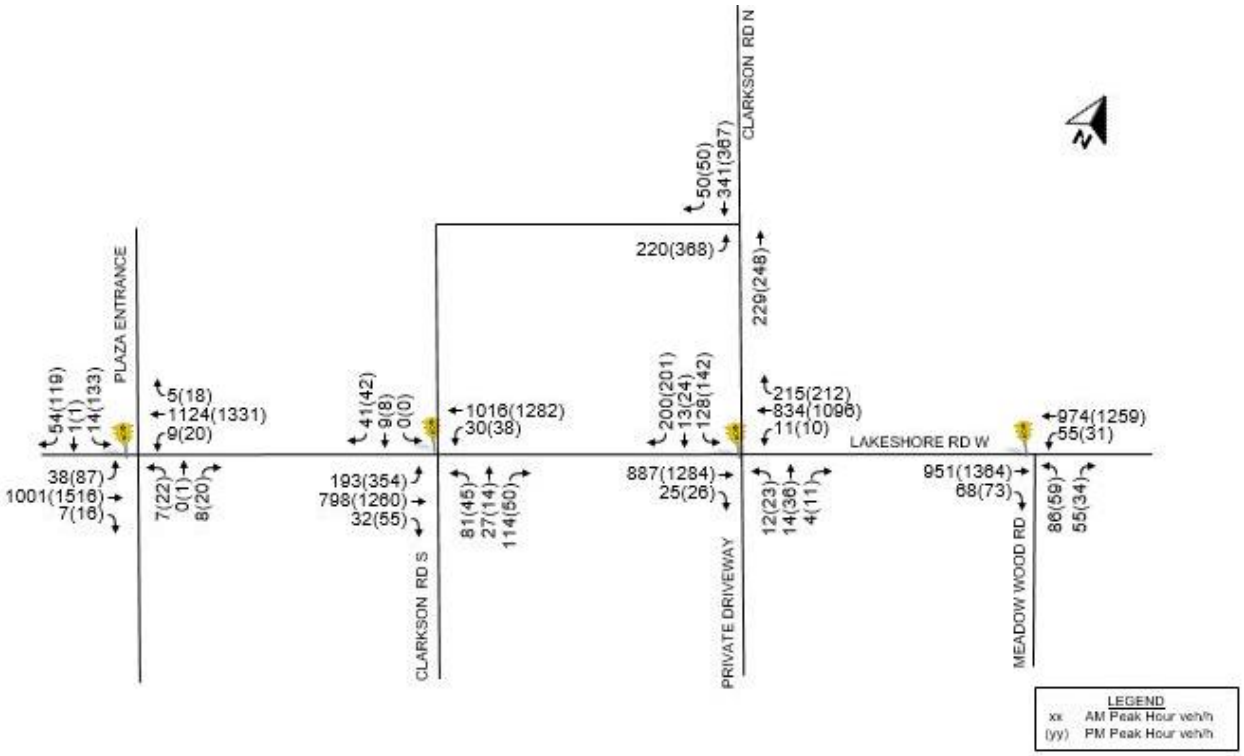


Figure 34: Future 2041 Solution 3 AM and PM Peak Hour Volumes

7.3 Solution 3 Results

Table 34 and **Table 35** highlight the traffic operations of the Solution 3 model in the future horizon years 2031 and 2041. The new intersection north of Clarkson Rd N & Lakeshore Rd W is unsignalized and therefore vehicles making an eastbound left-turn movement at this intersection must wait for a gap in the southbound and northbound traffic. The following movements are expected to reach/approach capacity:

Lakeshore Rd W & Clarkson Rd S

- The northbound movement is expected to have a LOS of E in the AM and PM peak in 2031 and 2041.
- The southbound movement is expected to have a LOS of E in the PM peak in 2031.
- The westbound left-turn movement is expected to have a 95th percentile queue of 70m in 2031 and over 75m in 2041 that is expected to exceed available storage and block the westbound through movement causing spillback into the upstream intersection of Lakeshore Rd W and Clarkson Rd N.
- The eastbound left-turn movement is expected to have a 95th percentile queue of 135m in the PM peak in 2041 that is expected to exceed available storage and block one of the eastbound through lanes. There is no spillback expected to the upstream intersection.

Lakeshore Rd W & Clarkson Rd N

- The southbound movement is expected to operate with a LOS of E in the PM peak in 2031 and 2041. The southbound movement will operate with a LOS of E in the AM peak in 2041. In 2041 the southbound shared through/left-turn movement is expected to have a 95th percentile queue exceeding 70m in the AM and PM peak hours in 2041 which is expected to exceed available storage and block the southbound right-turn movement.
- The eastbound through movement in the PM peak in 2041 is expected to have a 95th percentile queue greater than 70m which is expected to spill back to the upstream intersection of Lakeshore Rd W & Clarkson Rd S.

Clarkson Rd N & New Road

- The eastbound left-turn movement is expected to have a 95th percentile queue of 100m in the PM peak in 2041. While this queue is not expected to spill back to the upstream intersection of Clarkson Rd S & Lakeshore Rd W (130m away), it is expected that this movement might have difficulty finding gaps to make an eastbound left-turn when the southbound queueing at Lakeshore Rd W & Clarkson Rd N spills back to this unsignalized intersection (70m) in 2041.

Table 34: Simulated Intersection Performance Summary for Solution 3 in 2031 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Lakeshore Rd W/Clarkson Rd S Intersection (signalized)					
EBL	184(319)	2(12)	36(36)	14(28)	B(C)
EBT	690(1210)	3(5)	45(45)	4(4)	A(A)
EBR	37(54)	2(4)	46(46)	4(4)	A(A)
WBL	39(41)	12(9)	**70**(**70**)	27(23)	C(C)
WBT	921(1088)	12(9)	**70**(**70**)	5(8)	A(A)
WBR	0(0)	15(10)	0(0)	0(0)	A(A)
NBL	64(41)	14(7)	67(67)	56(56)	**E(E)**
NBT	24(15)	14(7)	0(0)	58(53)	**E**(D)
NBR	96(49)	14(6)	68(68)	34(27)	C(C)
SBL	0(0)	1(1)	13(13)	0(0)	A(A)
SBT	9(8)	1(1)	13(13)	50(57)	D**(E)**
SBR	32(33)	1(1)	14(14)	10(13)	B(B)
Total	**2096(2856)**	**-(-)**	**-(-)**	**10(10)**	**A(A)**
Lakeshore Rd W/Clarkson Rd N Intersection (signalized)					
EBT	764(1227)	2(3)	44(44)	3(2)	A(A)
EBR	22(28)	3(3)	45(45)	3(2)	A(A)
WBL	12(9)	0(0)	6(6)	8(14)	A(B)
WBT	819(955)	5(6)	78(78)	5(6)	A(A)
WBR	208(197)	5(6)	79(79)	5(5)	A(A)
NBL	14(21)	2(5)	19(19)	56(51)	**E**(D)
NBT	13(37)	2(5)	19(19)	50(51)	D(D)
NBR	5(12)	2(5)	20(20)	22(23)	C(C)
SBL	110(110)	12(12)	55(55)	55(56)	D**(E)**

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
SBT	15(17)	12(12)	55(55)	54(58)	D**(E)**
SBR	156(152)	12(12)	55(55)	8(11)	A(B)
Total	**2136(2766)**	**-(-)**	**-(-)**	**8(8)**	**A(A)**
Clarkson Rd N & New Road Intersection (unsignalized)					
EBL	209(334)	3(10)	34(34)	11(17)	B(C)
EBR	0(0)	0(0)	0(0)	0(0)	A(A)
NBL	0(0)	0(0)	0(0)	0(0)	A(A)
NBT	220(234)	0(0)	0(0)	0(0)	A(A)
SBT	278(275)	0(0)	0(0)	0(0)	A(A)
SBR	41(40)	0(0)	0(0)	0(0)	A(A)
Total	**749(883)**	**-(-)**	**-(-)**	**3(7)**	**A(A)**

Table 35: Simulated Intersection Performance Summary for Solution 3 in 2041 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
Lakeshore Rd W/Clarkson Rd S Intersection (signalized)					
EBL	193(353)	3(24)	37(**135**)	17(40)	B(D)
EBT	792(1255)	3(5)	55(105)	4(4)	A(A)
EBR	32(53)	3(5)	55(106)	3(4)	A(A)
WBL	32(39)	7(11)	**75(90)**	14(26)	B(C)
WBT	1001(1264)	7(11)	**75(90)**	7(8)	A(A)
WBR	0(0)	8(13)	0(0)	0(0)	A(A)
NBL	77(42)	16(8)	75(43)	54(57)	D**(E)**
NBT	25(16)	16(8)	0(0)	55(61)	**E(E)**
NBR	115(50)	17(7)	76(44)	35(28)	C(C)

Movement	Simulated AM(PM)				
	Volume (veh/h)	Average Queue (m)	95th Percentile Queue (m)	Delay(s)	LOS
SBL	0(0)	1(1)	19(18)	0(0)	A(A)
SBT	10(9)	1(1)	19(18)	47(48)	D(D)
SBR	43(45)	1(1)	20(18)	11(12)	B(B)
Total	**2320(3125)**	**-(-)**	**-(-)**	**10(12)**	**B(B)**
Lakeshore Rd W/Clarkson Rd N Intersection (signalized)					
EBT	881(1275)	3(4)	51(**78**)	3(3)	A(A)
EBR	26(28)	3(4)	52(**79**)	3(3)	A(A)
WBL	11(10)	0(0)	3(3)	7(15)	A(B)
WBT	824(1079)	4(9)	79(107)	6(8)	A(A)
WBR	220(219)	5(9)	80(108)	4(6)	A(A)
NBL	13(23)	2(5)	19(32)	52(51)	D(D)
NBT	14(37)	2(5)	19(32)	50(44)	D(D)
NBR	5(13)	2(5)	20(33)	16(28)	B(C)
SBL	130(143)	14(17)	**77(83)**	55(55)	D(D)
SBT	10(23)	14(17)	**77(83)**	65(56)	**E(E)**
SBR	199(200)	14(17)	**77(83)**	10(14)	A(B)
Total	**2331(3049)**	**-(-)**	**-(-)**	**8(10)**	**A(A)**
Clarkson Rd N & New Road Intersection (unsignalized)					
EBL	218(370)	4(18)	35(**100**)	12(26)	B(D)
EBR	0(0)	0(0)	0(0)	0(0)	A(A)
NBL	0(0)	0(0)	0(0)	0(0)	A(A)
NBT	233(256)	0(0)	0(0)	0(0)	A(A)
SBT	336(361)	0(0)	3(25)	1(1)	A(A)
SBR	53(54)	0(0)	5(22)	0(1)	A(A)
Total	**839(1040)**	**-(-)**	**-(-)**	**3(10)**	**A(A)**

8 Solution 4 – Prohibit Left Turn at Clarkson Road South

The following sections outlines the development and a summary of traffic operations of the Solution 4 configuration considered for AM and PM peak hours and for 2031 and 2041 future horizon years. For the Solution 4 scenarios, the volumes were adjusted (due to the updated lane configuration of Clarkson Rd S & Lakeshore Rd W), the geometry was updated based on provided drawings and the signal timing plans were optimized.

8.1 Solution 4 Model Development

The Vissim model for the preferred alternative scenario was prepared utilizing the Solution 4 lane configuration from the EA, shown below in **Figure 35**. Furthermore, the existing, signalized intersection of Lakeshore Rd W and Clarkson Rd S is expected to become unsignalized, with the north and south legs having right-in / right-out movements only.

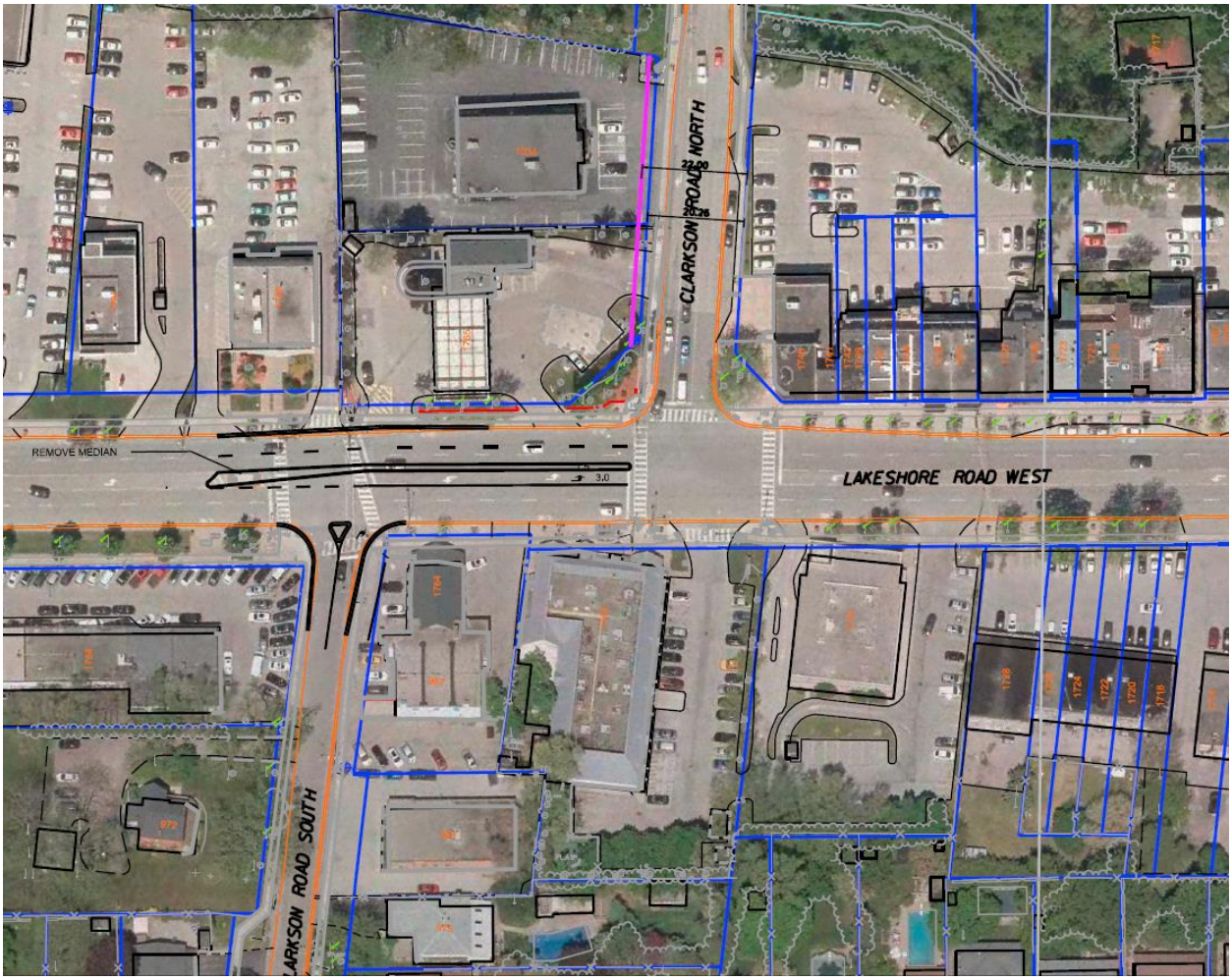


Figure 35: Solution 4 Drawing

8.2 Solution 4 Volumes

Using the Do Nothing Future Condition (2031 & 2041) balanced volumes as a base, an assumption was made that the diverted volumes from the Clarkson Road S intersections would be detoured to/from Meadow Wood Rd and Inverhouse Dr. It should be noted that this option would cause a potential added delay for local traffic of a minimum of 5 minutes to use the assumed detour routes due to the lack of network connectivity in the surrounding area. There are no other options available due to the lack of connectivity in these neighbourhoods. The following **Figure 36** and **Figure 37** highlight the balanced 2031 and 2041 Solution 4 volumes used in the Vissim model.

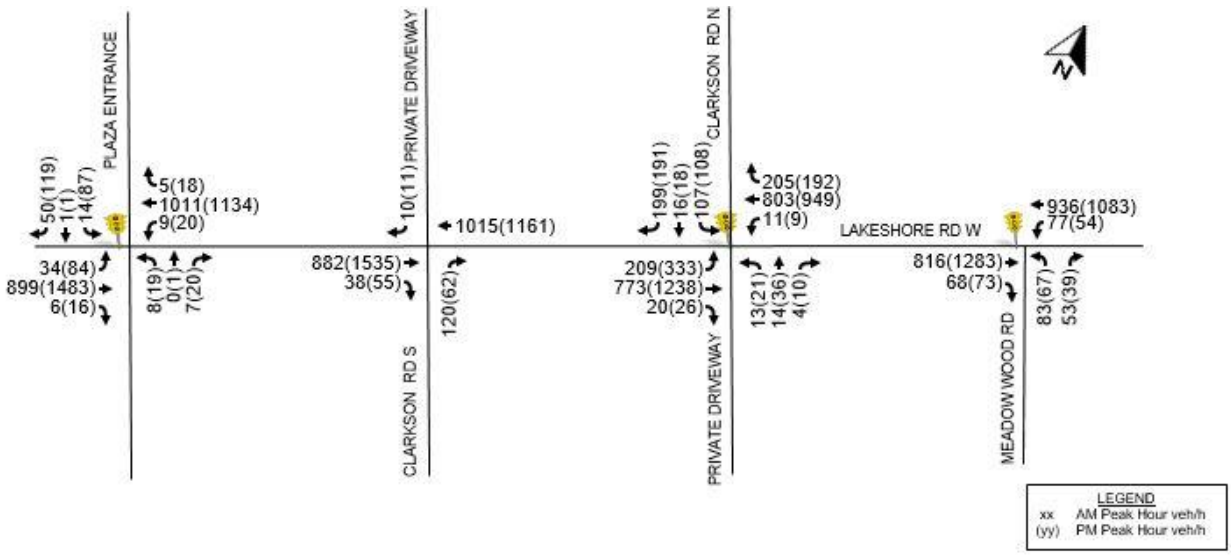


Figure 36: Future 2031 Solution 4 AM and PM Peak Hour Volumes

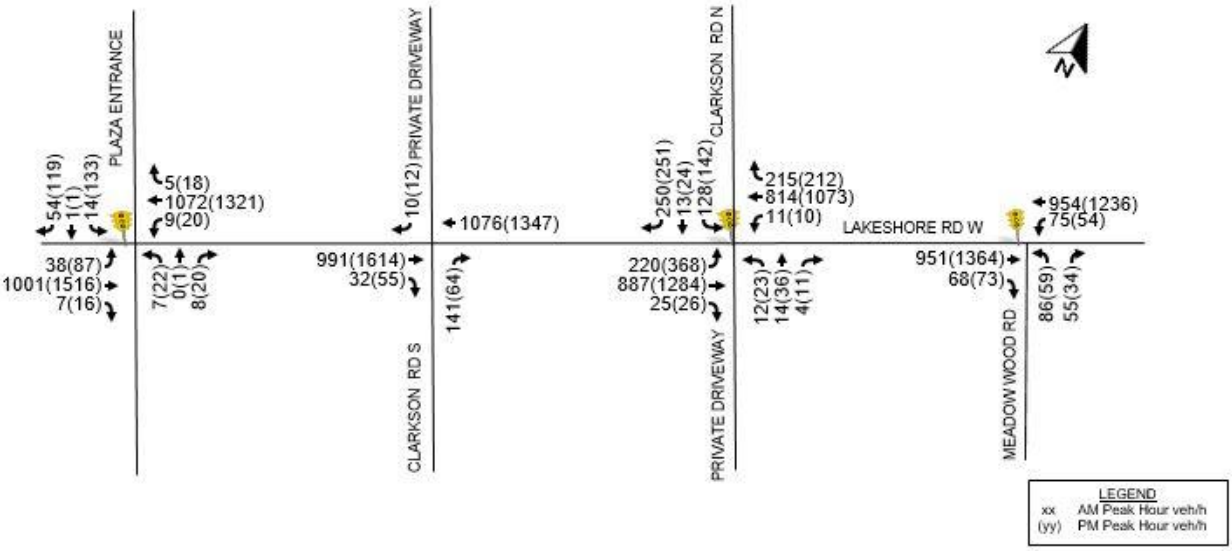


Figure 37: Future 2041 Solution 4 AM and PM Peak Hour Volumes

Using the Do Nothing Future Conditions (2031 & 2041) balanced volumes as a base, an assumption was made on how many vehicles would use the new road as an alternative route from the existing southbound right-turn

8.3 Solution 4 Results

Table 10 and **Table 11** highlight the traffic operations for the Solution 4 model future horizon years 2031 and 2041. The intersection with the new alignment is expected to operate at an overall acceptable level of service in 2031 and 2041; however, queue spillback is expected for the EB direction during the 2041 PM Peak. The following movements may approach capacity:

Lakeshore Rd W & Clarkson Rd N

- The northbound left-turn movement from the private driveway / commercial access is expected to operate with a LOS of E in the AM peak hour in 2031 and 2041. The northbound left-turn is expected to operate with a LOS of E in the AM peak hour in 2041.
- The southbound shared left-turn and through movement is expected to operate with a LOS of E in the PM peak hour in 2031 and 2041. The extent of the queue may block the southbound right-turn movement.
- The eastbound left-turn movement is expected to have a 95th percentile queue in the PM peak of more than 90m in 2041 which is expected to spill over the available storage and block the eastbound through movement at Clarkson Rd S. This spillback is expected create an eastbound queue of up to 162 m in the PM peak in 2041 at Lakeshore Rd W & Clarkson Rd S intersection. It is acknowledged that there is opportunity to refine the median design, to provide greater storage capacity, and therefore mitigate this issue.

Table 36: Simulated Intersection Performance Summary for Solution 4 in 2031 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	**Average Queue (m)**	**95th Percentile Queue (m)**	**Delay(s)**	**LOS**
Lakeshore Rd W/Clarkson Rd S Intersection (unsignalized)					
EBT	875(1530)	0(1)	0(65)	0(2)	A(A)
EBR	37(57)	0(0)	0(25)	1(1)	A(A)
WBT	1003(1144)	0(0)	0(0)	0(0)	A(A)
NBR	117(60)	1(1)	20(15)	8(9)	A(A)
SBR	10(11)	0(0)	8(8)	10(10)	B(B)

Movement	Simulated AM(PM)				
	Volume (veh/h)	**Average Queue (m)**	**95th Percentile Queue (m)**	**Delay(s)**	**LOS**
Total	**2042(2802)**	**-(-)**	**-(-)**	**1(1)**	**A(A)**
Lakeshore Rd W/Clarkson Rd N Intersection (signalized)					
EBL	209(337)	4(17)	45(**90**)	13(29)	B(C)
EBT	763(1227)	4(17)	45(90)	3(3)	A(A)
EBR	18(27)	3(8)	46(89)	3(3)	A(A)
WBL	11(9)	0(0)	6(6)	10(13)	A(B)
WBT	793(927)	7(10)	89(100)	7(9)	A(A)
WBR	208(196)	7(10)	90(101)	6(8)	A(A)
NBL	14(21)	2(5)	19(32)	57(54)	**E**(D)
NBT	13(37)	2(5)	19(32)	51(53)	D(D)
NBR	5(12)	3(6)	20(33)	21(26)	C(C)
SBL	110(109)	13(13)	56(55)	58(58)	**E(E)**
SBT	15(17)	13(13)	56(55)	56(61)	**E(E)**
SBR	198(192)	13(13)	56(56)	9(10)	A(A)
Total	**2357(3111)**	**-(-)**	**-(-)**	**10(12)**	**A(B)**

Table 37: Simulated Intersection Performance Summary for Solution 4 in 2041 AM (PM)

Movement	Simulated AM(PM)				
	Volume (veh/h)	**Average Queue (m)**	**95th Percentile Queue (m)**	**Delay(s)**	**LOS**
Lakeshore Rd W/Clarkson Rd S Intersection (unsignalized)					
EBT	982(1608)	0(12)	11(**154**)	1(7)	A(A)
EBR	34(57)	0(10)	0(**162**)	1(3)	A(A)
WBT	1068(1336)	0(0)	0(0)	0(0)	A(A)
NBR	138(62)	2(1)	24(15)	8(11)	A(B)
SBR	10(13)	0(0)	8(8)	10(10)	A(A)
Total	**2233(3076)**	**0(4)**	**0(0)**	**1(4)**	**A(A)**
Lakeshore Rd W/Clarkson Rd N Intersection (signalized)					
EBL	224(367)	5(34)	58(**92**)	15(42)	B(D)
EBT	874(1276)	5(34)	58(92)	4(4)	A(A)
EBR	23(26)	4(16)	57(93)	2(4)	A(A)
WBL	12(10)	0(0)	6(6)	9(20)	A(C)
WBT	805(1054)	8(19)	98(141)	8(14)	A(B)
WBR	217(219)	8(19)	100(142)	7(12)	A(B)
NBL	13(23)	2(5)	19(32)	58(55)	**E**(D)
NBT	14(37)	2(5)	19(32)	52(48)	D(D)
NBR	5(13)	2(6)	19(32)	19(29)	B(C)
SBL	130(143)	15(18)	59(71)	57(59)	**E(E)**
SBT	10(23)	15(18)	59(71)	67(62)	**E(E)**
SBR	252(253)	15(18)	60(72)	10(12)	A(B)
Total	**2576(3444)**	**7(15)**	**0(0)**	**10(16)**	**B(B)**

9 Comparison of Corridor Travel Time for Alternatives

A comparison between travel time along the Lakeshore Road West corridor for different alternatives is shown below in **Table 38**. The travel time is measured 100m upstream of the lakeshore Rd W & Plaza Entrance intersection and 100m downstream of the Lakeshore Rd W & Meadow Wood Dr intersection in both eastbound and westbound directions for the AM and PM peak across 2031 and 2041. The eastbound direction during the PM peak is considered critical for the study area.

The results indicate that the overall travel time along the eastbound direction of Lakeshore Road West corridor is expected to improve with all alternatives.

Table 38: Travel Time along Lakeshore Road West

Scenario	Lakeshore Corridor Travel Time AM (PM) [seconds]			
	2031		2041	
	EB	WB	EB	WB
Do Nothing	70(216)	70(131)	71(294)	72(171)
Solution 1	67(71)	71(73)	69(73)	73(76)
Solution 4	67(71)	70(75)	68(76)	71(81)
Solution 2	70(72)	72(75)	71(78)	73(80)
Solution 3	70(72)	73(79)	71(74)	75(83)

10 Summary of Findings

The traffic analysis identified all options provide overall operational benefits at the intersections in future years, in comparison to the 'Do Nothing' alternative (overall LOS at the intersections are summarized in **Table 39** and **Table 40**). Also, as detailed in Table 16, the alternatives are similar in their improvements to travel time along the Lakeshore Corridor. The difference between the alternatives would therefore become clearer once they are subjected to the full EA evaluation that considers all environmental factors, including operations.

There are several key notes to be considered when further reviewing these alternatives:

- Solution 1: Realign Clarkson Road North
    - Due to the larger flows on Lakeshore Road West, priority is given to the east-west movements. Therefore, even with the improvements, there are several movements that are anticipated to still be LOS E in the future years:
        - NB left turn from Clarkson Rd South = LOS of E in the AM peak hour in 2031.
        - SB left turn from Clarkson Rd North = LOS of E in the PM peak hour in 2031 and 2041.
        - SB through from Clarkson Rd North = LOS of E in the PM peak hour in 2031 and 2041.
- Solution 2: Widen Lakeshore Road West and provide 'Side-by-Side' Left-Turn Lanes
    - The option has the benefit of retaining all existing movements at each intersection, with general operational improvements, however there will still be some movements at LOS E at the Clarkson Road South intersection:
        - NB left turn LOS of E in the AM peak hour in 2031 and in 2041.
        - SB through = LOS of E in the PM peak hour in 2031 and in 2041, and in the AM in 2041.
    - At the Clarkson Road North intersection, there would be potential queuing spillbacks:
        - EB left turn is expected to have queueing spillback into the through lanes in the PM peaks in 2031 and 2041. However, there is opportunity to refine the median design, to provide greater storage capacity for the EB and therefore mitigate this issue.

  - The shared southbound left-turn/through movement is expected to operate with a LOS of E in the AM and PM peak hour in 2031 and in 2041. In 2041 the PM peak 95th percentile queue for this movement is expected to exceed 90m and block the southbound right-turn movement.

- Solution 3: Prohibit EB Left Turn at Clarkson Road North, and use “Laneway”

  Clarkson Road South and ‘Laneway’ Intersection

  - Like other alternatives, there are some movements at the Clarkson Road South intersection that are anticipated to still operate at LOS E:
    - NB through = LOS of E in the AM and PM peak in 2031 and 2041.
    - SB through = LOS of E in the PM peak in 2031.
  - WB left turn is expected to have queueing spillback into the through lanes in 2031 and 2041. However, there is opportunity to refine the median design, to provide greater storage capacity for the WB and therefore mitigate this issue
  - EB left turn is expected to have queueing spillback into the through lanes in 2041. However, there is opportunity to refine the median design, to provide greater storage capacity for the EB and therefore mitigate this issue.

  Lakeshore Rd W and Clarkson Rd N intersection

  - SB through = LOS of E in the PM peak in 2031 and 2041, AM peak in 2041.
  - SB shared through/left-turn movement queuing is expected to spillback and block the southbound right-turn movement in 2041
  - EB through in the PM peak in 2041 is expected to have queuing that spills back to the upstream intersection of Lakeshore Rd W & Clarkson Rd S.

  Clarkson Rd N and ‘Laneway’ intersection

  - EB left turn is expected to have queuing of approximately 100m in the PM peak in 2041. While this queue is not expected to spill back to the upstream intersection of Clarkson Rd S & Lakeshore Rd W (130m away), it is expected that this movement might have difficulty finding gaps to make an eastbound left-turn when the southbound queueing at Lakeshore Rd W & Clarkson Rd N spills back to this unsignalized intersection in 2041.

- Solution 4: Prohibit Left Turns at Clarkson Road South
  - The prohibition of the left turns results in large out-of-way travel for those on Clarkson Road South, requiring a minimum of 5 minutes to use the assumed detour routes, due to a lack of network connectivity in the surrounding area.
  - The improvements put a priority on Clarkson Road North and improve operations at that intersection, however there are still some movements at LOS E in future years:
    - NB left turn from the private driveway at Clarkson Road North = LOS of E in the AM peak hour in 2031 and 2041.
    - SB left-turn and through at Clarkson Road North = LOS of E in the PM peak hour in 2031 and 2041. The extent of the queue may block the southbound right-turn movement.
  - EB left turn is expected to have queueing spillback into the through lanes by 2041. However, there is opportunity to refine the median design, to provide greater storage capacity and therefore mitigate this issue.

Table 39: Summary of Overall Intersection LOS - Clarkson Road South

Alternative	2031		2041	
	AM	**PM**	**AM**	**PM**
Do Nothing	A	C	A	D
Solution 1: Realign Clarkson Road North*	A	B	B	A
Solution 2: Widen Lakeshore Road West	A	A	A	A
Solution 3: Prohibit EB Left Turn at Clarkson Road North**	A	A	B	B
Solution 4: Prohibit Left Turns at Clarkson Road South	A	A	A	A

*Option realigns Clarkson Road North to intersect with Clarkson Road South

**New Clarkson Road and Laneway intersection will have overall LOS A in both peaks

Table 40: Summary of Overall Intersection LOS - Clarkson Road North

	2031		2041	
	AM	**PM**	**AM**	**PM**
Do Nothing	A	D	A	E
Solution 1: Realign Clarkson Road North*				
Solution 2: Widen Lakeshore Road West	A	A	A	B
Solution 3: Prohibit EB Left Turn at Clarkson Road North**	A	A	A	A
Solution 4: Prohibit Left Turns at Clarkson Road South	A	B	B	B

*Option realigns Clarkson Road North to intersect with Clarkson Road South

**New Clarkson Road and Laneway intersection will have overall LOS A in both peaks

A

Appendix A: Turning Movement Counts

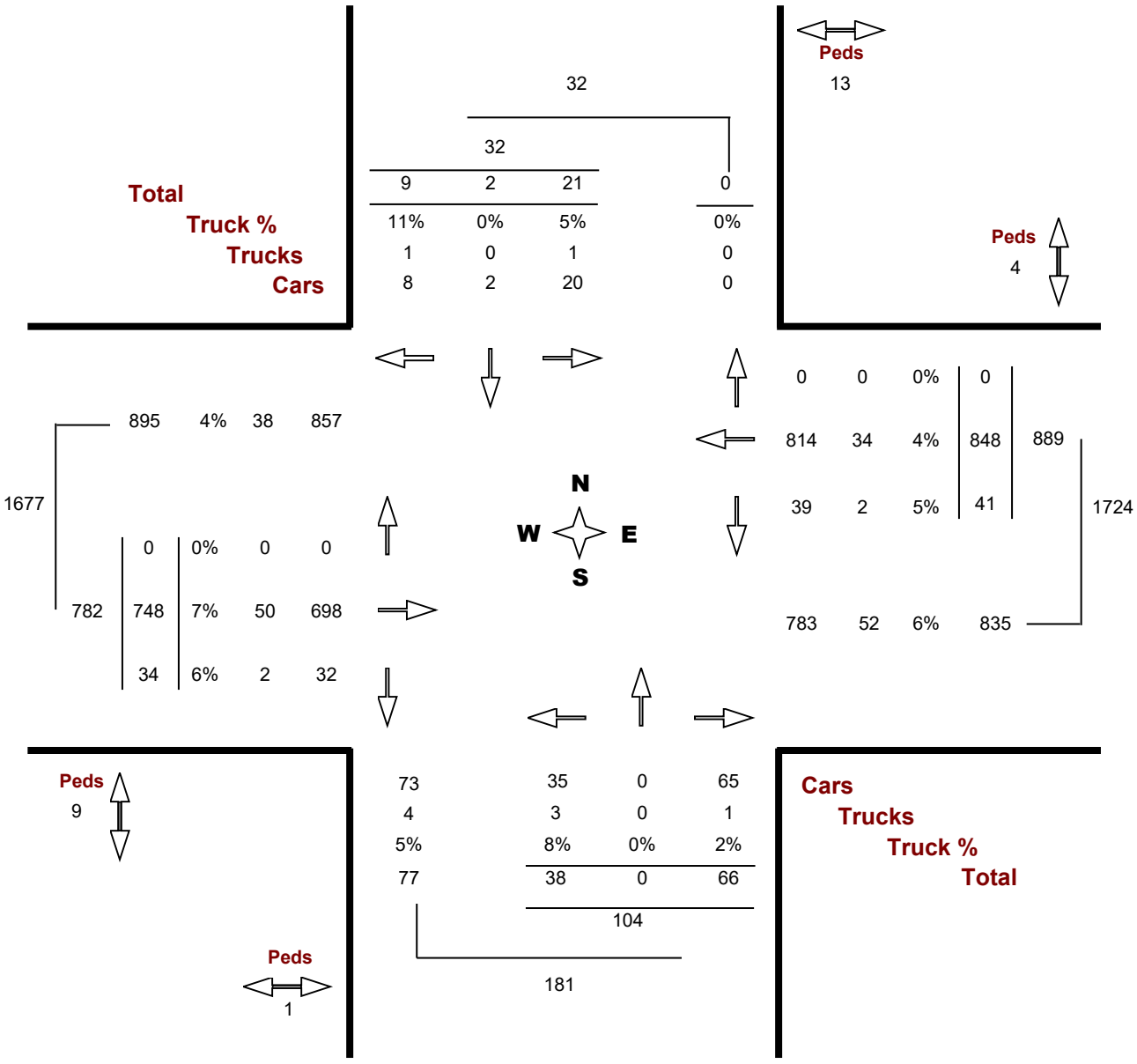
Turning Movements Report - AM Period

Location..... CLARKSON RD S @ LAKESHORE RD W

Municipality..... Mississauga **GeoID.....** 349400

Count Date..... Tuesday, 17 December, 201 **Peak Hour.....** 08:00 AM — 09:00 AM

Road 1 LAKESHORE RD W **Road 2** CLARKSON RD S



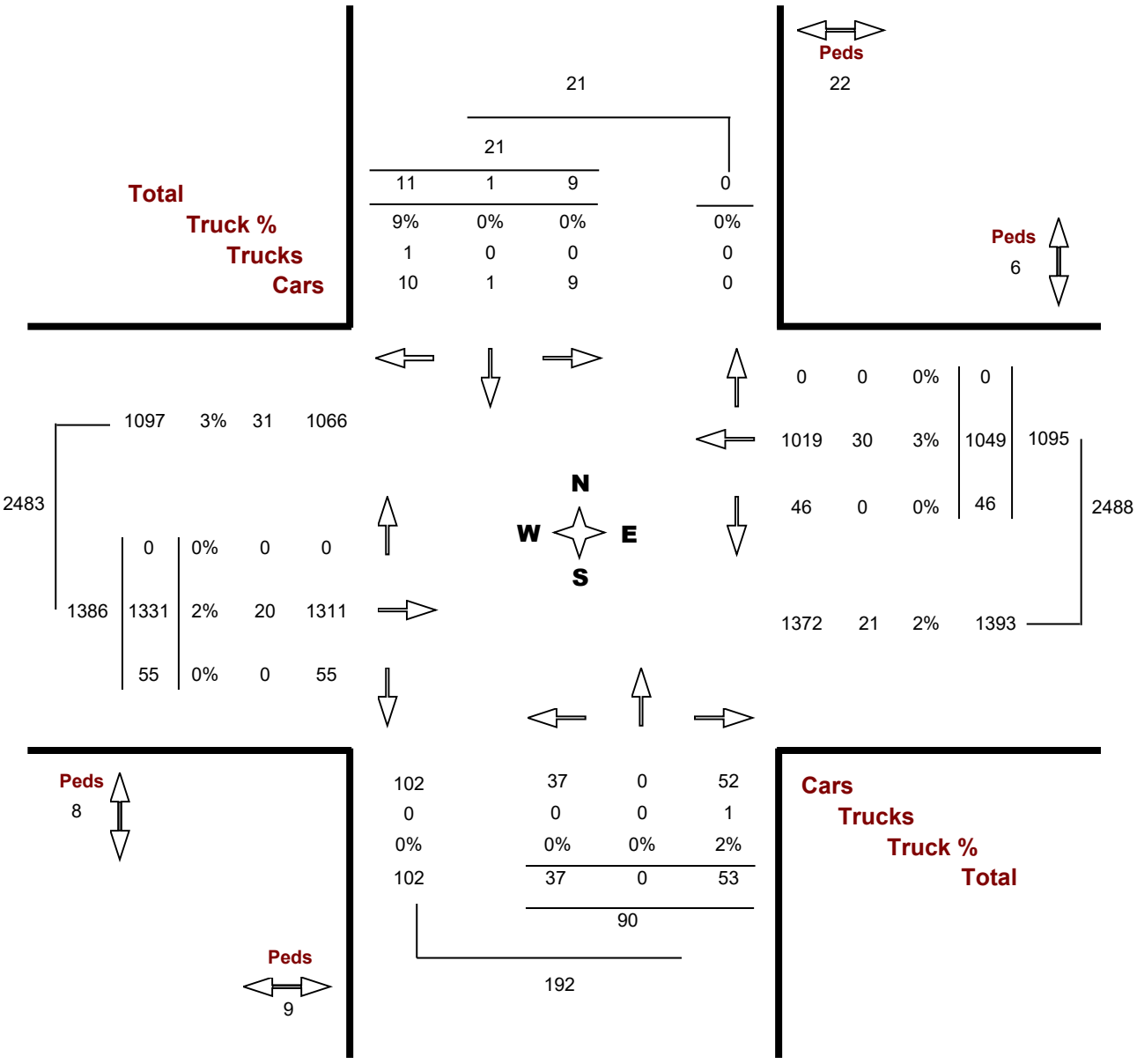
Turning Movements Report - PM Period

Location..... CLARKSON RD S @ LAKESHORE RD W

Municipality..... Mississauga **GeoID.....** 349400

Count Date..... Tuesday, 17 December, 201 **Peak Hour.....** 04:45 PM — 05:45 PM

Road 1 LAKESHORE RD W **Road 2** CLARKSON RD S



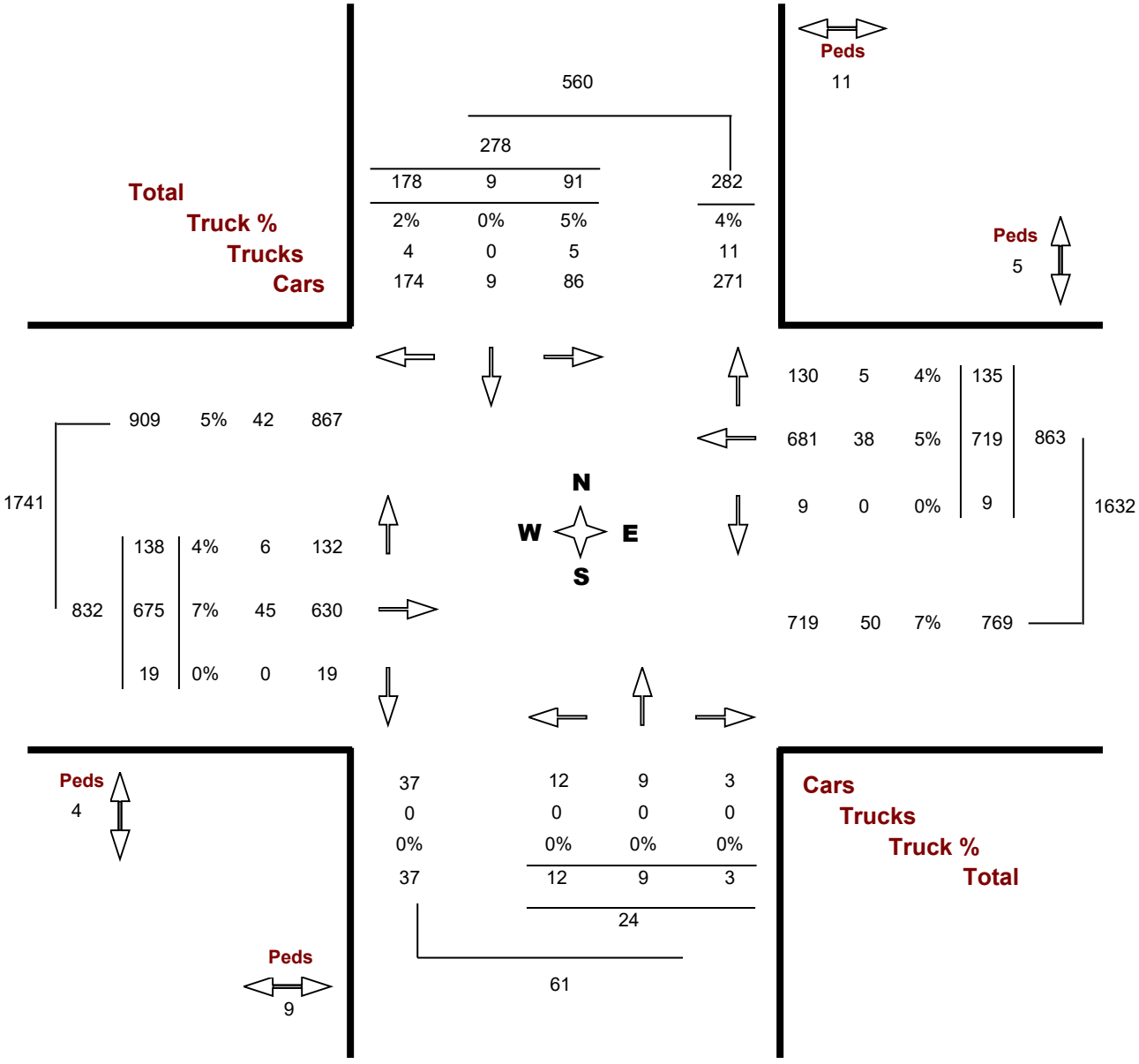
Turning Movements Report - AM Period

Location..... CLARKSON RD N @ LAKESHORE RD W

Municipality..... Mississauga **GeoID.....** 349439

Count Date..... Tuesday, 17 December, 201 **Peak Hour.....** 08:00 AM — 09:00 AM

Road 1 CLARKSON RD N **Road 2** LAKESHORE RD W



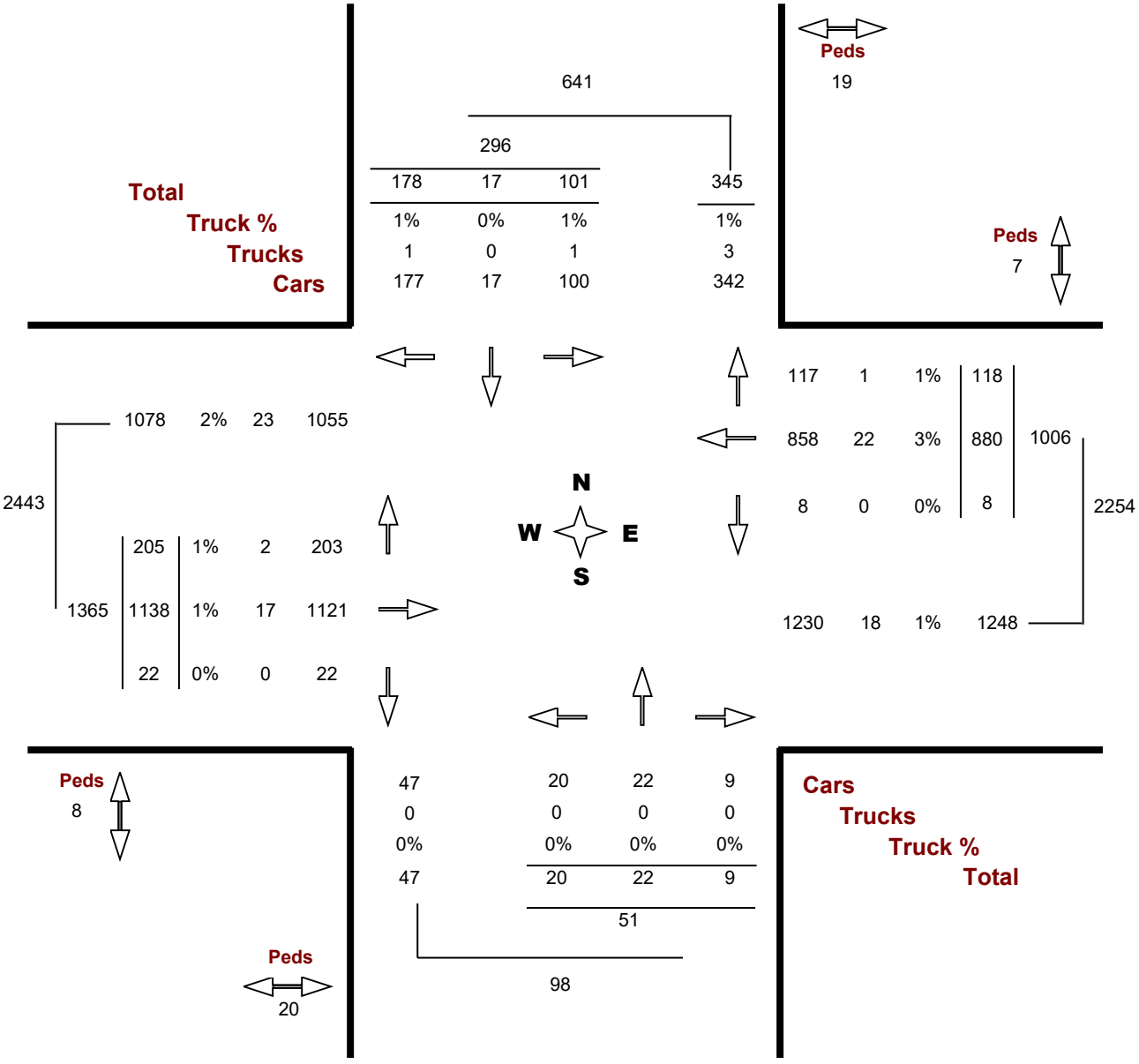
Turning Movements Report - PM Period

Location..... CLARKSON RD N @ LAKESHORE RD W

Municipality..... Mississauga **GeoID.....** 349439

Count Date..... Tuesday, 17 December, 201 **Peak Hour.....** 04:45 PM — 05:45 PM

Road 1 CLARKSON RD N **Road 2** LAKESHORE RD W



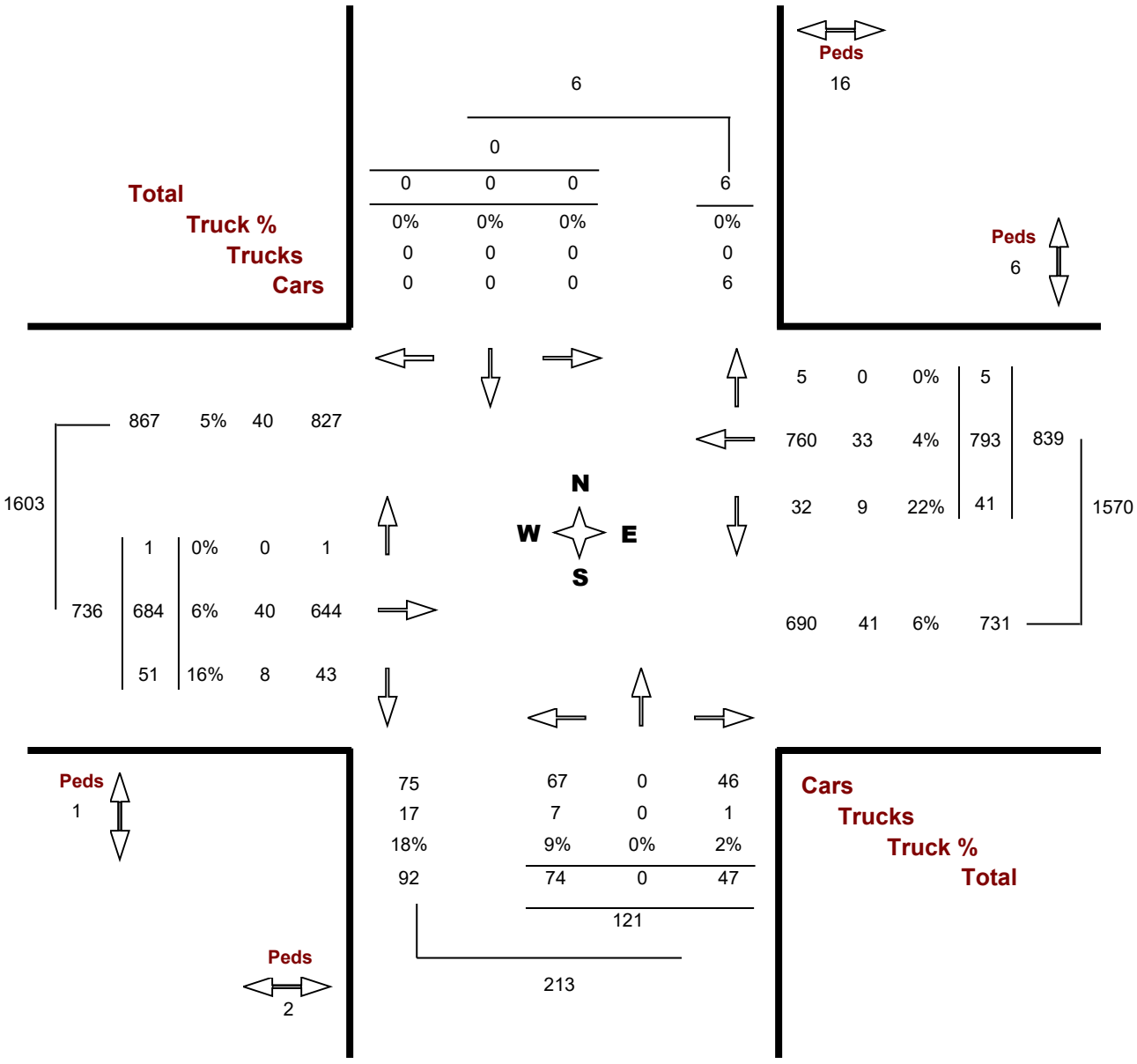
Turning Movements Report - AM Period

Location..... LAKESHORE RD W @ MEADOW WOOD RD

Municipality..... Mississauga **GeoID.....** 349539

Count Date..... Tuesday, 17 December, 201 **Peak Hour.....** 08:00 AM — 09:00 AM

Road 1 LAKESHORE RD W **Road 2** MEADOW WOOD RD



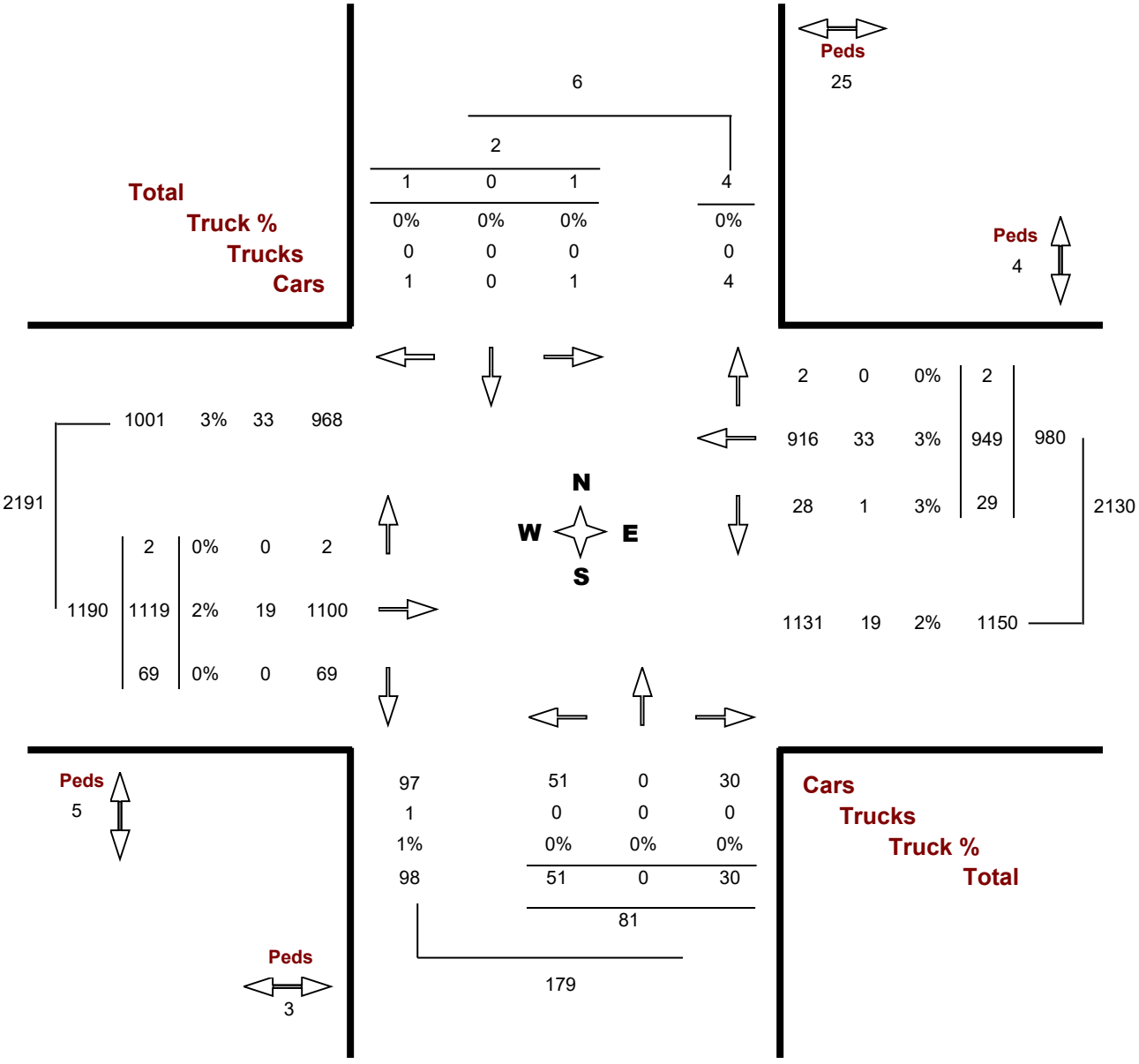
Turning Movements Report - PM Period

Location..... LAKESHORE RD W @ MEADOW WOOD RD

Municipality..... Mississauga **GeoID.....** 349539

Count Date..... Tuesday, 17 December, 201 **Peak Hour.....** 04:30 PM — 05:30 PM

Road 1 LAKESHORE RD W **Road 2** MEADOW WOOD RD



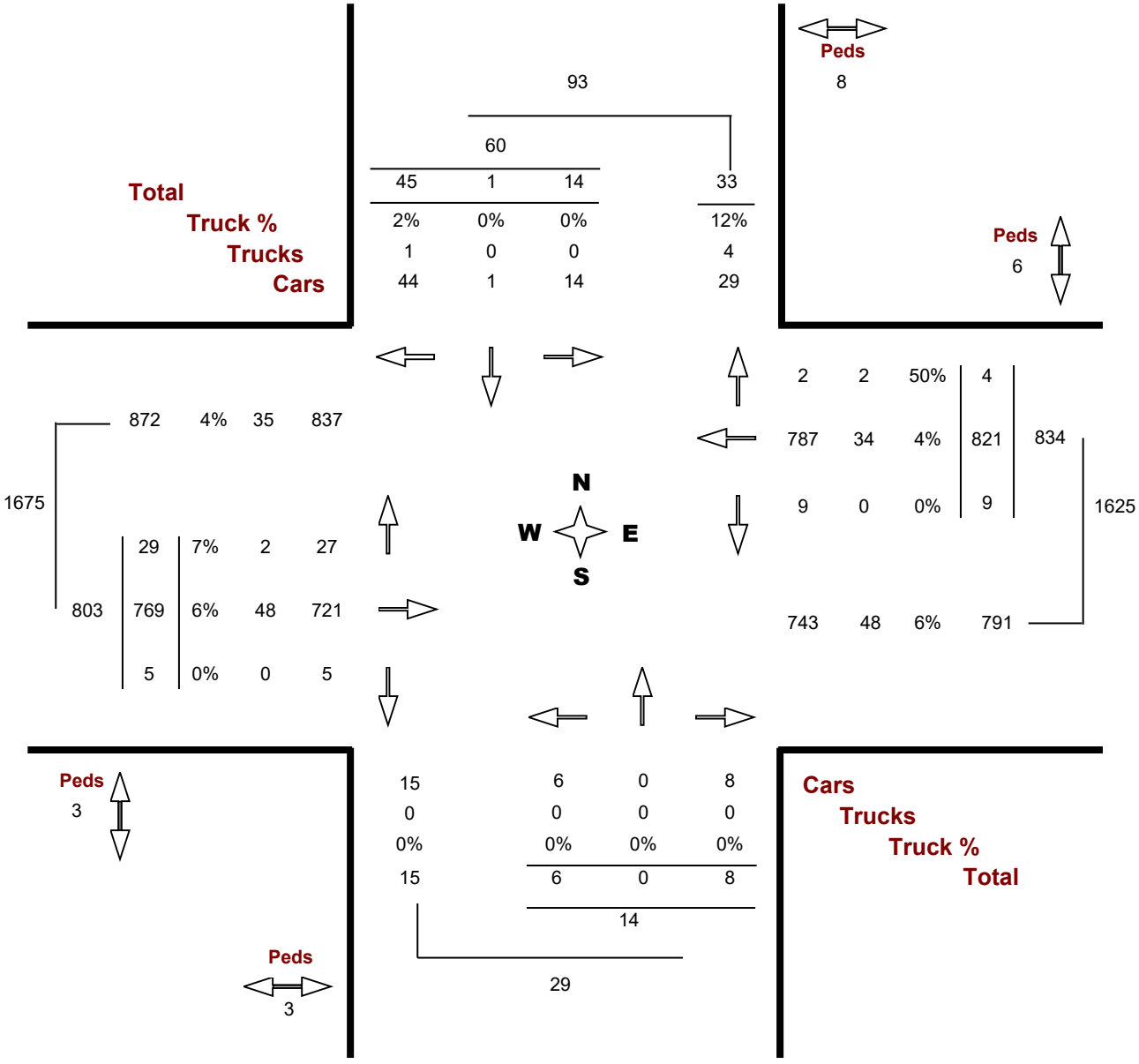
Turning Movements Report - AM Period

Location..... LAKESHORE RD W @ UNNAMED UCOM

Municipality..... Mississauga **GeoID.....** 349308

Count Date..... Tuesday, 17 December, 201 **Peak Hour.....** 08:00 AM — 09:00 AM

Road 1 UNNAMED UCOM **Road 2** LAKESHORE RD W



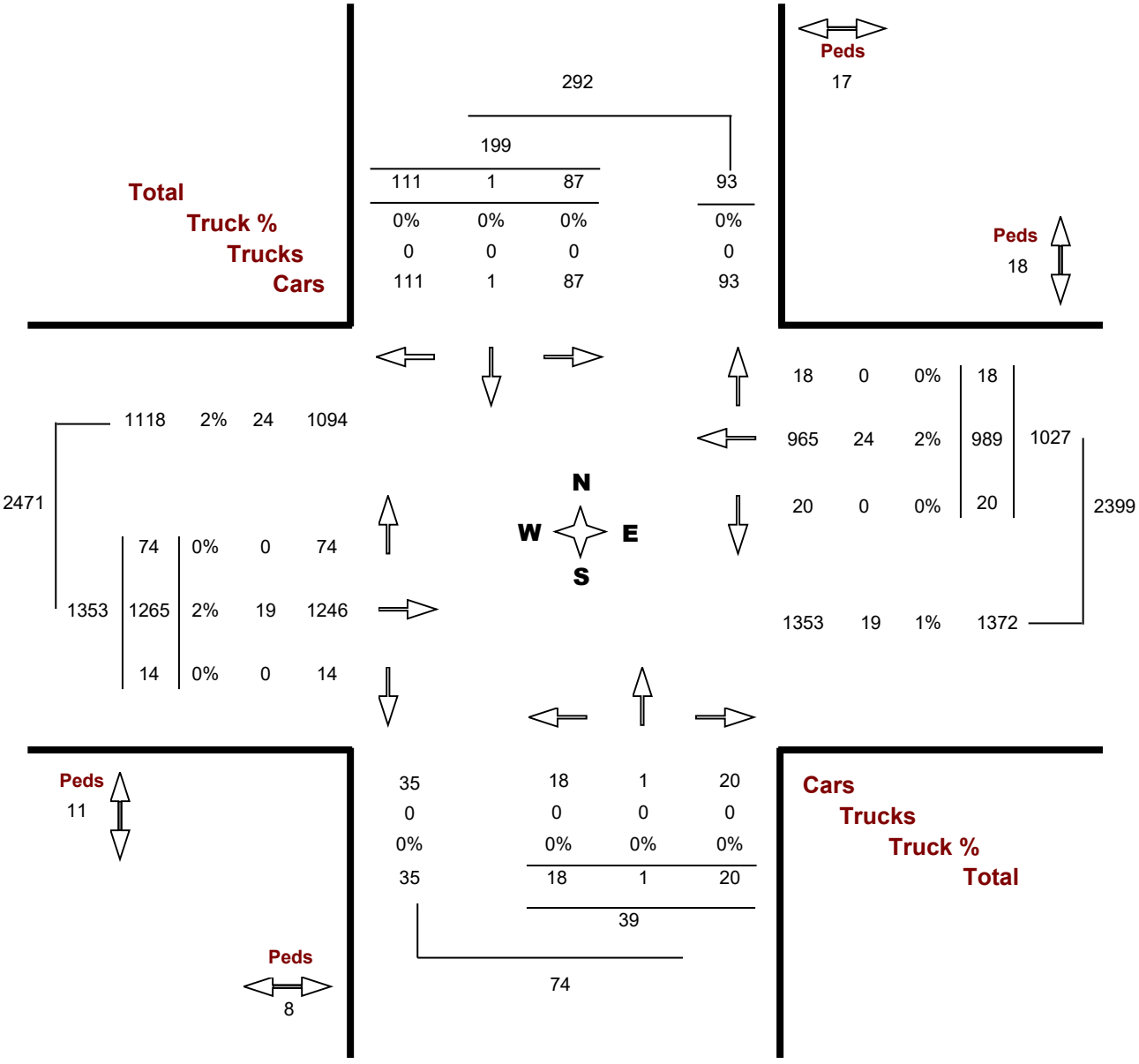
Turning Movements Report - PM Period

Location..... LAKESHORE RD W @ UNNAMED UCOM

Municipality..... Mississauga **GeoID.....** 349308

Count Date..... Tuesday, 17 December, 201 **Peak Hour.....** 04:45 PM — 05:45 PM

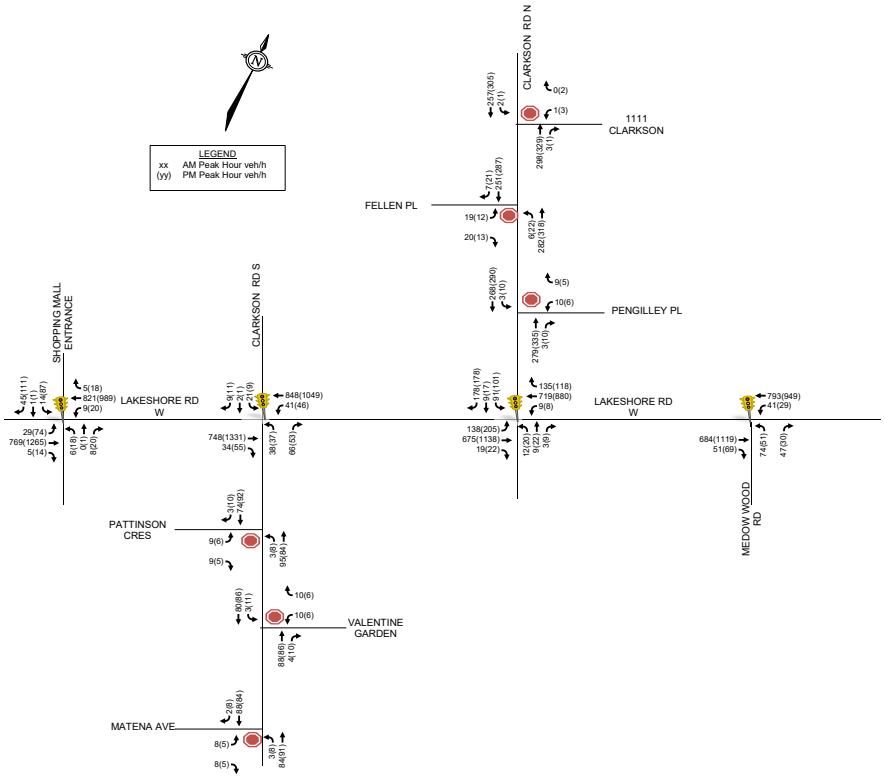
Road 1 UNNAMED UCOM **Road 2** LAKESHORE RD W



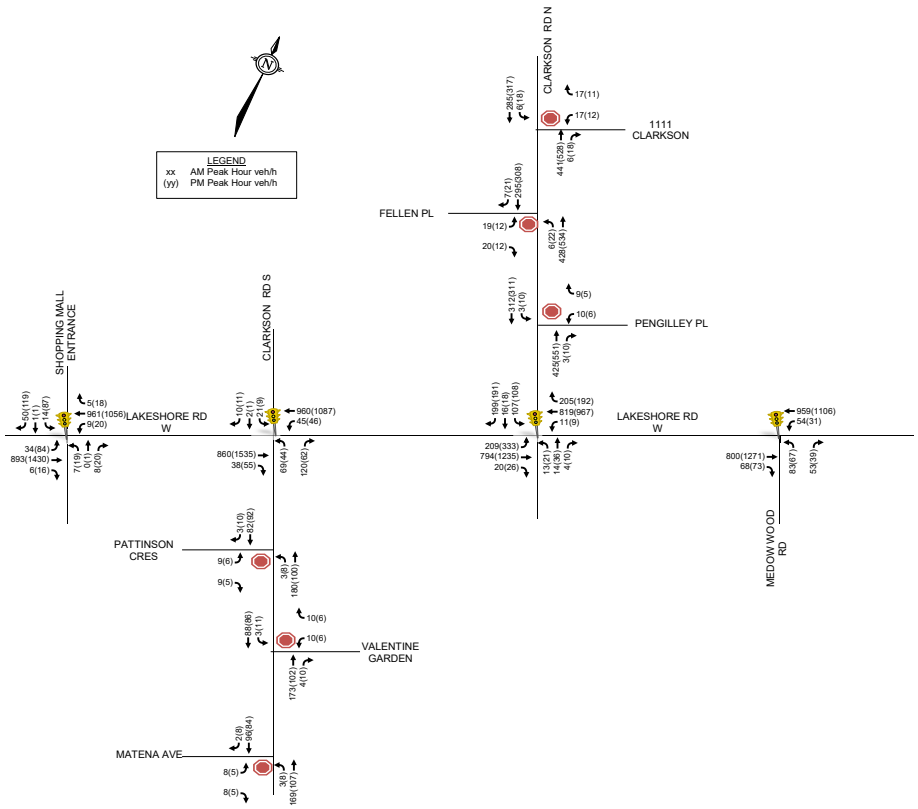
B

Appendix B: Volumes

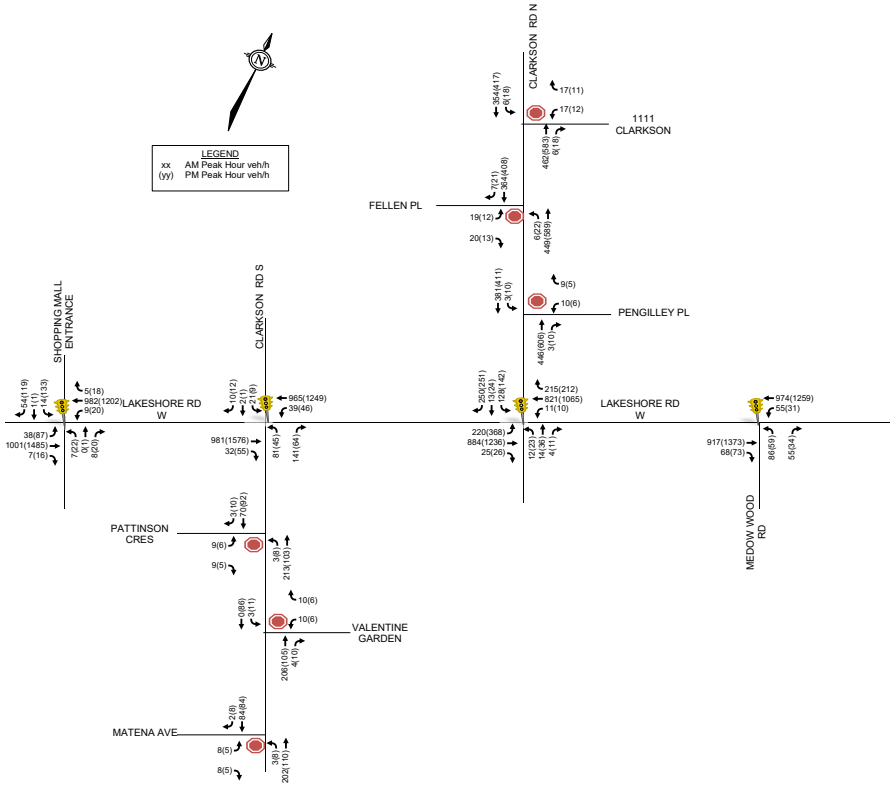
EXISTING CONDITIONS



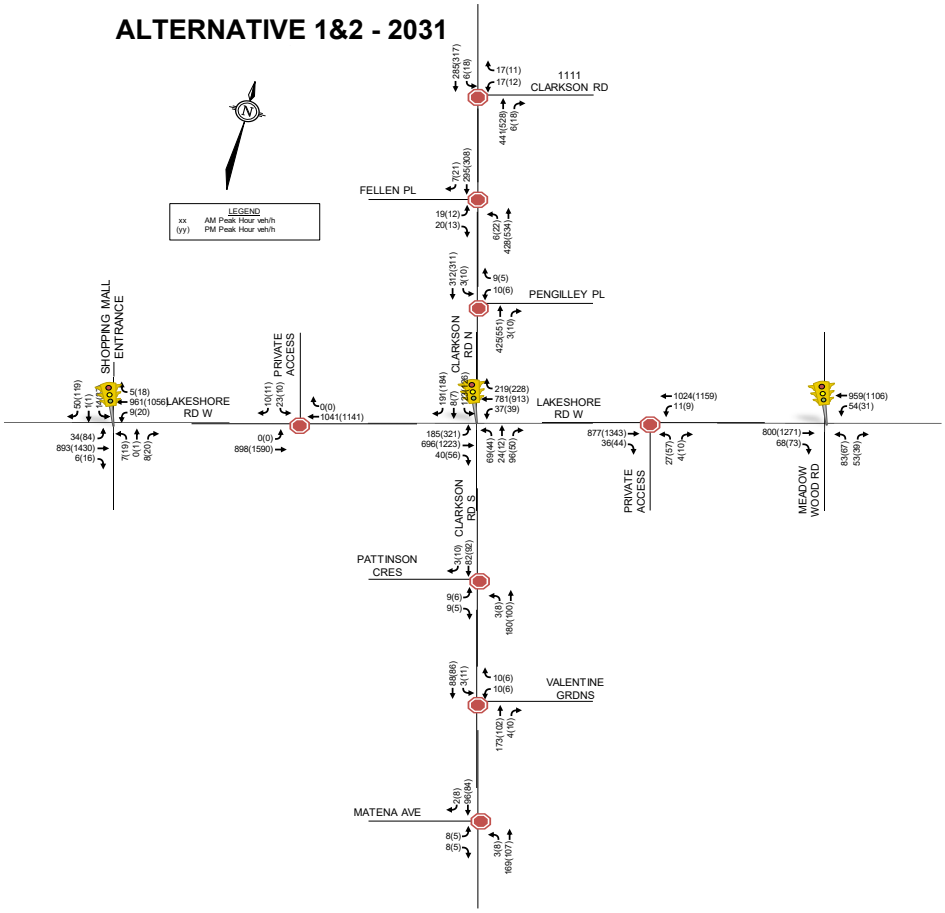
DO-NOTHING - 2031



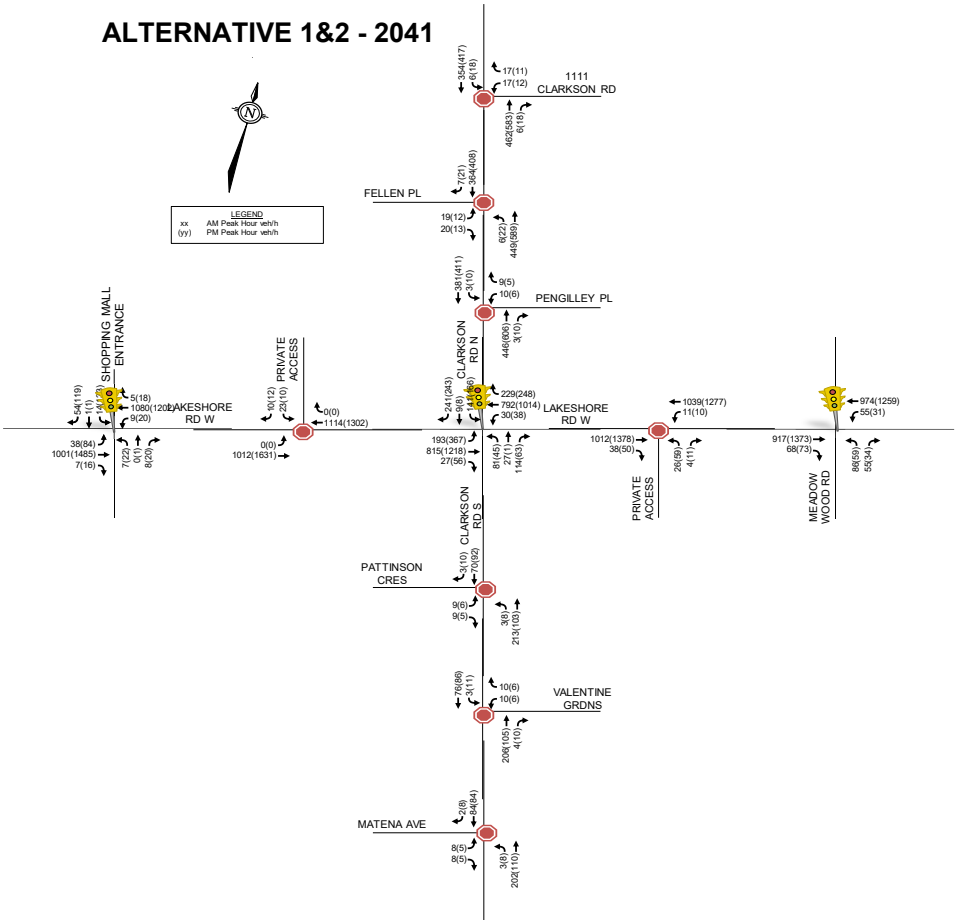
DO-NOTHING - 2041



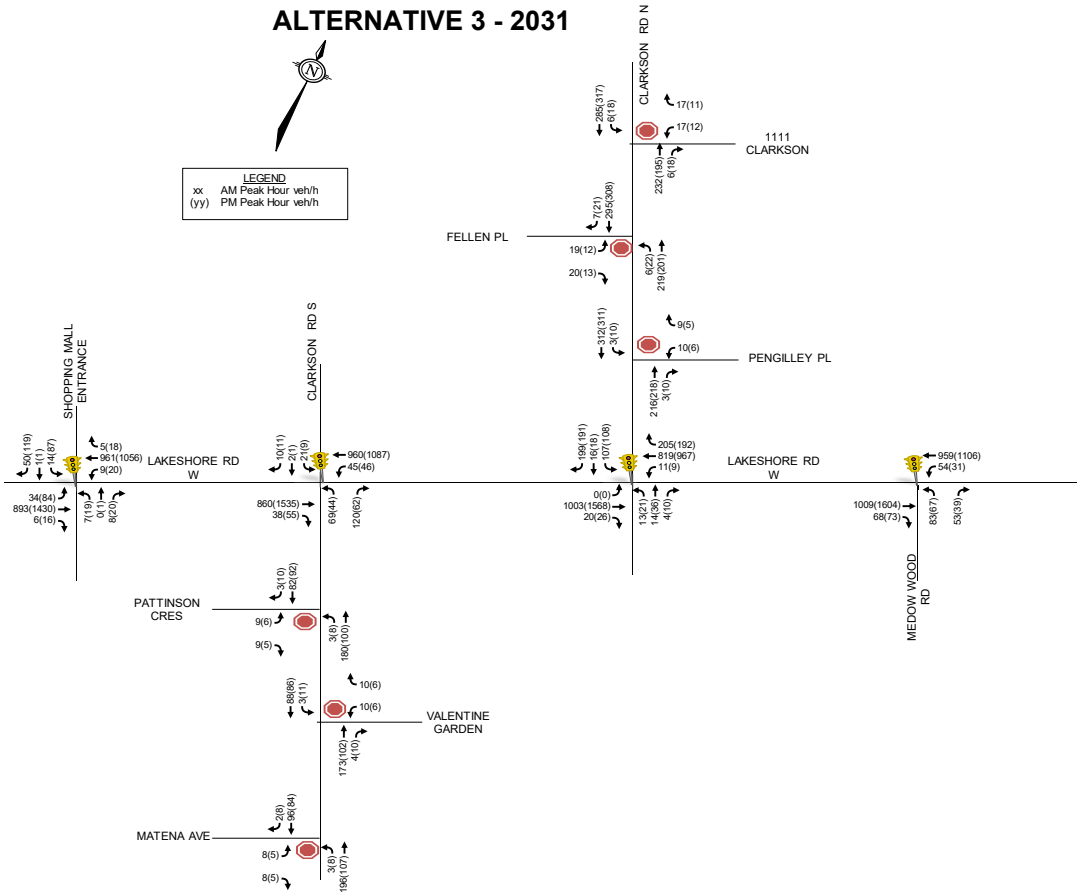
ALTERNATIVE 1&2 - 2031



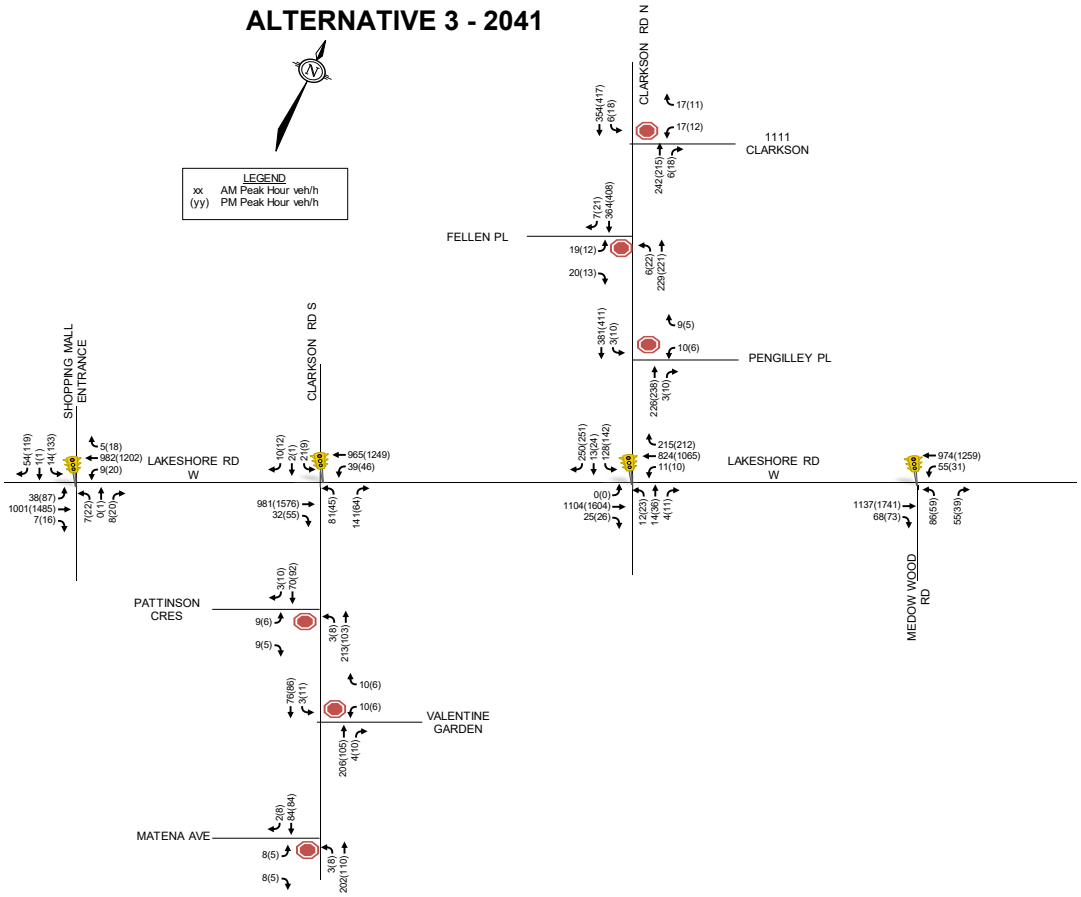
ALTERNATIVE 1&2 - 2041



ALTERNATIVE 3 - 2031



ALTERNATIVE 3 - 2041



C

Appendix C: Calculations

2031 AM / PM

AM 2031

Lakeshore & Clarkson N

2019 TMCs

		SBR	SBT	SBL		
		178	9	91		
EBL	138				135	WBR
EBT	675				719	WBT
EBR	19				9	WBL
		12	9	3		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on 2019 TMC

		SBR	SBT	SBL		
		64.03%	3.24%	32.73%		
EBL	48.94%				47.87%	WBR
EBT						WBT
EBR						WBL
			3.19%			
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction

NB	SB
428	322

Total 2031 Projected Volumes

		SBR	SBT	SBL		
		206	10	105		
EBL	209				205	WBR
EBT						WBT
EBR						WBL
		0	14	0		
		NBL	NBT	NBR		

PM 2031

Lakeshore & Clarkson N

2019 TMCs

		SBR	SBT	SBL		
		178	17	101		
EBL	205				118	WBR
EBT	1138				880	WBT
EBR	22				8	WBL
		20	22	9		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on 2019 TMC

		SBR	SBT	SBL		
		60.14%	5.74%	34.12%		
EBL	59.42%				34.20%	WBR
EBT						WBT
EBR						WBL
			6.38%			
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction

NB	SB
561	317

Total 2031 Projected Volumes

		SBR	SBT	SBL		
		191	18	108		
EBL	333				192	WBR
EBT						WBT
EBR						WBL
		0	36	0		
		NBL	NBT	NBR		

AM 2031

Lakeshore & Clarkson S

2019 TMCs

		SBR	SBT	SBL		
		9	2	12		
EBL	0				0	WBR
EBT	748				848	WBT
EBR	34				41	WBL
		38	0	66		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on

		SBR	SBT	SBL		
			2.60%			
EBL						WBR
EBT						WBT
EBR	44.16%				53.25%	WBL
		36.54%	0.00%	63.46%		
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction

NB	SB
189	84

Total 2031 Projected Volumes

		SBR	SBT	SBL		
		0	2	0		
EBL	0				0	WBR
EBT	0				0	WBT
EBR	37				45	WBL
		69	0	120		
		NBL	NBT	NBR		

2031 AM / PM

PM 2031

Lakeshore & Clarkson S

2019 TMCs

		SBR	SBT	SBL		
		11	1	9		
EBL	0				0	WBR
EBT	1331				1049	WBT
EBR	55				46	WBL
		37	0	53		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on

		SBR	SBT	SBL		
			0.98%			
EBL						WBR
EBT						WBT
EBR	53.92%				45.10%	WBL
		41.11%	0.00%	58.89%		
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction	
NB	SB
106	102

Total 2031 Projected Volumes

		SBR	SBT	SBL		
		0	1	0		
EBL	0				0	WBR
EBT	0				0	WBT
EBR	55				46	WBL
		44	0	62		
		NBL	NBT	NBR		

AM 2031

Lakeshore & Meadow Wood

2019 TMCs

EBL	0				0	WBR
EBT	684				793	WBT
EBR	51				41	WBL
		74	0	47		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on

EBL						WBR
EBT						WBT
EBR	55.43%				44.57%	WBL
		61.16%	0.00%	38.84%		
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction	
NB	SB
136	122

Total 2031 Projected Volumes

		0	0	0		
EBL	0				0	WBR
EBT	0				0	WBT
EBR	68				54	WBL
		83	0	53		
		NBL	NBT	NBR		

PM 2031

Lakeshore & Meadow Wood

2019 TMCs

EBL	0				0	WBR
EBT	1119				949	WBT
EBR	69				29	WBL
		51		30		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on

EBL						WBR
EBT						WBT
EBR	70.41%				29.59%	WBL
		62.96%	0.00%	37.04%		
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction	
NB	SB
106	104

Total 2031 Projected Volumes

		0	0	0		
EBL	0				0	WBR
EBT	0				0	WBT
EBR	73				31	WBL
		67	0	39		
		NBL	NBT	NBR		

2041 AM / PM

AM 2041

Lakeshore & Clarkson N

2019 TMCs

		SBR	SBT	SBL		
		178	9	91		
EBL	138				135	WBR
EBT	675				719	WBT
EBR	19				9	WBL
		12	9	3		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on 2019 TMC

		SBR	SBT	SBL		
		64.03%	3.24%	32.73%		
EBL	48.94%				47.87%	WBR
EBT						WBT
EBR						WBL
			3.19%			
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction

NB	SB
449	391

Total 2031 Projected Volumes

		SBR	SBT	SBL		
		250	13	128		
EBL	220				215	WBR
EBT						WBT
EBR						WBL
		0	14	0		
		NBL	NBT	NBR		

PM 2041

Lakeshore & Clarkson N

2019 TMCs

		SBR	SBT	SBL		
		178	17	101		
EBL	205				118	WBR
EBT	1138				880	WBT
EBR	22				8	WBL
		20	22	9		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on 2019 TMC

		SBR	SBT	SBL		
		60.14%	5.74%	34.12%		
EBL	59.42%				34.20%	WBR
EBT						WBT
EBR						WBL
			6.38%			
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction

NB	SB
619	417

Total 2031 Projected Volumes

		SBR	SBT	SBL		
		251	24	142		
EBL	368				212	WBR
EBT						WBT
EBR						WBL
		0	39	0		
		NBL	NBT	NBR		

AM 2041

Lakeshore & Clarkson S

2019 TMCs

		SBR	SBT	SBL		
		9	2	12		
EBL	0				0	WBR
EBT	748				848	WBT
EBR	34				41	WBL
		38	0	66		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on

		SBR	SBT	SBL		
			2.60%			
EBL						WBR
EBT						WBT
EBR	44.16%				53.25%	WBL
		36.54%	0.00%	63.46%		
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction

NB	SB
222	73

Total 2031 Projected Volumes

		SBR	SBT	SBL		
		0	2	0		
EBL	0				0	WBR
EBT	0				0	WBT
EBR	32				39	WBL
		81	0	141		
		NBL	NBT	NBR		

2041 AM / PM

PM 2041

Lakeshore & Clarkson S

2019 TMCs

		SBR	SBT	SBL		
		11	1	9		
EBL	0				0	WBR
EBT	1331				1049	WBT
EBR	55				46	WBL
		37	0	53		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on

		SBR	SBT	SBL		
			0.98%			
EBL						WBR
EBT						WBT
EBR	53.92%				45.10%	WBL
		41.11%	0.00%	58.89%		
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction	
NB	SB
109	102

Total 2031 Projected Volumes

		SBR	SBT	SBL		
		0	1	0		
EBL	0				0	WBR
EBT	0				0	WBT
EBR	55				46	WBL
		45	0	64		
		NBL	NBT	NBR		

AM 2041

Lakeshore & Meadow Wood

2019 TMCs

EBL	0				0	WBR
EBT	684				793	WBT
EBR	51				41	WBL
		74	0	47		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on

EBL						WBR
EBT						WBT
EBR	55.43%				44.57%	WBL
		61.16%	0.00%	38.84%		
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction	
NB	SB
141	123

Total 2031 Projected Volumes

		0	0	0		
EBL	0				0	WBR
EBT	0				0	WBT
EBR	68				55	WBL
		86	0	55		
		NBL	NBT	NBR		

PM 2041

Lakeshore & Meadow Wood

2019 TMCs

EBL	0				0	WBR
EBT	1119				949	WBT
EBR	69				29	WBL
		51		30		
		NBL	NBT	NBR		

Distribution Percentage by Movements - based on

EBL						WBR
EBT						WBT
EBR	70.41%				29.59%	WBL
		62.96%	0.00%	37.04%		
		NBL	NBT	NBR		

Project Volumes (as per email)

Direction	
NB	SB
93	104

Total 2031 Projected Volumes

		0	0	0		
EBL	0				0	WBR
EBT	0				0	WBT
EBR	73				31	WBL
		59	0	34		
		NBL	NBT	NBR		

D

Appendix D: Synchro / Sim Traffic Reports

Engineering for people

EXISTING CONDITIONS

Engineering
for **people**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	748	34	41	848	0	38	0	66	21	2	9
Future Volume (vph)	0	748	34	41	848	0	38	0	66	21	2	9
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00			1.00	
Frt		0.99		1.00	1.00			0.91			0.96	
Flt Protected		1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)		3382		1719	3510			1630			1664	
Flt Permitted		1.00		0.33	1.00			0.87			0.62	
Satd. Flow (perm)		3382		590	3510			1436			1066	
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	813	37	45	922	0	41	0	72	23	2	10
RTOR Reduction (vph)	0	1	0	0	0	0	0	52	0	0	9	0
Lane Group Flow (vph)	0	849	0	45	922	0	0	61	0	0	26	0
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	0%	7%	6%	5%	4%	0%	8%	0%	2%	5%	0%	11%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		115.0		115.0	115.0			13.0			13.0	
Effective Green, g (s)		115.0		115.0	115.0			13.0			13.0	
Actuated g/C Ratio		0.82		0.82	0.82			0.09			0.09	
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)		2778		484	2883			133			98	
v/s Ratio Prot		0.25			c0.26							
v/s Ratio Perm				0.08				c0.04			0.02	
v/c Ratio		0.31		0.09	0.32			0.46			0.26	
Uniform Delay, d1		3.0		2.4	3.0			60.2			59.1	
Progression Factor		1.17		0.21	0.31			1.00			1.00	
Incremental Delay, d2		0.3		0.4	0.3			2.5			1.4	
Delay (s)		3.8		0.9	1.2			62.7			60.5	
Level of Service		A		A	A			E			E	
Approach Delay (s)		3.8			1.2			62.7			60.5	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.2%	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)	138	675	19	9	719	135	12	9	3	91	9	178
Future Volume (vph)	138	675	19	9	719	135	12	9	3	91	9	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1752	3398		1805	3368			1836			1745	1571
Flt Permitted	0.27	1.00		0.37	1.00			0.83			0.73	1.00
Satd. Flow (perm)	501	3398		694	3368			1568			1326	1571
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)	150	734	21	10	782	147	13	10	3	99	10	193
RTOR Reduction (vph)	0	1	0	0	7	0	0	3	0	0	0	169
Lane Group Flow (vph)	150	754	0	10	922	0	0	23	0	0	109	24
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	4%	7%	0%	0%	5%	4%	0%	0%	0%	5%	0%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	110.9	110.9		99.8	99.8			17.1			17.1	17.1
Effective Green, g (s)	110.9	110.9		99.8	99.8			17.1			17.1	17.1
Actuated g/C Ratio	0.79	0.79		0.71	0.71			0.12			0.12	0.12
Clearance Time (s)	3.0	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)	469	2691		494	2400			191			161	191
v/s Ratio Prot	c0.02	0.22			c0.27							
v/s Ratio Perm	0.23			0.01				0.01			c0.08	0.02
v/c Ratio	0.32	0.28		0.02	0.38			0.12			0.68	0.12
Uniform Delay, d1	4.0	3.9		5.9	7.9			54.8			58.8	54.8
Progression Factor	0.87	0.62		0.69	0.76			1.00			1.00	1.00
Incremental Delay, d2	0.4	0.3		0.1	0.5			0.3			10.7	0.3
Delay (s)	3.9	2.7		4.1	6.5			55.1			69.5	55.1
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		2.9			6.5			55.1			60.3	
Approach LOS		A			A			E			E	

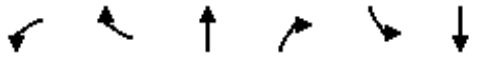
Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	3	95	74	3
Future Volume (Veh/h)	9	9	3	95	74	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	10	3	103	80	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	190	82	83			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	190	82	83			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	797	978	1514			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	106	83
Volume Left	10	3	0
Volume Right	10	0	3
cSH	878	1514	1700
Volume to Capacity	0.02	0.00	0.05
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.2	0.2	0.0
Lane LOS	A	A	
Approach Delay (s)	9.2	0.2	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	17.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	88	4	3	80
Future Volume (Veh/h)	10	10	88	4	3	80
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	96	4	3	87
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	191	98			100	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	191	98			100	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			100	
cM capacity (veh/h)	796	958			1493	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	100	90
Volume Left	11	0	3
Volume Right	11	4	0
cSH	870	1700	1493
Volume to Capacity	0.03	0.06	0.00
Queue Length 95th (m)	0.6	0.0	0.0
Control Delay (s)	9.2	0.0	0.3
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	0.3
Approach LOS	A		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	8	3	84	88	2
Future Volume (Veh/h)	8	8	3	84	88	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	9	3	91	96	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	194	97	98			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	194	97	98			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	793	959	1495			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	18	94	98
Volume Left	9	3	0
Volume Right	9	0	2
cSH	868	1495	1700
Volume to Capacity	0.02	0.00	0.06
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.2	0.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.2	0.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	9	279	3	3	268
Future Volume (Veh/h)	10	9	279	3	3	268
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	10	303	3	3	291
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.99	0.99			0.99	
vC, conflicting volume	602	304			306	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	596	298			299	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	462	738			1255	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	21	306	294
Volume Left	11	0	3
Volume Right	10	3	0
cSH	562	1700	1255
Volume to Capacity	0.04	0.18	0.00
Queue Length 95th (m)	0.9	0.0	0.1
Control Delay (s)	11.7	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	11.7	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		26.5%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	20	6	282	251	7
Future Volume (Veh/h)	19	20	6	282	251	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	22	7	307	273	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked						
vC, conflicting volume	598	277	281			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	598	277	281			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	97	99			
cM capacity (veh/h)	463	762	1282			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	314	281
Volume Left	21	7	0
Volume Right	22	0	8
cSH	579	1282	1700
Volume to Capacity	0.07	0.01	0.17
Queue Length 95th (m)	1.8	0.1	0.0
Control Delay (s)	11.7	0.2	0.0
Lane LOS	B	A	
Approach Delay (s)	11.7	0.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	29.7%	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)	29	769	5	9	821	4	6	0	8	14	1	45
Future Volume (vph)	29	769	5	9	821	4	6	0	8	14	1	45
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	1.00			0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1690	3441		1818	3500			1714			1821	1575
Flt Permitted	0.31	1.00		0.33	1.00			0.87			0.73	1.00
Satd. Flow (perm)	555	3441		634	3500			1525			1387	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)	32	836	5	10	892	4	7	0	9	15	1	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	15	0	0	0	45
Lane Group Flow (vph)	32	841	0	10	896	0	0	1	0	0	16	4
Confl. Peds. (#/hr)	8		3	3		8	3		6	6		3
Heavy Vehicles (%)	7%	6%	0%	0%	4%	50%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Effective Green, g (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.08			0.08	0.08
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)	464	2880		530	2930			117			106	121
v/s Ratio Prot		0.24			c0.26							
v/s Ratio Perm	0.06			0.02				0.00			c0.01	0.00
v/c Ratio	0.07	0.29		0.02	0.31			0.01			0.15	0.03
Uniform Delay, d1	2.0	2.5		1.9	2.5			59.7			60.3	59.8
Progression Factor	1.00	1.00		0.67	0.56			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.3		0.1	0.3			0.0			0.7	0.1
Delay (s)	2.3	2.7		1.3	1.7			59.7			61.0	59.9
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		2.7			1.6			59.7			60.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	0	298	3	2	257
Future Volume (Veh/h)	1	0	298	3	2	257
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	324	3	2	279
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			228			
pX, platoon unblocked						
vC, conflicting volume	608	326			327	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	608	326			327	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	458	716			1233	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	1	327	281
Volume Left	1	0	2
Volume Right	0	3	0
cSH	458	1700	1233
Volume to Capacity	0.00	0.19	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	12.9	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	12.9	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	25.9%	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)	0	684	51	41	793	0	74	0	47	0	0	0
Future Volume (vph)	0	684	51	41	793	0	74	0	47	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.99				
Flpb, ped/bikes		1.00		1.00	1.00			1.00				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3534		1782	3579			1708				
Flt Permitted		1.00		0.34	1.00			0.97				
Satd. Flow (perm)		3534		643	3579			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)	0	743	55	45	862	0	80	0	51	0	0	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	21	0	0	0	0
Lane Group Flow (vph)	0	796	0	45	862	0	0	110	0	0	0	0
Confl. Peds. (#/hr)			3	3			3		6			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		112.7		112.7	112.7			14.3				
Effective Green, g (s)		112.7		112.7	112.7			14.3				
Actuated g/C Ratio		0.81		0.81	0.81			0.10				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Vehicle Extension (s)		3.0		3.0	3.0			3.0				
Lane Grp Cap (vph)		2844		517	2881			174				
v/s Ratio Prot		0.23			c0.24							
v/s Ratio Perm				0.07				0.06				
v/c Ratio		0.28		0.09	0.30			0.63				
Uniform Delay, d1		3.4		2.9	3.5			60.3				
Progression Factor		0.60		1.00	1.00			1.00				
Incremental Delay, d2		0.2		0.3	0.3			7.3				
Delay (s)		2.3		3.2	3.8			67.7				
Level of Service		A		A	A			E				
Approach Delay (s)		2.3			3.7			67.7			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	51.8%	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	1331	55	46	1049	0	37	0	53	9	1	11
Future Volume (vph)	0	1331	55	46	1049	0	37	0	53	9	1	11
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		0.99	1.00			0.99			1.00	
Frt		0.99		1.00	1.00			0.92			0.93	
Flt Protected		1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)		3545		1814	3544			1678			1640	
Flt Permitted		1.00		0.15	1.00			0.86			0.82	
Satd. Flow (perm)		3545		291	3544			1467			1379	
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	1447	60	50	1140	0	40	0	58	10	1	12
RTOR Reduction (vph)	0	1	0	0	0	0	0	43	0	0	11	0
Lane Group Flow (vph)	0	1506	0	50	1140	0	0	55	0	0	12	0
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	9%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		115.4		115.4	115.4			12.6			12.6	
Effective Green, g (s)		115.4		115.4	115.4			12.6			12.6	
Actuated g/C Ratio		0.82		0.82	0.82			0.09			0.09	
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)		2922		239	2921			132			124	
v/s Ratio Prot		c0.42			0.32							
v/s Ratio Perm				0.17				c0.04			0.01	
v/c Ratio		0.52		0.21	0.39			0.42			0.10	
Uniform Delay, d1		3.8		2.6	3.2			60.2			58.5	
Progression Factor		1.15		0.41	0.34			1.00			1.00	
Incremental Delay, d2		0.6		1.8	0.4			2.1			0.3	
Delay (s)		4.9		2.9	1.5			62.4			58.8	
Level of Service		A		A	A			E			E	
Approach Delay (s)		4.9			1.5			62.4			58.8	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.4%	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)	205	1138	22	8	880	118	20	22	9	101	17	178
Future Volume (vph)	205	1138	22	8	880	118	20	22	9	101	17	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1804	3598		1803	3454			1823			1810	1576
Flt Permitted	0.22	1.00		0.22	1.00			0.79			0.75	1.00
Satd. Flow (perm)	421	3598		417	3454			1473			1422	1576
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)	223	1237	24	9	957	128	22	24	10	110	18	193
RTOR Reduction (vph)	0	1	0	0	6	0	0	6	0	0	0	168
Lane Group Flow (vph)	223	1260	0	9	1079	0	0	50	0	0	128	25
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	1%	1%	0%	0%	3%	1%	0%	0%	0%	1%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	109.9	109.9		98.9	98.9			18.1			18.1	18.1
Effective Green, g (s)	109.9	109.9		98.9	98.9			18.1			18.1	18.1
Actuated g/C Ratio	0.79	0.79		0.71	0.71			0.13			0.13	0.13
Clearance Time (s)	3.0	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)	409	2824		294	2440			190			183	203
v/s Ratio Prot	c0.03	0.35			0.31							
v/s Ratio Perm	c0.40			0.02				0.03			c0.09	0.02
v/c Ratio	0.55	0.45		0.03	0.44			0.26			0.70	0.12
Uniform Delay, d1	5.4	5.0		6.2	8.8			54.9			58.3	53.9
Progression Factor	1.82	0.30		0.39	0.46			1.00			1.00	1.00
Incremental Delay, d2	4.5	0.4		0.2	0.5			0.7			11.1	0.3
Delay (s)	14.3	2.0		2.6	4.6			55.7			69.4	54.2
Level of Service	B	A		A	A			E			E	D
Approach Delay (s)		3.8			4.5			55.7			60.3	
Approach LOS		A			A			E			E	

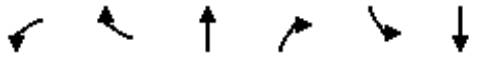
Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	5	8	84	92	10
Future Volume (Veh/h)	6	5	8	84	92	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	9	91	100	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	214	106	111			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	214	106	111			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	769	949	1479			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	100	111
Volume Left	7	9	0
Volume Right	5	0	11
cSH	835	1479	1700
Volume to Capacity	0.01	0.01	0.07
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.4	0.7	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	0.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	6	86	10	11	86
Future Volume (Veh/h)	6	6	86	10	11	86
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	7	93	11	12	93
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	216	98			104	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	216	98			104	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	767	957			1488	

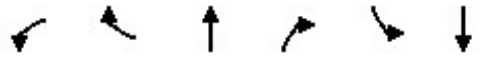
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	14	104	105
Volume Left	7	0	12
Volume Right	7	11	0
cSH	851	1700	1488
Volume to Capacity	0.02	0.06	0.01
Queue Length 95th (m)	0.4	0.0	0.2
Control Delay (s)	9.3	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.3	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	5	8	91	84	8
Future Volume (Veh/h)	5	5	8	91	84	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	9	99	91	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	212	96	100			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	212	96	100			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	771	961	1493			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	108	100
Volume Left	5	9	0
Volume Right	5	0	9
cSH	856	1493	1700
Volume to Capacity	0.01	0.01	0.06
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.3	0.7	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	0.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	5	335	10	10	290
Future Volume (Veh/h)	6	5	335	10	10	290
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	364	11	11	315
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.98	0.98			0.98	
vC, conflicting volume	706	370			375	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	687	342			348	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	399	684			1183	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	12	375	326
Volume Left	7	0	11
Volume Right	5	11	0
cSH	483	1700	1183
Volume to Capacity	0.02	0.22	0.01
Queue Length 95th (m)	0.6	0.0	0.2
Control Delay (s)	12.6	0.0	0.4
Lane LOS	B		A
Approach Delay (s)	12.6	0.0	0.4
Approach LOS	B		

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		33.3%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	13	22	318	287	21
Future Volume (Veh/h)	12	13	22	318	287	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	14	24	346	312	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked	0.99					
vC, conflicting volume	718	324	335			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	706	324	335			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	98			
cM capacity (veh/h)	389	717	1224			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	370	335
Volume Left	13	24	0
Volume Right	14	0	23
cSH	510	1224	1700
Volume to Capacity	0.05	0.02	0.20
Queue Length 95th (m)	1.3	0.5	0.0
Control Delay (s)	12.5	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	12.5	0.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		44.8%	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)	74	1265	14	20	989	18	18	1	20	87	1	111
Future Volume (vph)	74	1265	14	20	989	18	18	1	20	87	1	111
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00			0.99			0.98	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1803	3571		1820	3564			1704			1788	1589
Flt Permitted	0.24	1.00		0.17	1.00			0.83			0.77	1.00
Satd. Flow (perm)	461	3571		325	3564			1447			1446	1589
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)	80	1375	15	22	1075	20	20	1	22	95	1	121
RTOR Reduction (vph)	0	0	0	0	1	0	0	19	0	0	0	106
Lane Group Flow (vph)	80	1390	0	22	1094	0	0	24	0	0	96	15
Confl. Peds. (#/hr)	17		8	8		17	11		18	18		11
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	110.9	110.9		110.9	110.9			17.1			17.1	17.1
Effective Green, g (s)	110.9	110.9		110.9	110.9			17.1			17.1	17.1
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.12			0.12	0.12
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)	365	2828		257	2823			176			176	194
v/s Ratio Prot		c0.39			0.31							
v/s Ratio Perm	0.17			0.07				0.02			c0.07	0.01
v/c Ratio	0.22	0.49		0.09	0.39			0.13			0.55	0.08
Uniform Delay, d1	3.7	5.0		3.2	4.4			54.8			57.8	54.5
Progression Factor	1.00	1.00		0.75	0.68			1.00			1.00	1.00
Incremental Delay, d2	1.4	0.6		0.6	0.4			0.3			3.4	0.2
Delay (s)	5.0	5.6		3.0	3.4			55.2			61.2	54.6
Level of Service	A	A		A	A			E			E	D
Approach Delay (s)		5.5			3.3			55.2			57.5	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	2	329	1	1	305
Future Volume (Veh/h)	3	2	329	1	1	305
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	2	358	1	1	332
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			230			
pX, platoon unblocked						
vC, conflicting volume	692	358			359	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	692	358			359	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	409	686			1200	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	359	333
Volume Left	3	0	1
Volume Right	2	1	0
cSH	488	1700	1200
Volume to Capacity	0.01	0.21	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	12.5	0.0	0.0
Lane LOS	B		A
Approach Delay (s)	12.5	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	27.4%	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)	0	1119	69	29	949	0	51	0	30	0	0	0
Future Volume (vph)	0	1119	69	29	949	0	51	0	30	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.98				
Flpb, ped/bikes		1.00		1.00	1.00			0.98				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3537		1784	3579			1675				
Flt Permitted		1.00		0.18	1.00			0.97				
Satd. Flow (perm)		3537		338	3579			1675				
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	1216	75	32	1032	0	55	0	33	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1288	0	32	1032	0	0	69	0	0	0	0
Confl. Peds. (#/hr)			8	8			11		18			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		103.0		103.0	103.0			24.0				
Effective Green, g (s)		103.0		103.0	103.0			24.0				
Actuated g/C Ratio		0.74		0.74	0.74			0.17				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Lane Grp Cap (vph)		2602		248	2633			287				
v/s Ratio Prot		c0.36			0.29							
v/s Ratio Perm				0.09				0.04				
v/c Ratio		0.49		0.13	0.39			0.24				
Uniform Delay, d1		7.7		5.4	6.9			50.1				
Progression Factor		0.52		1.00	1.00			1.00				
Incremental Delay, d2		0.6		1.1	0.4			2.0				
Delay (s)		4.6		6.5	7.3			52.1				
Level of Service		A		A	A			D				
Approach Delay (s)		4.6			7.3			52.1			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	61.4	54.0	24.3	50.4	50.2	34.2	28.5
Average Queue (m)	25.8	18.6	7.1	16.5	17.8	19.0	9.9
95th Queue (m)	59.0	45.9	17.7	42.9	43.2	35.3	23.5
Link Distance (m)	60.2	60.2		63.1	63.1	32.2	25.4
Upstream Blk Time (%)	0	0		0	0	6	2
Queuing Penalty (veh)	2	0		0	0	6	0
Storage Bay Dist (m)			12.1				
Storage Blk Time (%)			3	5			
Queuing Penalty (veh)			13	2			

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	18.9	59.5	45.8	12.2	62.7	54.8	19.7	54.5	35.8
Average Queue (m)	12.8	19.7	12.0	1.5	24.1	21.1	8.0	24.8	15.5
95th Queue (m)	20.3	44.2	31.2	7.5	49.3	47.8	19.0	45.2	26.8
Link Distance (m)		63.1	63.1		97.6	97.6	15.2	82.6	
Upstream Blk Time (%)		0	0				9	0	
Queuing Penalty (veh)		0	0				0	0	
Storage Bay Dist (m)	8.3			5.9					48.3
Storage Blk Time (%)	27	13		1	18			1	0
Queuing Penalty (veh)	91	18		5	2			3	0

Intersection: 7: Pattinson Cres & Clarkson Rd S

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	9.2
Average Queue (m)	3.2	1.4
95th Queue (m)	9.9	6.9
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		3
Queuing Penalty (veh)		3
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	10.2	9.2	1.9
Average Queue (m)	4.0	0.7	0.1
95th Queue (m)	11.4	4.5	1.3
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		1	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	11.0
Average Queue (m)	4.1	0.5
95th Queue (m)	11.0	4.8
Link Distance (m)	73.1	66.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	10.4	22.2	1.8
Average Queue (m)	4.4	0.7	0.1
95th Queue (m)	11.8	15.7	1.3
Link Distance (m)	93.1	82.6	31.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Fellen Pl & Clarkson Rd N

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	10.5	9.9
Average Queue (m)	6.7	0.7
95th Queue (m)	13.3	5.6
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	22.6	67.8	49.6	9.1	26.4	31.5	13.8	19.3	17.8
Average Queue (m)	4.7	18.8	9.5	1.6	7.4	8.2	4.1	5.0	7.4
95th Queue (m)	15.1	52.3	31.1	7.1	20.5	23.0	12.0	14.2	15.5
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		0					12		
Queuing Penalty (veh)		0					0		
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	1	9		0	4				
Queuing Penalty (veh)	5	3		1	0				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	1.8	1.8
Average Queue (m)	0.1	0.1
95th Queue (m)	1.2	1.3
Link Distance (m)	46.3	37.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	33.0	33.5	21.1	56.0	38.8	64.2
Average Queue (m)	10.6	12.0	5.1	20.8	11.6	25.9
95th Queue (m)	24.4	28.0	14.7	46.2	29.4	51.3
Link Distance (m)	97.6	97.6		73.4	73.4	167.6
Upstream Blk Time (%)				0		
Queuing Penalty (veh)				0		
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			5	13		
Queuing Penalty (veh)			20	5		

Network Summary

Network wide Queuing Penalty: 180

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	62.3	65.1	22.0	30.1	28.3	33.7	22.4
Average Queue (m)	31.7	27.1	9.0	7.0	8.5	17.6	5.0
95th Queue (m)	67.7	62.7	18.7	21.5	22.2	33.7	14.7
Link Distance (m)	60.2	60.2		63.1	63.1	32.2	25.4
Upstream Blk Time (%)	1	1				3	0
Queuing Penalty (veh)	7	4				3	0
Storage Bay Dist (m)			12.1				
Storage Blk Time (%)			8	2			
Queuing Penalty (veh)			44	1			

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	18.8	66.6	66.8	13.3	63.1	59.6	19.8	62.0	33.2
Average Queue (m)	15.8	33.0	24.5	1.9	21.8	22.7	12.3	26.5	15.8
95th Queue (m)	20.2	70.5	59.0	8.6	47.2	48.3	22.7	47.9	28.0
Link Distance (m)		63.1	63.1		98.0	98.0	15.2	82.6	
Upstream Blk Time (%)		1	0				21		
Queuing Penalty (veh)		10	2				0		
Storage Bay Dist (m)	8.3			5.9					48.3
Storage Blk Time (%)	46	11		3	22			1	
Queuing Penalty (veh)	264	23		15	2			3	

Intersection: 7: Clarkson Rd S & Pattinson Cres

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	6.1
Average Queue (m)	2.5	0.8
95th Queue (m)	8.9	5.1
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		1
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	10.8	6.1	6.1
Average Queue (m)	1.9	0.3	0.2
95th Queue (m)	7.9	3.0	2.4
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		0	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.8	8.9
Average Queue (m)	2.0	0.6
95th Queue (m)	7.9	4.2
Link Distance (m)	73.3	49.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.0	14.2
Average Queue (m)	2.9	1.6
95th Queue (m)	9.7	9.2
Link Distance (m)	93.1	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	11.9	14.2
Average Queue (m)	4.9	1.7
95th Queue (m)	12.3	8.5
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.0	73.3	72.3	24.6	49.8	51.6	15.0	33.2	27.6
Average Queue (m)	10.8	53.5	34.5	5.5	24.8	23.7	8.2	19.9	12.5
95th Queue (m)	24.0	87.0	69.5	15.7	45.1	42.4	17.1	35.0	23.3
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		6	1		0	0	23	9	1
Queuing Penalty (veh)		0	0		0	0	0	0	0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	6	20		1	15				
Queuing Penalty (veh)	38	15		5	3				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB
Directions Served	LR
Maximum Queue (m)	9.0
Average Queue (m)	1.5
95th Queue (m)	6.9
Link Distance (m)	69.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

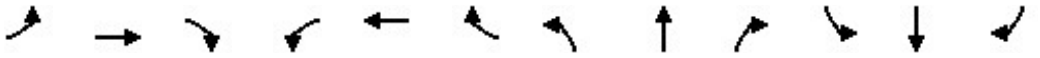
Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	41.9	44.8	21.4	77.4	51.8	39.6
Average Queue (m)	21.7	23.3	5.3	40.7	20.8	17.1
95th Queue (m)	36.8	39.5	14.5	69.9	43.7	33.5
Link Distance (m)	98.0	98.0		72.9	72.9	145.6
Upstream Blk Time (%)				1		
Queuing Penalty (veh)				0		
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			12	20		
Queuing Penalty (veh)			58	6		

Network Summary

Network wide Queuing Penalty: 504

DO NOTHING

Engineering
for **people**



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	860	38	45	960	0	69	0	120	21	2	10
Future Volume (vph)	0	860	38	45	960	0	69	0	120	21	2	10
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00			1.00	
Frt		0.99		1.00	1.00			0.91			0.96	
Flt Protected		1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)		3383		1724	3510			1630			1660	
Flt Permitted		1.00		0.27	1.00			0.86			0.64	
Satd. Flow (perm)		3383		499	3510			1435			1089	
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	935	41	49	1043	0	75	0	130	23	2	11
RTOR Reduction (vph)	0	2	0	0	0	0	0	49	0	0	9	0
Lane Group Flow (vph)	0	974	0	49	1043	0	0	156	0	0	27	0
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	0%	7%	6%	5%	4%	0%	8%	0%	2%	5%	0%	11%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		107.7		107.7	107.7			20.3			20.3	
Effective Green, g (s)		107.7		107.7	107.7			20.3			20.3	
Actuated g/C Ratio		0.77		0.77	0.77			0.15			0.15	
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)		2602		383	2700			208			157	
v/s Ratio Prot		0.29			c0.30							
v/s Ratio Perm				0.10				c0.11			0.02	
v/c Ratio		0.37		0.13	0.39			0.75			0.17	
Uniform Delay, d1		5.2		4.1	5.3			57.4			52.5	
Progression Factor		1.17		0.21	0.32			1.00			1.00	
Incremental Delay, d2		0.4		0.6	0.4			14.2			0.5	
Delay (s)		6.5		1.5	2.1			71.6			53.0	
Level of Service		A		A	A			E			D	
Approach Delay (s)		6.5			2.0			71.6			53.0	
Approach LOS		A			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.9%	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)	209	794	20	11	819	205	13	14	4	107	16	199
Future Volume (vph)	209	794	20	11	819	205	13	14	4	107	16	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.97			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1754	3400		1808	3339			1842			1752	1571
Flt Permitted	0.21	1.00		0.32	1.00			0.85			0.73	1.00
Satd. Flow (perm)	383	3400		611	3339			1600			1334	1571
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)	227	863	22	12	890	223	14	15	4	116	17	216
RTOR Reduction (vph)	0	1	0	0	11	0	0	3	0	0	0	186
Lane Group Flow (vph)	227	884	0	12	1102	0	0	30	0	0	133	30
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	4%	7%	0%	0%	5%	4%	0%	0%	0%	5%	0%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	108.5	108.5		95.2	95.2			19.5			19.5	19.5
Effective Green, g (s)	108.5	108.5		95.2	95.2			19.5			19.5	19.5
Actuated g/C Ratio	0.78	0.78		0.68	0.68			0.14			0.14	0.14
Clearance Time (s)	3.0	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)	397	2635		415	2270			222			185	218
v/s Ratio Prot	c0.04	0.26			0.33							
v/s Ratio Perm	c0.40			0.02				0.02			c0.10	0.02
v/c Ratio	0.57	0.34		0.03	0.49			0.13			0.72	0.14
Uniform Delay, d1	6.5	4.8		7.3	10.7			52.8			57.6	52.9
Progression Factor	2.77	0.61		0.68	0.78			1.00			1.00	1.00
Incremental Delay, d2	1.9	0.3		0.1	0.7			0.3			12.5	0.3
Delay (s)	19.7	3.2		5.1	9.0			53.1			70.2	53.2
Level of Service	B	A		A	A			D			E	D
Approach Delay (s)		6.6			9.0			53.1			59.6	
Approach LOS		A			A			D			E	

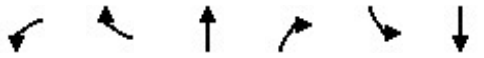
Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	3	180	82	3
Future Volume (Veh/h)	9	9	3	180	82	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	10	3	196	89	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	292	90	92			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	292	90	92			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	697	967	1503			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	199	92
Volume Left	10	3	0
Volume Right	10	0	3
cSH	810	1503	1700
Volume to Capacity	0.02	0.00	0.05
Queue Length 95th (m)	0.6	0.0	0.0
Control Delay (s)	9.6	0.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	0.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	173	4	3	88
Future Volume (Veh/h)	10	10	173	4	3	88
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	188	4	3	96
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	292	190			192	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	292	190			192	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	697	852			1381	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	192	99
Volume Left	11	0	3
Volume Right	11	4	0
cSH	767	1700	1381
Volume to Capacity	0.03	0.11	0.00
Queue Length 95th (m)	0.7	0.0	0.0
Control Delay (s)	9.8	0.0	0.2
Lane LOS	A		A
Approach Delay (s)	9.8	0.0	0.2
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	8	3	169	96	2
Future Volume (Veh/h)	8	8	3	169	96	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	9	3	184	104	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	295	105	106			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	295	105	106			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	695	949	1485			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	18	187	106
Volume Left	9	3	0
Volume Right	9	0	2
cSH	802	1485	1700
Volume to Capacity	0.02	0.00	0.06
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	0.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	21.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	9	425	3	3	312
Future Volume (Veh/h)	10	9	425	3	3	312
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	10	462	3	3	339
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	808	464			465	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	790	436			437	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	98			100	
cM capacity (veh/h)	349	604			1093	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	21	465	342
Volume Left	11	0	3
Volume Right	10	3	0
cSH	437	1700	1093
Volume to Capacity	0.05	0.27	0.00
Queue Length 95th (m)	1.1	0.0	0.1
Control Delay (s)	13.7	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	13.7	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	20	6	428	295	7
Future Volume (Veh/h)	19	20	6	428	295	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	22	7	465	321	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked	0.98					
vC, conflicting volume	804	325	329			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	791	325	329			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	97	99			
cM capacity (veh/h)	350	716	1231			

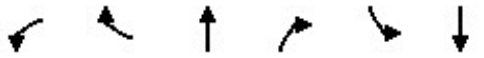
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	472	329
Volume Left	21	7	0
Volume Right	22	0	8
cSH	474	1231	1700
Volume to Capacity	0.09	0.01	0.19
Queue Length 95th (m)	2.3	0.1	0.0
Control Delay (s)	13.4	0.2	0.0
Lane LOS	B	A	
Approach Delay (s)	13.4	0.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	37.3%	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	893	6	9	961	5	7	0	8	14	1	50
Future Volume (vph)	34	893	6	9	961	5	7	0	8	14	1	50
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1694	3440		1820	3499			1721			1821	1575
Flt Permitted	0.26	1.00		0.29	1.00			0.86			0.73	1.00
Satd. Flow (perm)	469	3440		546	3499			1513			1386	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)	37	971	7	10	1045	5	8	0	9	15	1	54
RTOR Reduction (vph)	0	0	0	0	0	0	0	16	0	0	0	50
Lane Group Flow (vph)	37	978	0	10	1050	0	0	1	0	0	16	4
Confl. Peds. (#/hr)	8		3	3		8	3		6	6		3
Heavy Vehicles (%)	7%	6%	0%	0%	4%	50%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Effective Green, g (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.08			0.08	0.08
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)	392	2879		457	2929			116			106	121
v/s Ratio Prot		0.28			c0.30							
v/s Ratio Perm	0.08			0.02				0.00			c0.01	0.00
v/c Ratio	0.09	0.34		0.02	0.36			0.01			0.15	0.03
Uniform Delay, d1	2.0	2.6		1.9	2.7			59.7			60.3	59.8
Progression Factor	1.00	1.00		0.67	0.56			1.00			1.00	1.00
Incremental Delay, d2	0.5	0.3		0.1	0.3			0.0			0.7	0.1
Delay (s)	2.5	2.9		1.3	1.8			59.7			61.0	59.9
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		2.9			1.8			59.7			60.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	17	441	6	6	285
Future Volume (Veh/h)	17	17	441	6	6	285
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	18	479	7	7	310
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			228			
pX, platoon unblocked	1.00	1.00			1.00	
vC, conflicting volume	806	482			486	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	805	480			484	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	97			99	
cM capacity (veh/h)	349	584			1077	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	36	486	317
Volume Left	18	0	7
Volume Right	18	7	0
cSH	437	1700	1077
Volume to Capacity	0.08	0.29	0.01
Queue Length 95th (m)	2.0	0.0	0.1
Control Delay (s)	14.0	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	14.0	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		33.6%	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)	0	800	68	54	959	0	83	0	53	0	0	0
Future Volume (vph)	0	800	68	54	959	0	83	0	53	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.99				
Flpb, ped/bikes		1.00		1.00	1.00			1.00				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3528		1784	3579			1707				
Flt Permitted		1.00		0.29	1.00			0.97				
Satd. Flow (perm)		3528		544	3579			1707				
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	870	74	59	1042	0	90	0	58	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	941	0	59	1042	0	0	128	0	0	0	0
Confl. Peds. (#/hr)			3	3			3		6			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		111.2		111.2	111.2			15.8				
Effective Green, g (s)		111.2		111.2	111.2			15.8				
Actuated g/C Ratio		0.79		0.79	0.79			0.11				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Vehicle Extension (s)		3.0		3.0	3.0			3.0				
Lane Grp Cap (vph)		2802		432	2842			192				
v/s Ratio Prot		0.27			c0.29							
v/s Ratio Perm				0.11				0.07				
v/c Ratio		0.34		0.14	0.37			0.66				
Uniform Delay, d1		4.0		3.3	4.2			59.6				
Progression Factor		0.55		1.00	1.00			1.00				
Incremental Delay, d2		0.3		0.7	0.4			8.4				
Delay (s)		2.5		4.0	4.5			67.9				
Level of Service		A		A	A			E				
Approach Delay (s)		2.5			4.5			67.9			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	56.3%	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	1535	55	46	1087	0	44	0	62	9	1	11
Future Volume (vph)	0	1535	55	46	1087	0	44	0	62	9	1	11
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		1.00	1.00			0.99			1.00	
Frt		0.99		1.00	1.00			0.92			0.93	
Flt Protected		1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)		3549		1825	3544			1680			1641	
Flt Permitted		1.00		0.11	1.00			0.85			0.82	
Satd. Flow (perm)		3549		217	3544			1465			1371	
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	1668	60	50	1182	0	48	0	67	10	1	12
RTOR Reduction (vph)	0	1	0	0	0	0	0	37	0	0	11	0
Lane Group Flow (vph)	0	1727	0	50	1182	0	0	78	0	0	12	0
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	9%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		114.1		114.1	114.1			13.9			13.9	
Effective Green, g (s)		114.1		114.1	114.1			13.9			13.9	
Actuated g/C Ratio		0.81		0.81	0.81			0.10			0.10	
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)		2892		176	2888			145			136	
v/s Ratio Prot		c0.49			0.33							
v/s Ratio Perm				0.23				c0.05			0.01	
v/c Ratio		0.60		0.28	0.41			0.54			0.09	
Uniform Delay, d1		4.7		3.1	3.6			60.0			57.3	
Progression Factor		1.09		0.36	0.34			1.00			1.00	
Incremental Delay, d2		0.8		3.5	0.4			3.8			0.3	
Delay (s)		5.9		4.6	1.6			63.8			57.6	
Level of Service		A		A	A			E			E	
Approach Delay (s)		5.9			1.7			63.8			57.6	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.0%	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)	333	1235	26	9	967	192	21	36	10	108	18	191
Future Volume (vph)	333	1235	26	9	967	192	21	36	10	108	18	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1807	3597		1808	3418			1840			1811	1576
Flt Permitted	0.17	1.00		0.19	1.00			0.82			0.71	1.00
Satd. Flow (perm)	329	3597		360	3418			1532			1335	1576
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)	362	1342	28	10	1051	209	23	39	11	117	20	208
RTOR Reduction (vph)	0	1	0	0	10	0	0	5	0	0	0	165
Lane Group Flow (vph)	362	1369	0	10	1250	0	0	68	0	0	137	43
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	1%	1%	0%	0%	3%	1%	0%	0%	0%	1%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	108.3	108.3		97.3	97.3			19.7			19.7	19.7
Effective Green, g (s)	108.3	108.3		97.3	97.3			19.7			19.7	19.7
Actuated g/C Ratio	0.77	0.77		0.69	0.69			0.14			0.14	0.14
Clearance Time (s)	3.0	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)	338	2782		250	2375			215			187	221
v/s Ratio Prot	c0.06	0.38			0.37							
v/s Ratio Perm	c0.77			0.03				0.04			c0.10	0.03
v/c Ratio	1.07	0.49		0.04	0.53			0.32			0.73	0.19
Uniform Delay, d1	13.8	5.8		6.7	10.3			54.1			57.6	53.1
Progression Factor	5.00	0.31		0.46	0.53			1.00			1.00	1.00
Incremental Delay, d2	64.5	0.5		0.3	0.8			0.8			13.8	0.4
Delay (s)	133.6	2.3		3.3	6.2			54.9			71.4	53.6
Level of Service	F	A		A	A			D			E	D
Approach Delay (s)		29.8			6.1			54.9			60.7	
Approach LOS		C			A			D			E	

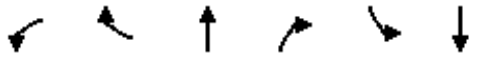
Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	5	8	100	92	10
Future Volume (Veh/h)	6	5	8	100	92	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	9	109	100	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	232	106	111			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	232	106	111			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	751	949	1479			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	118	111
Volume Left	7	9	0
Volume Right	5	0	11
cSH	823	1479	1700
Volume to Capacity	0.01	0.01	0.07
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.4	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	6	102	10	11	86
Future Volume (Veh/h)	6	6	102	10	11	86
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	7	111	11	12	93
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	234	116			122	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	116			122	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	749	936			1465	

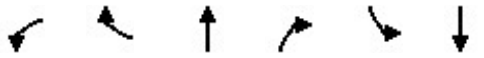
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	14	122	105
Volume Left	7	0	12
Volume Right	7	11	0
cSH	832	1700	1465
Volume to Capacity	0.02	0.07	0.01
Queue Length 95th (m)	0.4	0.0	0.2
Control Delay (s)	9.4	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	5	8	107	84	8
Future Volume (Veh/h)	5	5	8	107	84	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	9	116	91	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	230	96	100			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	230	96	100			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	754	961	1493			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	125	100
Volume Left	5	9	0
Volume Right	5	0	9
cSH	845	1493	1700
Volume to Capacity	0.01	0.01	0.06
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.3	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	5	551	10	10	311
Future Volume (Veh/h)	6	5	551	10	10	311
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	599	11	11	338
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	964	604			610	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933	552			558	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	276	504			957	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	12	610	349
Volume Left	7	0	11
Volume Right	5	11	0
cSH	340	1700	957
Volume to Capacity	0.04	0.36	0.01
Queue Length 95th (m)	0.8	0.0	0.3
Control Delay (s)	16.0	0.0	0.4
Lane LOS	C		A
Approach Delay (s)	16.0	0.0	0.4
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	13	22	534	308	21
Future Volume (Veh/h)	12	13	22	534	308	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	14	24	580	335	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked	0.95					
vC, conflicting volume	974	346	358			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	946	346	358			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	98	98			
cM capacity (veh/h)	270	697	1201			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	604	358
Volume Left	13	24	0
Volume Right	14	0	23
cSH	395	1201	1700
Volume to Capacity	0.07	0.02	0.21
Queue Length 95th (m)	1.7	0.5	0.0
Control Delay (s)	14.8	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	14.8	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	1430	16	20	1056	18	19	1	20	87	1	119
Future Volume (vph)	84	1430	16	20	1056	18	19	1	20	87	1	119
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00			0.99			0.98	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1807	3571		1825	3565			1707			1788	1589
Flt Permitted	0.22	1.00		0.13	1.00			0.82			0.77	1.00
Satd. Flow (perm)	423	3571		258	3565			1439			1439	1589
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	1554	17	22	1148	20	21	1	22	95	1	129
RTOR Reduction (vph)	0	0	0	0	1	0	0	19	0	0	0	96
Lane Group Flow (vph)	91	1571	0	22	1167	0	0	25	0	0	96	33
Confl. Peds. (#/hr)	17		8	8		17	11		18	18		11
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	110.9	110.9		110.9	110.9			17.1			17.1	17.1
Effective Green, g (s)	110.9	110.9		110.9	110.9			17.1			17.1	17.1
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.12			0.12	0.12
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)	335	2828		204	2823			175			175	194
v/s Ratio Prot		c0.44			0.33							
v/s Ratio Perm	0.22			0.09				0.02			c0.07	0.02
v/c Ratio	0.27	0.56		0.11	0.41			0.14			0.55	0.17
Uniform Delay, d1	3.9	5.4		3.3	4.5			54.9			57.8	55.1
Progression Factor	1.00	1.00		0.75	0.69			1.00			1.00	1.00
Incremental Delay, d2	2.0	0.8		1.0	0.4			0.4			3.5	0.4
Delay (s)	5.8	6.2		3.5	3.5			55.3			61.3	55.5
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		6.2			3.5			55.3			58.0	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	12	11	528	18	18	317
Future Volume (Veh/h)	12	11	528	18	18	317
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	12	574	20	20	345
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			230			
pX, platoon unblocked	0.96	0.96			0.96	
vC, conflicting volume	969	584			594	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	947	547			557	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	98			98	
cM capacity (veh/h)	273	516			974	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	25	594	365
Volume Left	13	0	20
Volume Right	12	20	0
cSH	352	1700	974
Volume to Capacity	0.07	0.35	0.02
Queue Length 95th (m)	1.7	0.0	0.5
Control Delay (s)	16.0	0.0	0.7
Lane LOS	C		A
Approach Delay (s)	16.0	0.0	0.7
Approach LOS	C		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	41.4%	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)	0	1271	73	31	1106	0	67	0	39	0	0	0
Future Volume (vph)	0	1271	73	31	1106	0	67	0	39	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.98				
Flpb, ped/bikes		1.00		1.00	1.00			0.98				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3539		1789	3579			1677				
Flt Permitted		1.00		0.14	1.00			0.97				
Satd. Flow (perm)		3539		269	3579			1677				
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	1382	79	34	1202	0	73	0	42	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1458	0	34	1202	0	0	96	0	0	0	0
Confl. Peds. (#/hr)			8	8			11		18			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		103.0		103.0	103.0			24.0				
Effective Green, g (s)		103.0		103.0	103.0			24.0				
Actuated g/C Ratio		0.74		0.74	0.74			0.17				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Lane Grp Cap (vph)		2603		197	2633			287				
v/s Ratio Prot		c0.41			0.34							
v/s Ratio Perm				0.13				0.06				
v/c Ratio		0.56		0.17	0.46			0.33				
Uniform Delay, d1		8.3		5.6	7.4			51.0				
Progression Factor		0.51		1.00	1.00			1.00				
Incremental Delay, d2		0.8		1.9	0.6			3.1				
Delay (s)		5.0		7.5	7.9			54.1				
Level of Service		A		A	A			D				
Approach Delay (s)		5.0			7.9			54.1			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	64.0	60.6	26.0	63.7	65.6	35.1	26.6
Average Queue (m)	34.1	26.5	7.2	25.4	25.9	28.8	5.8
95th Queue (m)	73.6	60.6	18.4	59.3	59.5	40.6	17.8
Link Distance (m)	60.2	60.2		63.1	63.1	32.2	25.4
Upstream Blk Time (%)	1	0		0	0	19	1
Queuing Penalty (veh)	7	2		1	1	36	0
Storage Bay Dist (m)			12.1				
Storage Blk Time (%)			4	7			
Queuing Penalty (veh)			20	3			

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	18.8	66.2	63.1	15.6	89.7	84.6	19.8	58.3	33.8
Average Queue (m)	15.4	31.0	21.1	2.0	24.8	25.8	8.4	31.8	18.3
95th Queue (m)	21.0	63.8	50.3	8.7	52.0	50.3	18.8	53.9	29.5
Link Distance (m)		63.1	63.1		97.6	97.6	15.2	82.6	
Upstream Blk Time (%)		1	0				14		
Queuing Penalty (veh)		5	0				0		
Storage Bay Dist (m)	8.3			5.9					48.3
Storage Blk Time (%)	36	14		2	19			4	
Queuing Penalty (veh)	142	30		9	2			7	

Intersection: 7: Pattinson Cres & Clarkson Rd S

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	19.8
Average Queue (m)	4.1	6.3
95th Queue (m)	11.0	14.9
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		15
Queuing Penalty (veh)		27
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB
Directions Served	LR	TR
Maximum Queue (m)	21.0	15.0
Average Queue (m)	4.7	3.0
95th Queue (m)	13.3	10.4
Link Distance (m)	66.2	1.8
Upstream Blk Time (%)		7
Queuing Penalty (veh)		13
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	14.7	21.5
Average Queue (m)	2.5	2.9
95th Queue (m)	9.4	13.0
Link Distance (m)	73.1	66.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB
Directions Served	LR
Maximum Queue (m)	14.7
Average Queue (m)	4.6
95th Queue (m)	12.3
Link Distance (m)	93.1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 15: Fellen Pl & Clarkson Rd N

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	9.1	9.2
Average Queue (m)	6.1	0.3
95th Queue (m)	12.7	3.0
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	24.9	69.6	58.8	9.1	47.9	34.2	8.9	15.5	20.2
Average Queue (m)	6.1	32.6	15.9	0.6	12.9	11.3	2.4	4.5	8.3
95th Queue (m)	14.7	66.0	42.5	4.3	33.0	28.7	8.6	13.1	17.1
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		0					4		
Queuing Penalty (veh)		0					0		
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	2	12		0	9				
Queuing Penalty (veh)	10	4		0	1				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB
Directions Served	LR
Maximum Queue (m)	15.7
Average Queue (m)	7.1
95th Queue (m)	14.2
Link Distance (m)	46.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	34.0	45.7	21.3	78.0	78.0	71.4
Average Queue (m)	15.8	17.9	9.3	29.5	24.2	28.5
95th Queue (m)	33.0	38.2	20.0	62.4	56.3	54.9
Link Distance (m)	97.6	97.6		73.4	73.4	167.6
Upstream Blk Time (%)				1	0	
Queuing Penalty (veh)				0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			12	15		
Queuing Penalty (veh)			59	8		

Network Summary

Network wide Queuing Penalty: 386

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	76.5	78.4	24.8	41.0	25.4	34.1	16.4
Average Queue (m)	60.6	60.1	10.4	9.0	9.2	22.1	7.4
95th Queue (m)	71.8	81.0	20.7	26.3	19.1	35.2	17.0
Link Distance (m)	60.2	60.2		63.1	63.1	32.2	25.4
Upstream Blk Time (%)	12	10				5	
Queuing Penalty (veh)	95	77				6	
Storage Bay Dist (m)			12.1				
Storage Blk Time (%)			18	2			
Queuing Penalty (veh)			97	1			

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	17.9	77.2	83.1	13.5	88.2	82.1	19.8	83.8	82.3
Average Queue (m)	17.9	66.7	71.1	2.2	36.4	39.8	16.1	30.8	19.4
95th Queue (m)	18.1	70.5	87.0	8.9	77.9	77.0	25.0	57.7	42.0
Link Distance (m)		63.1	63.1		98.0	98.0	15.2	82.6	
Upstream Blk Time (%)		27	11				33	0	0
Queuing Penalty (veh)		219	91				0	0	0
Storage Bay Dist (m)	8.3			5.9					48.3
Storage Blk Time (%)	87	6		9	27			5	
Queuing Penalty (veh)	535	21		44	2			10	

Intersection: 7: Clarkson Rd S & Pattinson Cres

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	8.9	12.9	3.1
Average Queue (m)	2.5	2.3	0.2
95th Queue (m)	9.0	9.3	2.4
Link Distance (m)	82.6	9.2	32.2
Upstream Blk Time (%)		5	
Queuing Penalty (veh)		5	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	8.8	14.0	9.2
Average Queue (m)	3.9	1.4	0.8
95th Queue (m)	10.9	7.5	5.1
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		3	0
Queuing Penalty (veh)		3	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	8.9	18.1	2.3
Average Queue (m)	2.2	1.0	0.1
95th Queue (m)	8.3	7.9	1.2
Link Distance (m)	73.3	49.8	1.8
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	15.5	15.5
Average Queue (m)	4.0	1.4
95th Queue (m)	11.9	7.6
Link Distance (m)	93.1	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	9.0	21.8
Average Queue (m)	5.2	3.8
95th Queue (m)	12.3	14.5
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.1	76.0	77.6	25.3	53.0	54.1	15.0	33.2	29.6
Average Queue (m)	18.6	68.8	61.5	6.1	28.7	29.7	9.6	16.6	13.8
95th Queue (m)	30.8	83.0	91.5	18.2	52.4	53.6	17.2	34.9	23.0
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		49	33				37	6	1
Queuing Penalty (veh)		0	0				0	0	0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	16	55		2	19				
Queuing Penalty (veh)	115	46		10	4				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

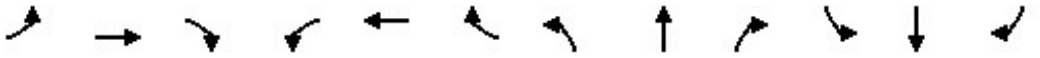
Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.0	16.0
Average Queue (m)	3.5	2.7
95th Queue (m)	10.4	10.7
Link Distance (m)	69.0	48.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	40.4	47.8	21.4	81.8	57.9	47.4
Average Queue (m)	27.0	33.7	8.7	51.0	30.4	19.1
95th Queue (m)	42.2	47.7	18.3	74.6	56.4	36.5
Link Distance (m)	98.0	98.0		72.9	72.9	145.6
Upstream Blk Time (%)				1		
Queuing Penalty (veh)				0		
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			22	22		
Queuing Penalty (veh)			120	7		

Network Summary

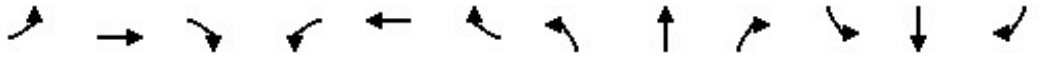
Network wide Queuing Penalty: 1502



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	981	32	39	965	0	81	0	141	21	2	10
Future Volume (vph)	0	981	32	39	965	0	81	0	141	21	2	10
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00			1.00	
Frt		1.00		1.00	1.00			0.91			0.96	
Flt Protected		1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)		3390		1728	3510			1630			1661	
Flt Permitted		1.00		0.23	1.00			0.86			0.64	
Satd. Flow (perm)		3390		424	3510			1435			1103	
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	1066	35	42	1049	0	88	0	153	23	2	11
RTOR Reduction (vph)	0	2	0	0	0	0	0	48	0	0	9	0
Lane Group Flow (vph)	0	1099	0	42	1049	0	0	193	0	0	27	0
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	0%	7%	6%	5%	4%	0%	8%	0%	2%	5%	0%	11%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		104.9		104.9	104.9			23.1			23.1	
Effective Green, g (s)		104.9		104.9	104.9			23.1			23.1	
Actuated g/C Ratio		0.75		0.75	0.75			0.17			0.17	
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)		2540		317	2629			236			181	
v/s Ratio Prot		c0.32			0.30							
v/s Ratio Perm				0.10				c0.13			0.02	
v/c Ratio		0.43		0.13	0.40			0.82			0.15	
Uniform Delay, d1		6.5		4.9	6.3			56.4			50.0	
Progression Factor		1.19		0.25	0.35			1.00			1.00	
Incremental Delay, d2		0.5		0.8	0.4			19.4			0.4	
Delay (s)		8.3		2.0	2.6			75.9			50.4	
Level of Service		A		A	A			E			D	
Approach Delay (s)		8.3			2.6			75.9			50.4	
Approach LOS		A			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.3%	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)	220	884	25	11	824	215	12	14	4	128	13	250
Future Volume (vph)	220	884	25	11	824	215	12	14	4	128	13	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.97			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1755	3399		1810	3335			1843			1745	1571
Flt Permitted	0.20	1.00		0.29	1.00			0.86			0.72	1.00
Satd. Flow (perm)	365	3399		553	3335			1616			1318	1571
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)	239	961	27	12	896	234	13	15	4	139	14	272
RTOR Reduction (vph)	0	1	0	0	12	0	0	3	0	0	0	229
Lane Group Flow (vph)	239	987	0	12	1118	0	0	29	0	0	153	43
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	4%	7%	0%	0%	5%	4%	0%	0%	0%	5%	0%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	106.0	106.0		92.3	92.3			22.0			22.0	22.0
Effective Green, g (s)	106.0	106.0		92.3	92.3			22.0			22.0	22.0
Actuated g/C Ratio	0.76	0.76		0.66	0.66			0.16			0.16	0.16
Clearance Time (s)	3.0	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)	382	2573		364	2198			253			207	246
v/s Ratio Prot	c0.05	0.29			0.34							
v/s Ratio Perm	c0.43			0.02				0.02			c0.12	0.03
v/c Ratio	0.63	0.38		0.03	0.51			0.11			0.74	0.17
Uniform Delay, d1	7.9	5.8		8.3	12.2			50.6			56.3	51.1
Progression Factor	3.17	0.56		0.70	0.81			1.00			1.00	1.00
Incremental Delay, d2	2.9	0.4		0.2	0.8			0.2			12.9	0.3
Delay (s)	27.8	3.6		5.9	10.7			50.8			69.2	51.5
Level of Service	C	A		A	B			D			E	D
Approach Delay (s)		8.3			10.6			50.8			57.8	
Approach LOS		A			B			D			E	

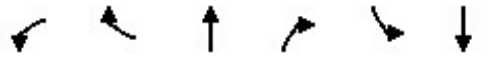
Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	3	213	70	3
Future Volume (Veh/h)	9	9	3	213	70	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	10	3	232	76	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	316	78	79			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	316	78	79			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	676	983	1519			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	235	79
Volume Left	10	3	0
Volume Right	10	0	3
cSH	801	1519	1700
Volume to Capacity	0.02	0.00	0.05
Queue Length 95th (m)	0.6	0.0	0.0
Control Delay (s)	9.6	0.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	0.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	23.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	206	4	3	76
Future Volume (Veh/h)	10	10	206	4	3	76
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	224	4	3	83
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	315	226			228	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	315	226			228	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	676	813			1340	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	228	86
Volume Left	11	0	3
Volume Right	11	4	0
cSH	739	1700	1340
Volume to Capacity	0.03	0.13	0.00
Queue Length 95th (m)	0.7	0.0	0.1
Control Delay (s)	10.0	0.0	0.3
Lane LOS	B		A
Approach Delay (s)	10.0	0.0	0.3
Approach LOS	B		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		21.1%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	8	3	202	84	2
Future Volume (Veh/h)	8	8	3	202	84	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	9	3	220	91	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	318	92	93			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	318	92	93			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	674	965	1501			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	18	223	93
Volume Left	9	3	0
Volume Right	9	0	2
cSH	794	1501	1700
Volume to Capacity	0.02	0.00	0.05
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	0.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	23.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	9	446	3	3	381
Future Volume (Veh/h)	10	9	446	3	3	381
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	10	485	3	3	414
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	906	486			488	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	887	453			454	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	98			100	
cM capacity (veh/h)	304	587			1071	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	21	488	417
Volume Left	11	0	3
Volume Right	10	3	0
cSH	394	1700	1071
Volume to Capacity	0.05	0.29	0.00
Queue Length 95th (m)	1.3	0.0	0.1
Control Delay (s)	14.6	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	14.6	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	20	6	449	364	7
Future Volume (Veh/h)	19	20	6	449	364	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	22	7	488	396	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked	0.97					
vC, conflicting volume	902	400	404			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	886	400	404			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	97	99			
cM capacity (veh/h)	305	650	1155			

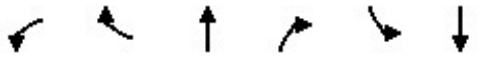
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	495	404
Volume Left	21	7	0
Volume Right	22	0	8
cSH	419	1155	1700
Volume to Capacity	0.10	0.01	0.24
Queue Length 95th (m)	2.6	0.1	0.0
Control Delay (s)	14.6	0.2	0.0
Lane LOS	B	A	
Approach Delay (s)	14.6	0.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	38.4%	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)	38	1001	7	9	982	5	7	0	8	14	1	54
Future Volume (vph)	38	1001	7	9	982	5	7	0	8	14	1	54
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1695	3440		1821	3499			1721			1821	1575
Flt Permitted	0.26	1.00		0.25	1.00			0.86			0.73	1.00
Satd. Flow (perm)	458	3440		479	3499			1513			1386	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)	41	1088	8	10	1067	5	8	0	9	15	1	59
RTOR Reduction (vph)	0	0	0	0	0	0	0	16	0	0	0	54
Lane Group Flow (vph)	41	1096	0	10	1072	0	0	1	0	0	16	5
Confl. Peds. (#/hr)	8		3	3		8	3		6	6		3
Heavy Vehicles (%)	7%	6%	0%	0%	4%	50%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Effective Green, g (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.08			0.08	0.08
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)	383	2879		400	2929			116			106	121
v/s Ratio Prot		c0.32			0.31							
v/s Ratio Perm	0.09			0.02				0.00			c0.01	0.00
v/c Ratio	0.11	0.38		0.03	0.37			0.01			0.15	0.04
Uniform Delay, d1	2.0	2.7		1.9	2.7			59.7			60.3	59.8
Progression Factor	1.00	1.00		0.67	0.56			1.00			1.00	1.00
Incremental Delay, d2	0.6	0.4		0.1	0.3			0.0			0.7	0.1
Delay (s)	2.6	3.1		1.4	1.8			59.7			61.0	59.9
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		3.1			1.8			59.7			60.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



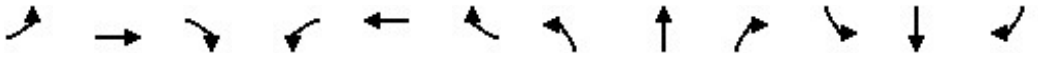
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	17	462	6	6	354
Future Volume (Veh/h)	17	17	462	6	6	354
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	18	502	7	7	385
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			228			
pX, platoon unblocked	0.99	0.99			0.99	
vC, conflicting volume	904	506			509	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	898	494			498	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			99	
cM capacity (veh/h)	305	569			1054	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	36	509	392
Volume Left	18	0	7
Volume Right	18	7	0
cSH	397	1700	1054
Volume to Capacity	0.09	0.30	0.01
Queue Length 95th (m)	2.3	0.0	0.2
Control Delay (s)	15.0	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	15.0	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		34.7%	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)	0	917	68	55	974	0	86	0	55	0	0	0
Future Volume (vph)	0	917	68	55	974	0	86	0	55	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.99				
Flpb, ped/bikes		1.00		1.00	1.00			1.00				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3534		1785	3579			1707				
Flt Permitted		1.00		0.25	1.00			0.97				
Satd. Flow (perm)		3534		469	3579			1707				
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	997	74	60	1059	0	93	0	60	0	0	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	1069	0	60	1059	0	0	133	0	0	0	0
Confl. Peds. (#/hr)			3	3			3		6			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		110.8		110.8	110.8			16.2				
Effective Green, g (s)		110.8		110.8	110.8			16.2				
Actuated g/C Ratio		0.79		0.79	0.79			0.12				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Vehicle Extension (s)		3.0		3.0	3.0			3.0				
Lane Grp Cap (vph)		2796		371	2832			197				
v/s Ratio Prot		c0.30			0.30							
v/s Ratio Perm				0.13				0.08				
v/c Ratio		0.38		0.16	0.37			0.67				
Uniform Delay, d1		4.4		3.5	4.3			59.4				
Progression Factor		0.53		1.00	1.00			1.00				
Incremental Delay, d2		0.4		0.9	0.4			8.7				
Delay (s)		2.7		4.4	4.7			68.1				
Level of Service		A		A	A			E				
Approach Delay (s)		2.7			4.7			68.1			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	59.8%	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	1576	55	46	1249	0	45	0	64	9	1	12
Future Volume (vph)	0	1576	55	46	1249	0	45	0	64	9	1	12
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		1.00	1.00			0.99			1.00	
Frt		0.99		1.00	1.00			0.92			0.93	
Flt Protected		1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)		3550		1825	3544			1679			1634	
Flt Permitted		1.00		0.11	1.00			0.86			0.83	
Satd. Flow (perm)		3550		202	3544			1466			1378	
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	1713	60	50	1358	0	49	0	70	10	1	13
RTOR Reduction (vph)	0	1	0	0	0	0	0	33	0	0	12	0
Lane Group Flow (vph)	0	1772	0	50	1358	0	0	86	0	0	12	0
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	9%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		113.6		113.6	113.6			14.4			14.4	
Effective Green, g (s)		113.6		113.6	113.6			14.4			14.4	
Actuated g/C Ratio		0.81		0.81	0.81			0.10			0.10	
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)		2880		163	2875			150			141	
v/s Ratio Prot		c0.50			0.38							
v/s Ratio Perm				0.25				c0.06			0.01	
v/c Ratio		0.62		0.31	0.47			0.57			0.09	
Uniform Delay, d1		5.0		3.3	4.0			59.9			56.9	
Progression Factor		1.02		0.51	0.48			1.00			1.00	
Incremental Delay, d2		0.8		3.9	0.5			5.2			0.3	
Delay (s)		5.9		5.6	2.4			65.0			57.1	
Level of Service		A		A	A			E			E	
Approach Delay (s)		5.9			2.5			65.0			57.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.5%	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)	368	1236	26	10	1065	212	23	36	11	142	24	251
Future Volume (vph)	368	1236	26	10	1065	212	23	36	11	142	24	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1807	3597		1809	3418			1837			1811	1576
Flt Permitted	0.14	1.00		0.18	1.00			0.75			0.71	1.00
Satd. Flow (perm)	259	3597		349	3418			1406			1333	1576
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)	400	1343	28	11	1158	230	25	39	12	154	26	273
RTOR Reduction (vph)	0	1	0	0	11	0	0	5	0	0	0	142
Lane Group Flow (vph)	400	1370	0	11	1377	0	0	71	0	0	180	131
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	1%	1%	0%	0%	3%	1%	0%	0%	0%	1%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	104.5	104.5		93.5	93.5			23.5			23.5	23.5
Effective Green, g (s)	104.5	104.5		93.5	93.5			23.5			23.5	23.5
Actuated g/C Ratio	0.75	0.75		0.67	0.67			0.17			0.17	0.17
Clearance Time (s)	3.0	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)	281	2684		233	2282			236			223	264
v/s Ratio Prot	c0.08	0.38			0.40							
v/s Ratio Perm	c0.98			0.03				0.05			c0.14	0.08
v/c Ratio	1.42	0.51		0.05	0.60			0.30			0.81	0.50
Uniform Delay, d1	19.3	7.3		8.0	12.9			51.1			56.1	52.9
Progression Factor	3.33	0.30		0.43	0.54			1.00			1.00	1.00
Incremental Delay, d2	206.5	0.6		0.3	1.0			0.7			18.9	1.5
Delay (s)	270.8	2.7		3.7	8.0			51.8			74.9	54.3
Level of Service	F	A		A	A			D			E	D
Approach Delay (s)		63.3			8.0			51.8			62.5	
Approach LOS		E			A			D			E	

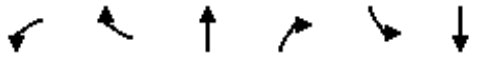
Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	5	8	103	92	10
Future Volume (Veh/h)	6	5	8	103	92	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	9	112	100	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	236	106	111			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	236	106	111			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	748	949	1479			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	121	111
Volume Left	7	9	0
Volume Right	5	0	11
cSH	820	1479	1700
Volume to Capacity	0.01	0.01	0.07
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.5	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.5	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	6	105	10	11	86
Future Volume (Veh/h)	6	6	105	10	11	86
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	7	114	11	12	93
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	236	120			125	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	236	120			125	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	746	932			1462	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	14	125	105
Volume Left	7	0	12
Volume Right	7	11	0
cSH	828	1700	1462
Volume to Capacity	0.02	0.07	0.01
Queue Length 95th (m)	0.4	0.0	0.2
Control Delay (s)	9.4	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	5	8	110	84	8
Future Volume (Veh/h)	5	5	8	110	84	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	9	120	91	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	234	96	100			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	96	100			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	750	961	1493			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	129	100
Volume Left	5	9	0
Volume Right	5	0	9
cSH	843	1493	1700
Volume to Capacity	0.01	0.01	0.06
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.3	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	5	606	10	10	411
Future Volume (Veh/h)	6	5	606	10	10	411
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	659	11	11	447
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.93	0.93			0.93	
vC, conflicting volume	1134	664			670	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1105	599			605	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	214	465			902	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	12	670	458
Volume Left	7	0	11
Volume Right	5	11	0
cSH	276	1700	902
Volume to Capacity	0.04	0.39	0.01
Queue Length 95th (m)	1.0	0.0	0.3
Control Delay (s)	18.6	0.0	0.4
Lane LOS	C		A
Approach Delay (s)	18.6	0.0	0.4
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	13	22	589	408	21
Future Volume (Veh/h)	12	13	22	589	408	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	14	24	640	443	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked	0.93					
vC, conflicting volume	1142	454	466			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1116	454	466			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	98	98			
cM capacity (veh/h)	209	606	1095			

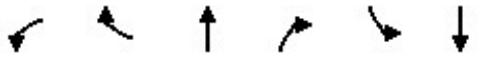
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	664	466
Volume Left	13	24	0
Volume Right	14	0	23
cSH	317	1095	1700
Volume to Capacity	0.09	0.02	0.27
Queue Length 95th (m)	2.1	0.5	0.0
Control Delay (s)	17.4	0.6	0.0
Lane LOS	C	A	
Approach Delay (s)	17.4	0.6	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	1485	16	20	1202	18	22	1	20	133	1	119
Future Volume (vph)	87	1485	16	20	1202	18	22	1	20	133	1	119
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00			0.99			0.98	1.00
Frt	1.00	1.00		1.00	1.00			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1814	3572		1825	3567			1715			1788	1589
Flt Permitted	0.18	1.00		0.12	1.00			0.76			0.75	1.00
Satd. Flow (perm)	339	3572		226	3567			1329			1404	1589
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)	95	1614	17	22	1307	20	24	1	22	145	1	129
RTOR Reduction (vph)	0	0	0	0	0	0	0	19	0	0	0	67
Lane Group Flow (vph)	95	1631	0	22	1327	0	0	28	0	0	146	62
Confl. Peds. (#/hr)	17		8	8		17	11		18	18		11
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	106.9	106.9		106.9	106.9			21.1			21.1	21.1
Effective Green, g (s)	106.9	106.9		106.9	106.9			21.1			21.1	21.1
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.15			0.15	0.15
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)	258	2727		172	2723			200			211	239
v/s Ratio Prot		c0.46			0.37							
v/s Ratio Perm	0.28			0.10				0.02			c0.10	0.04
v/c Ratio	0.37	0.60		0.13	0.49			0.14			0.69	0.26
Uniform Delay, d1	5.4	7.2		4.3	6.2			51.6			56.4	52.5
Progression Factor	1.00	1.00		0.68	0.61			1.00			1.00	1.00
Incremental Delay, d2	4.0	1.0		1.4	0.6			0.3			9.4	0.6
Delay (s)	9.5	8.2		4.3	4.4			51.9			65.8	53.1
Level of Service	A	A		A	A			D			E	D
Approach Delay (s)		8.2			4.4			51.9			59.8	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	12	11	583	18	18	417
Future Volume (Veh/h)	12	11	583	18	18	417
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	12	634	20	20	453
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			230			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	1137	644			654	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1114	589			600	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			98	
cM capacity (veh/h)	212	478			918	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	25	654	473
Volume Left	13	0	20
Volume Right	12	20	0
cSH	289	1700	918
Volume to Capacity	0.09	0.38	0.02
Queue Length 95th (m)	2.1	0.0	0.5
Control Delay (s)	18.6	0.0	0.6
Lane LOS	C		A
Approach Delay (s)	18.6	0.0	0.6
Approach LOS	C		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	46.6%	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)	0	1373	73	31	1259	0	59	0	34	0	0	0
Future Volume (vph)	0	1373	73	31	1259	0	59	0	34	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.98				
Flpb, ped/bikes		1.00		1.00	1.00			0.98				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3542		1789	3579			1677				
Flt Permitted		1.00		0.12	1.00			0.97				
Satd. Flow (perm)		3542		229	3579			1677				
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	1492	79	34	1368	0	64	0	37	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1568	0	34	1368	0	0	82	0	0	0	0
Confl. Peds. (#/hr)			8	8			11		18			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		103.0		103.0	103.0			24.0				
Effective Green, g (s)		103.0		103.0	103.0			24.0				
Actuated g/C Ratio		0.74		0.74	0.74			0.17				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Lane Grp Cap (vph)		2605		168	2633			287				
v/s Ratio Prot		c0.44			0.38							
v/s Ratio Perm				0.15				0.05				
v/c Ratio		0.60		0.20	0.52			0.29				
Uniform Delay, d1		8.8		5.7	7.9			50.5				
Progression Factor		0.50		1.00	1.00			1.00				
Incremental Delay, d2		0.9		2.7	0.7			2.5				
Delay (s)		5.3		8.4	8.7			53.0				
Level of Service		A		A	A			D				
Approach Delay (s)		5.3			8.6			53.0			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	63.2	64.4	25.9	66.6	67.7	39.8	30.1
Average Queue (m)	44.4	36.7	7.4	21.4	24.6	31.4	9.8
95th Queue (m)	78.5	70.3	19.0	51.6	52.9	39.4	24.1
Link Distance (m)	60.2	60.2		63.1	63.1	32.2	25.4
Upstream Blk Time (%)	3	1		0	0	26	1
Queuing Penalty (veh)	16	4		1	2	57	0
Storage Bay Dist (m)			12.1				
Storage Blk Time (%)			6	6			
Queuing Penalty (veh)			27	2			

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	22.3	74.1	74.8	19.5	93.9	94.0	19.2	75.3	45.3
Average Queue (m)	17.6	43.9	36.7	2.1	44.4	48.3	9.0	31.6	20.7
95th Queue (m)	21.5	76.4	73.7	9.6	80.1	81.7	18.3	56.1	32.4
Link Distance (m)		63.1	63.1		97.6	97.6	15.2	82.6	
Upstream Blk Time (%)		3	1		0	0	7		
Queuing Penalty (veh)		16	5		0	0	0		
Storage Bay Dist (m)	8.3			5.9					48.3
Storage Blk Time (%)	58	18		4	29			3	0
Queuing Penalty (veh)	256	39		19	3			6	0

Intersection: 7: Pattinson Cres & Clarkson Rd S

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.2	16.5
Average Queue (m)	2.7	6.7
95th Queue (m)	9.9	14.2
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		21
Queuing Penalty (veh)		46
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB
Directions Served	LR	TR
Maximum Queue (m)	15.6	16.6
Average Queue (m)	5.1	5.1
95th Queue (m)	12.7	13.1
Link Distance (m)	66.2	1.8
Upstream Blk Time (%)		17
Queuing Penalty (veh)		36
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	16.0	41.0
Average Queue (m)	3.6	8.8
95th Queue (m)	11.2	30.3
Link Distance (m)	73.1	66.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB
Directions Served	LR
Maximum Queue (m)	9.1
Average Queue (m)	5.0
95th Queue (m)	12.2
Link Distance (m)	93.1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 15: Fellen Pl & Clarkson Rd N

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	9.0	9.1
Average Queue (m)	5.8	0.9
95th Queue (m)	12.7	5.2
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.1	81.5	51.7	9.0	34.9	33.3	15.0	15.5	21.4
Average Queue (m)	5.7	34.0	16.4	2.4	8.7	9.7	2.6	3.7	9.2
95th Queue (m)	16.0	80.6	45.5	8.6	27.0	26.5	10.1	12.4	18.2
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		2					8		
Queuing Penalty (veh)		0					0		
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	1	15		0	7				
Queuing Penalty (veh)	5	6		1	1				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	16.1	9.0
Average Queue (m)	7.2	0.9
95th Queue (m)	15.0	5.3
Link Distance (m)	46.3	37.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	45.7	46.4	22.6	73.3	69.7	47.9
Average Queue (m)	15.1	16.7	10.2	33.7	25.1	27.8
95th Queue (m)	33.2	37.2	20.2	62.9	52.6	42.3
Link Distance (m)	97.6	97.6		73.4	73.4	167.6
Upstream Blk Time (%)				0	0	
Queuing Penalty (veh)				0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			17	17		
Queuing Penalty (veh)			82	9		

Network Summary

Network wide Queuing Penalty: 641

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	66.5	81.6	25.9	38.8	36.4	34.2	21.9
Average Queue (m)	62.1	60.1	9.1	13.7	15.4	19.2	7.0
95th Queue (m)	64.8	86.9	20.8	33.6	34.8	35.4	16.2
Link Distance (m)	60.2	60.2		63.1	63.1	32.2	25.4
Upstream Blk Time (%)	37	9				3	0
Queuing Penalty (veh)	304	73				3	0
Storage Bay Dist (m)			12.1				
Storage Blk Time (%)			11	6			
Queuing Penalty (veh)			70	3			

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	17.9	68.6	81.4	9.1	100.0	109.1	19.8	86.5	82.6
Average Queue (m)	17.9	66.5	47.3	2.1	46.2	50.0	15.5	47.1	32.6
95th Queue (m)	17.9	68.1	90.2	8.1	89.3	96.1	24.6	77.5	62.3
Link Distance (m)		63.1	63.1		98.0	98.0	15.2	82.6	
Upstream Blk Time (%)		54	5		0	0	30	2	0
Queuing Penalty (veh)		449	44		2	2	0	7	0
Storage Bay Dist (m)	8.3			5.9					48.3
Storage Blk Time (%)	89	0		6	30			11	2
Queuing Penalty (veh)	553	0		30	3			28	3

Intersection: 7: Clarkson Rd S & Pattinson Cres

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.8	9.2
Average Queue (m)	2.8	2.3
95th Queue (m)	9.2	8.9
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		10
Queuing Penalty (veh)		11
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	8.8	9.1	6.1
Average Queue (m)	2.8	1.5	0.5
95th Queue (m)	9.4	6.8	3.9
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		7	0
Queuing Penalty (veh)		8	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.8	21.8
Average Queue (m)	2.8	2.2
95th Queue (m)	9.4	12.5
Link Distance (m)	73.3	49.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	15.5	35.0
Average Queue (m)	2.2	6.6
95th Queue (m)	9.2	23.5
Link Distance (m)	93.1	31.8
Upstream Blk Time (%)		1
Queuing Penalty (veh)		4
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	9.0	16.5	28.5
Average Queue (m)	4.0	3.0	1.7
95th Queue (m)	11.1	11.5	12.0
Link Distance (m)	72.4	31.8	59.5
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.2	77.6	70.7	14.3	64.4	61.5	15.0	33.2	33.2
Average Queue (m)	20.8	71.0	60.4	4.1	41.3	42.5	9.3	30.0	15.6
95th Queue (m)	34.4	74.3	88.3	11.7	63.3	62.6	17.9	37.6	27.2
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		86	20		1	1	27	33	2
Queuing Penalty (veh)		0	0		5	8	0	0	0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	15	85		1	23				
Queuing Penalty (veh)	108	74		4	5				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	15.4	16.7
Average Queue (m)	7.0	1.1
95th Queue (m)	14.0	7.1
Link Distance (m)	69.0	48.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	66.7	60.0	21.1	77.5	73.2	46.7
Average Queue (m)	28.2	32.0	6.1	49.5	34.8	16.4
95th Queue (m)	48.7	52.3	13.6	80.0	61.4	33.5
Link Distance (m)	98.0	98.0		72.9	72.9	145.6
Upstream Blk Time (%)				2	0	
Queuing Penalty (veh)				0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			12	22		
Queuing Penalty (veh)			74	7		

Network Summary

Network wide Queuing Penalty: 1864

RE-ALIGNMENT

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	696	40	37	781	219	69	24	96	123	8	191
Future Volume (vph)	185	696	40	37	781	219	69	24	96	123	8	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		6.0	6.0			6.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.97			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1789	3550		1789	3461			1723			1799	1601
Flt Permitted	0.21	1.00		0.35	1.00			0.65			0.49	1.00
Satd. Flow (perm)	390	3550		658	3461			1143			923	1601
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)	201	757	43	40	849	238	75	26	104	134	9	208
RTOR Reduction (vph)	0	2	0	0	12	0	0	30	0	0	0	171
Lane Group Flow (vph)	201	798	0	40	1075	0	0	175	0	0	143	37
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	104.0	104.0		90.8	90.8			24.0			25.0	25.0
Effective Green, g (s)	104.0	104.0		90.8	90.8			24.0			25.0	25.0
Actuated g/C Ratio	0.74	0.74		0.65	0.65			0.17			0.18	0.18
Clearance Time (s)	3.0	6.0		6.0	6.0			6.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	391	2637		426	2244			195			164	285
v/s Ratio Prot	c0.04	0.22			0.31							
v/s Ratio Perm	c0.34			0.06				0.15			c0.15	0.02
v/c Ratio	0.51	0.30		0.09	0.48			0.90			0.87	0.13
Uniform Delay, d1	7.6	6.0		9.2	12.5			56.8			55.9	48.4
Progression Factor	0.56	0.57		0.74	0.84			1.00			1.00	1.00
Incremental Delay, d2	1.1	0.3		0.4	0.7			37.1			36.3	0.2
Delay (s)	5.3	3.7		7.2	11.2			93.9			92.3	48.6
Level of Service	A	A		A	B			F			F	D
Approach Delay (s)		4.0			11.1			93.9			66.4	
Approach LOS		A			B			F			E	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	69.8%	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)	321	1223	56	39	913	228	44	12	50	126	7	184
Future Volume (vph)	321	1223	56	39	913	228	44	12	50	126	7	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frt	1.00	0.99		1.00	0.97			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1789	3555		1789	3471			1728			1798	1601
Flt Permitted	0.14	1.00		0.19	1.00			0.64			0.61	1.00
Satd. Flow (perm)	261	3555		365	3471			1131			1146	1601
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)	349	1329	61	42	992	248	48	13	54	137	8	200
RTOR Reduction (vph)	0	2	0	0	13	0	0	24	0	0	0	169
Lane Group Flow (vph)	349	1388	0	42	1227	0	0	91	0	0	145	31
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	106.3	106.3		79.0	79.0			21.7			21.7	21.7
Effective Green, g (s)	106.3	106.3		79.0	79.0			21.7			21.7	21.7
Actuated g/C Ratio	0.76	0.76		0.56	0.56			0.15			0.15	0.15
Clearance Time (s)	3.0	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)	463	2699		205	1958			175			177	248
v/s Ratio Prot	c0.13	0.39			0.35							
v/s Ratio Perm	c0.44			0.12				0.08			c0.13	0.02
v/c Ratio	0.75	0.51		0.20	0.63			0.52			0.82	0.12
Uniform Delay, d1	24.6	6.7		15.0	20.6			54.4			57.3	51.0
Progression Factor	0.91	0.53		0.76	0.78			1.00			1.00	1.00
Incremental Delay, d2	6.0	0.6		2.1	1.4			2.8			24.6	0.2
Delay (s)	28.4	4.1		13.4	17.5			57.2			81.9	51.2
Level of Service	C	A		B	B			E			F	D
Approach Delay (s)		9.0			17.3			57.2			64.1	
Approach LOS		A			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	77.6%	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)	193	815	27	30	792	229	81	27	114	141	9	241
Future Volume (vph)	193	815	27	30	792	229	81	27	114	141	9	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frt	1.00	1.00		1.00	0.97			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1789	3562		1789	3458			1721			1799	1601
Flt Permitted	0.19	1.00		0.31	1.00			0.67			0.48	1.00
Satd. Flow (perm)	352	3562		587	3458			1171			903	1601
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)	210	886	29	33	861	249	88	29	124	153	10	262
RTOR Reduction (vph)	0	1	0	0	14	0	0	31	0	0	0	208
Lane Group Flow (vph)	210	914	0	33	1096	0	0	210	0	0	163	54
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	99.3	99.3		84.4	84.4			28.7			28.7	28.7
Effective Green, g (s)	99.3	99.3		84.4	84.4			28.7			28.7	28.7
Actuated g/C Ratio	0.71	0.71		0.60	0.60			0.20			0.20	0.20
Clearance Time (s)	3.0	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)	371	2526		353	2084			240			185	328
v/s Ratio Prot	c0.05	0.26			0.32							
v/s Ratio Perm	c0.35			0.06				0.18			c0.18	0.03
v/c Ratio	0.57	0.36		0.09	0.53			0.87			0.88	0.16
Uniform Delay, d1	10.3	8.0		11.7	16.2			53.9			54.0	45.8
Progression Factor	0.69	0.64		0.79	0.86			1.00			1.00	1.00
Incremental Delay, d2	1.9	0.4		0.5	0.9			27.8			35.2	0.2
Delay (s)	9.0	5.5		9.8	14.8			81.7			89.1	46.0
Level of Service	A	A		A	B			F			F	D
Approach Delay (s)		6.1			14.7			81.7			62.6	
Approach LOS		A			B			F			E	

Intersection Summary			
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	72.8%	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)	367	1218	56	38	1014	248	45	1	63	166	8	243
Future Volume (vph)	367	1218	56	38	1014	248	45	1	63	166	8	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frt	1.00	0.99		1.00	0.97			0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1789	3555		1789	3473			1702			1798	1601
Flt Permitted	0.08	1.00		0.19	1.00			0.60			0.62	1.00
Satd. Flow (perm)	146	3555		367	3473			1041			1159	1601
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)	399	1324	61	41	1102	270	49	1	68	180	9	264
RTOR Reduction (vph)	0	2	0	0	14	0	0	36	0	0	0	215
Lane Group Flow (vph)	399	1383	0	41	1358	0	0	82	0	0	189	49
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2			4			8		8
Actuated Green, G (s)	102.2	102.2		69.7	69.7			25.8			25.8	25.8
Effective Green, g (s)	102.2	102.2		69.7	69.7			25.8			25.8	25.8
Actuated g/C Ratio	0.73	0.73		0.50	0.50			0.18			0.18	0.18
Clearance Time (s)	3.0	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)	452	2595		182	1729			191			213	295
v/s Ratio Prot	c0.19	0.39			0.39							
v/s Ratio Perm	c0.46			0.11				0.08			c0.16	0.03
v/c Ratio	0.88	0.53		0.23	0.79			0.43			0.89	0.16
Uniform Delay, d1	40.9	8.4		19.9	29.0			50.6			55.7	48.0
Progression Factor	0.95	0.53		0.74	0.79			1.00			1.00	1.00
Incremental Delay, d2	15.4	0.6		2.5	3.3			1.6			32.7	0.3
Delay (s)	54.3	5.1		17.2	26.2			52.1			88.4	48.3
Level of Service	D	A		B	C			D			F	D
Approach Delay (s)		16.1			25.9			52.1			65.0	
Approach LOS		B			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3: Lakeshore Road W & Private Access

Movement	EB	EB	WB	WB	SB
Directions Served	T	T	T	T	LR
Maximum Queue (m)	78.2	60.4	18.3	18.3	23.2
Average Queue (m)	16.6	6.9	1.9	2.4	6.7
95th Queue (m)	53.4	31.7	9.3	10.7	17.5
Link Distance (m)	62.4	62.4	18.3	18.3	25.0
Upstream Blk Time (%)	1	0	0	0	0
Queuing Penalty (veh)	2	0	0	0	0
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LR
Maximum Queue (m)	26.0	28.5	9.1	25.4	31.6	19.3
Average Queue (m)	2.9	1.7	1.8	4.6	4.0	9.1
95th Queue (m)	14.0	12.2	7.6	18.2	16.9	17.2
Link Distance (m)	32.4	32.4		99.1	99.1	14.7
Upstream Blk Time (%)		0				4
Queuing Penalty (veh)		0				0
Storage Bay Dist (m)			5.9			
Storage Blk Time (%)			2	2		
Queuing Penalty (veh)			9	0		

Intersection: 7: Pattinson Cres & Clarkson Rd S

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.6	9.2
Average Queue (m)	3.4	0.6
95th Queue (m)	11.1	4.4
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		1
Queuing Penalty (veh)		2
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB
Directions Served	LR	TR
Maximum Queue (m)	8.8	9.1
Average Queue (m)	4.0	0.3
95th Queue (m)	11.1	3.0
Link Distance (m)	66.2	1.8
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB
Directions Served	LR
Maximum Queue (m)	8.9
Average Queue (m)	4.1
95th Queue (m)	11.0
Link Distance (m)	73.1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	8.7	9.3
Average Queue (m)	4.1	0.9
95th Queue (m)	11.0	5.4
Link Distance (m)	92.8	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.9	16.1
Average Queue (m)	8.1	1.4
95th Queue (m)	14.1	8.3
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.0	70.2	40.4	9.1	33.6	43.2	14.4	21.4	21.0
Average Queue (m)	5.0	27.1	11.2	2.1	13.6	14.4	3.6	3.7	7.6
95th Queue (m)	14.1	68.1	31.6	8.3	32.5	37.4	12.1	13.5	17.0
Link Distance (m)		65.6	65.6		62.4	62.4	10.4	28.6	28.6
Upstream Blk Time (%)		2					6		
Queuing Penalty (veh)		0					0		
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	2	10		0	8				
Queuing Penalty (veh)	7	4		1	1				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB
Directions Served	LR
Maximum Queue (m)	16.6
Average Queue (m)	8.2
95th Queue (m)	16.2
Link Distance (m)	46.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 26: Clarkson Rd S/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	18.0	47.8	47.7	19.5	57.5	61.2	52.8	80.7	44.0
Average Queue (m)	14.5	25.9	14.8	4.2	30.0	29.2	27.1	31.6	16.8
95th Queue (m)	19.8	44.5	32.6	13.3	59.4	54.3	48.2	53.6	30.6
Link Distance (m)		18.3	18.3		32.4	32.4	50.2	107.2	
Upstream Blk Time (%)	3	15	4		4	4	2		
Queuing Penalty (veh)	0	67	18		20	22	4		
Storage Bay Dist (m)	8.3			5.9					48.3
Storage Blk Time (%)	40	24		5	22			3	0
Queuing Penalty (veh)	138	45		20	8			7	0

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	41.4	48.5	21.5	65.1	78.0	67.3
Average Queue (m)	17.3	15.8	8.9	33.0	21.7	25.7
95th Queue (m)	31.6	37.2	17.9	59.8	49.4	50.1
Link Distance (m)	99.1	99.1		73.4	73.4	167.6
Upstream Blk Time (%)					0	
Queuing Penalty (veh)					0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			11	16		
Queuing Penalty (veh)			52	9		

Network Summary

Network wide Queuing Penalty: 438

Intersection: 3: Lakeshore Road W & Private Access

Movement	EB	EB	WB	WB	SB
Directions Served	T	T	T	T	LR
Maximum Queue (m)	73.0	83.1	10.2	20.4	16.0
Average Queue (m)	64.4	65.7	0.6	1.2	5.9
95th Queue (m)	77.9	88.5	5.6	9.3	13.8
Link Distance (m)	62.4	62.4	22.4	22.4	25.0
Upstream Blk Time (%)	19	9		0	
Queuing Penalty (veh)	149	65		0	
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LR
Maximum Queue (m)	36.2	36.5	16.1	110.1	112.2	19.3
Average Queue (m)	8.2	9.0	2.8	87.0	87.6	15.4
95th Queue (m)	30.8	32.4	10.9	130.5	133.9	23.1
Link Distance (m)	29.0	29.0		99.5	99.5	14.7
Upstream Blk Time (%)	3	4		36	36	60
Queuing Penalty (veh)	19	25		209	211	0
Storage Bay Dist (m)			5.9			
Storage Blk Time (%)			5	66		
Queuing Penalty (veh)			32	6		

Intersection: 7: Clarkson Rd S & Pattinson Cres

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	9.9
Average Queue (m)	3.2	0.3
95th Queue (m)	9.9	4.2
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	8.7	3.0	6.1
Average Queue (m)	2.7	0.1	0.5
95th Queue (m)	9.2	1.7	4.0
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		0	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	6.1
Average Queue (m)	2.4	0.4
95th Queue (m)	8.7	3.5
Link Distance (m)	73.3	49.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	11.1	2.0	20.0
Average Queue (m)	3.1	0.1	1.7
95th Queue (m)	10.0	1.1	9.7
Link Distance (m)	93.0	102.0	31.8
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	15.2	23.3	9.6
Average Queue (m)	5.4	3.0	0.3
95th Queue (m)	12.9	13.9	5.3
Link Distance (m)	72.4	31.8	59.5
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.1	81.1	77.6	12.9	27.5	28.2	15.0	33.2	32.2
Average Queue (m)	16.4	69.3	57.0	4.3	9.7	14.2	8.6	21.9	15.8
95th Queue (m)	31.8	82.7	88.4	12.3	23.3	28.0	17.3	36.4	28.1
Link Distance (m)		65.6	65.6		62.4	62.4	10.4	28.6	28.6
Upstream Blk Time (%)		44	13				23	13	2
Queuing Penalty (veh)		0	0				0	0	0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	15	56		1	4				
Queuing Penalty (veh)	105	47		5	1				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	11.2	22.4
Average Queue (m)	4.2	3.5
95th Queue (m)	11.5	14.4
Link Distance (m)	69.0	48.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 26: Clarkson Rd S/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	19.1	38.7	34.0	26.1	47.9	48.6	52.9	67.6	46.8
Average Queue (m)	17.4	31.9	24.0	16.6	40.2	35.2	21.9	29.9	16.3
95th Queue (m)	18.9	39.0	30.3	28.1	48.9	44.7	43.0	56.3	30.1
Link Distance (m)		22.4	22.4		29.0	29.0	54.6	102.0	
Upstream Blk Time (%)	18	57	23	0	65	49	0		
Queuing Penalty (veh)	0	453	182	0	394	296	0		
Storage Bay Dist (m)	8.3			12.1					48.3
Storage Blk Time (%)	61	25		65	37			4	0
Queuing Penalty (veh)	375	81		294	14			7	0

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	63.1	67.7	21.3	84.3	82.3	124.3
Average Queue (m)	27.4	31.3	7.1	64.8	58.6	98.1
95th Queue (m)	53.5	57.6	19.7	95.4	99.8	190.7
Link Distance (m)	99.5	99.5		72.9	72.9	145.6
Upstream Blk Time (%)				35	37	48
Queuing Penalty (veh)				0	0	0
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			13	51		
Queuing Penalty (veh)			70	16		

Network Summary

Network wide Queuing Penalty: 3057

Intersection: 3: Lakeshore Road W & Private Access

Movement	EB	EB	WB	WB	SB
Directions Served	T	T	T	T	LR
Maximum Queue (m)	86.9	78.1	21.1	22.5	30.8
Average Queue (m)	44.9	29.9	3.1	4.2	14.7
95th Queue (m)	86.5	70.0	14.3	16.7	30.6
Link Distance (m)	62.4	62.4	18.3	18.3	25.0
Upstream Blk Time (%)	5	1	0	1	17
Queuing Penalty (veh)	26	6	2	6	0
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LR
Maximum Queue (m)	36.5	33.7	12.6	103.8	105.0	17.9
Average Queue (m)	2.7	3.1	2.0	69.7	67.7	7.2
95th Queue (m)	15.9	16.6	9.1	106.0	103.9	16.4
Link Distance (m)	32.4	32.4		99.1	99.1	14.7
Upstream Blk Time (%)	0	0		2	1	4
Queuing Penalty (veh)	1	1		10	8	0
Storage Bay Dist (m)			5.9			
Storage Blk Time (%)			2	29		
Queuing Penalty (veh)			8	3		

Intersection: 7: Pattinson Cres & Clarkson Rd S

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	9.0	13.6
Average Queue (m)	3.3	2.7
95th Queue (m)	10.1	10.1
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		4
Queuing Penalty (veh)		9
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	8.8	14.0	3.0
Average Queue (m)	5.1	2.0	0.1
95th Queue (m)	12.0	9.1	1.7
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		3	0
Queuing Penalty (veh)		5	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	11.2	22.6
Average Queue (m)	2.8	1.5
95th Queue (m)	9.7	11.3
Link Distance (m)	73.1	66.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	8.7	17.8
Average Queue (m)	3.3	1.0
95th Queue (m)	10.0	7.1
Link Distance (m)	92.8	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.4	13.7
Average Queue (m)	6.1	0.5
95th Queue (m)	14.6	4.6
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	24.8	74.4	66.5	13.3	54.0	52.0	14.7	17.6	22.4
Average Queue (m)	5.3	33.9	16.9	1.7	17.3	18.6	4.9	4.0	9.1
95th Queue (m)	16.4	76.8	48.5	8.1	44.6	46.4	12.8	12.5	18.7
Link Distance (m)		65.6	65.6		62.4	62.4	10.4	28.6	28.6
Upstream Blk Time (%)		3	0		0	0	9		0
Queuing Penalty (veh)		0	0		0	0	0		0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	2	15		0	9				
Queuing Penalty (veh)	11	6		1	1				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	13.8	16.1
Average Queue (m)	6.5	1.2
95th Queue (m)	14.6	8.1
Link Distance (m)	46.3	37.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 26: Clarkson Rd S/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	18.0	46.5	44.3	19.5	44.2	43.0	52.9	69.0	63.0
Average Queue (m)	15.6	37.9	28.9	3.9	35.3	35.5	35.8	31.5	21.3
95th Queue (m)	20.2	46.2	46.7	13.3	40.8	40.3	59.7	55.9	41.9
Link Distance (m)		18.3	18.3		32.4	32.4	50.2	107.2	
Upstream Blk Time (%)	7	45	18		31	31	6		
Queuing Penalty (veh)	0	233	92		166	163	14		
Storage Bay Dist (m)	8.3			5.9					48.3
Storage Blk Time (%)	57	46		7	53			3	0
Queuing Penalty (veh)	234	89		28	16			6	1

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	46.8	52.1	21.0	73.2	58.2	70.9
Average Queue (m)	18.2	19.7	7.2	35.3	24.8	34.8
95th Queue (m)	38.7	43.4	17.0	66.1	52.5	62.2
Link Distance (m)	99.1	99.1		73.4	73.4	167.6
Upstream Blk Time (%)				0	0	
Queuing Penalty (veh)				0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			15	19		
Queuing Penalty (veh)			74	10		

Network Summary

Network wide Queuing Penalty: 1232

Intersection: 3: Lakeshore Road W & Private Access

Movement	EB	EB	WB	SB
Directions Served	T	T	T	LR
Maximum Queue (m)	73.6	84.1	22.4	21.8
Average Queue (m)	66.4	61.2	1.6	5.8
95th Queue (m)	69.8	78.2	9.8	15.9
Link Distance (m)	62.4	62.4	22.4	25.0
Upstream Blk Time (%)	20	6	0	0
Queuing Penalty (veh)	166	47	3	0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LR
Maximum Queue (m)	35.1	36.4	9.3	106.2	108.5	19.3
Average Queue (m)	4.7	4.7	1.5	93.0	91.0	14.2
95th Queue (m)	23.4	23.4	7.1	119.6	117.6	22.8
Link Distance (m)	29.0	29.0		99.5	99.5	14.7
Upstream Blk Time (%)	1	2		7	7	29
Queuing Penalty (veh)	8	15		48	45	0
Storage Bay Dist (m)			5.9			
Storage Blk Time (%)			3	38		
Queuing Penalty (veh)			20	4		

Intersection: 7: Clarkson Rd S & Pattinson Cres

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	8.7	9.2	9.1
Average Queue (m)	1.9	1.2	0.3
95th Queue (m)	7.7	6.4	3.0
Link Distance (m)	82.6	9.2	54.6
Upstream Blk Time (%)		3	
Queuing Penalty (veh)		4	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	8.8	9.2	9.2
Average Queue (m)	3.1	0.8	0.3
95th Queue (m)	10.0	4.8	3.0
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		3	0
Queuing Penalty (veh)		3	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	28.2
Average Queue (m)	2.0	1.5
95th Queue (m)	8.0	10.3
Link Distance (m)	73.3	49.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	21.7	16.0	21.2
Average Queue (m)	2.7	0.5	2.1
95th Queue (m)	11.0	5.3	10.7
Link Distance (m)	93.0	102.0	31.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.5	34.5
Average Queue (m)	5.2	4.7
95th Queue (m)	12.9	19.0
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		0
Queuing Penalty (veh)		1
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.1	77.6	77.6	25.2	59.1	60.8	15.0	33.2	29.7
Average Queue (m)	17.4	69.7	53.5	5.5	33.5	36.4	9.5	26.0	13.8
95th Queue (m)	32.0	75.8	78.0	16.7	61.1	60.2	18.0	38.4	25.6
Link Distance (m)		65.6	65.6		62.4	62.4	10.4	28.6	28.6
Upstream Blk Time (%)		37	8		0	0	30	28	1
Queuing Penalty (veh)		0	0		0	0	0	0	0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	14	49		1	19				
Queuing Penalty (veh)	107	41		9	4				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	16.7	23.5
Average Queue (m)	6.2	2.5
95th Queue (m)	14.8	11.6
Link Distance (m)	69.0	48.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 26: Clarkson Rd S/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	22.4	39.8	35.4	25.8	47.3	41.1	57.6	102.0	90.2
Average Queue (m)	20.6	32.0	22.6	7.2	36.1	33.7	28.4	39.8	22.8
95th Queue (m)	24.7	37.6	27.6	19.9	43.7	40.1	53.8	72.1	46.7
Link Distance (m)		22.4	22.4		29.0	29.0	54.6	102.0	
Upstream Blk Time (%)	22	59	23	0	43	40	3	0	
Queuing Penalty (veh)	0	483	188	0	286	270	4	0	
Storage Bay Dist (m)	20.0			12.1					48.3
Storage Blk Time (%)	42	61		5	51			9	
Queuing Penalty (veh)	256	223		23	19			22	

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	65.3	75.4	21.2	77.5	84.8	35.1
Average Queue (m)	32.1	34.1	7.8	55.1	45.7	19.6
95th Queue (m)	53.8	59.1	18.1	87.7	78.4	34.0
Link Distance (m)	99.5	99.5		72.9	72.9	145.6
Upstream Blk Time (%)				5	2	
Queuing Penalty (veh)				0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			27	30		
Queuing Penalty (veh)			169	9		

Network Summary

Network wide Queuing Penalty: 2477

PROHIBITED LEFT-TURN

CIMA+ Engineering for people

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	60.2	57.9	61.3	66.0	64.4	39.1	22.0
Average Queue (m)	33.5	27.2	7.3	32.6	32.3	28.7	9.1
95th Queue (m)	62.2	54.9	25.3	65.7	61.8	41.7	19.5
Link Distance (m)	60.2	60.2	63.8	63.8	63.8	32.2	25.4
Upstream Blk Time (%)	1	0	0	1	1	22	0
Queuing Penalty (veh)	3	0	0	2	2	41	0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	40.0	42.7	19.6	49.4	41.1	19.8	58.2	34.6
Average Queue (m)	22.8	18.3	4.1	23.3	19.8	9.4	30.0	20.0
95th Queue (m)	39.2	35.2	12.5	44.3	38.1	20.1	50.8	33.0
Link Distance (m)	63.8	63.8		97.6	97.6	15.2	80.0	
Upstream Blk Time (%)						12		
Queuing Penalty (veh)						0		
Storage Bay Dist (m)			5.9					48.3
Storage Blk Time (%)			5	17			2	
Queuing Penalty (veh)			20	2			3	

Intersection: 7: Pattinson Cres & Clarkson Rd S

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	9.3
Average Queue (m)	4.2	4.9
95th Queue (m)	11.1	12.4
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		15
Queuing Penalty (veh)		27
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB
Directions Served	LR	TR
Maximum Queue (m)	8.8	9.3
Average Queue (m)	4.6	3.9
95th Queue (m)	11.6	10.9
Link Distance (m)	66.2	1.8
Upstream Blk Time (%)		11
Queuing Penalty (veh)		19
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	42.5
Average Queue (m)	3.8	4.0
95th Queue (m)	10.6	19.5
Link Distance (m)	73.1	66.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB
Directions Served	LR
Maximum Queue (m)	9.1
Average Queue (m)	5.5
95th Queue (m)	12.5
Link Distance (m)	93.1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 15: Fellen Pl & Clarkson Rd N

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	14.8	9.2
Average Queue (m)	6.6	0.6
95th Queue (m)	13.4	4.4
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	19.8	70.3	49.9	9.1	41.8	40.7	15.0	22.0	33.2
Average Queue (m)	8.0	20.2	8.8	1.2	10.3	11.6	4.1	4.8	9.4
95th Queue (m)	16.8	53.8	30.8	6.0	28.8	31.8	11.2	15.2	18.9
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		0					16		0
Queuing Penalty (veh)		0					0		0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	4	9		0	7				
Queuing Penalty (veh)	18	3		1	1				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	14.8	8.4
Average Queue (m)	5.1	0.3
95th Queue (m)	12.8	2.8
Link Distance (m)	46.3	37.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	39.4	47.6	21.5	78.0	54.0	48.7
Average Queue (m)	14.2	17.9	6.8	34.5	17.9	26.0
95th Queue (m)	29.2	37.6	17.1	64.6	43.0	43.4
Link Distance (m)	97.6	97.6		73.4	73.4	167.6
Upstream Blk Time (%)				0		
Queuing Penalty (veh)				0		
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			12	17		
Queuing Penalty (veh)			59	9		

Network Summary

Network wide Queuing Penalty: 211

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	65.7	68.1	26.8	35.6	32.0	34.1	23.5
Average Queue (m)	28.8	30.3	9.8	8.1	11.8	16.6	5.8
95th Queue (m)	71.7	72.0	22.1	24.7	26.8	28.7	18.2
Link Distance (m)	60.2	60.2	63.8	63.8	63.8	32.2	25.4
Upstream Blk Time (%)	1	1				2	0
Queuing Penalty (veh)	11	10				2	0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	39.8	49.0	16.4	48.6	55.4	19.8	57.9	43.0
Average Queue (m)	14.1	17.3	3.6	14.2	16.6	13.8	28.0	16.8
95th Queue (m)	26.0	32.3	11.6	29.5	34.1	23.3	51.8	31.4
Link Distance (m)	63.8	63.8		98.0	98.0	15.2	80.0	
Upstream Blk Time (%)						32		
Queuing Penalty (veh)						0		
Storage Bay Dist (m)			5.9					48.3
Storage Blk Time (%)			9	17			1	0
Queuing Penalty (veh)			42	2			1	0

Intersection: 7: Clarkson Rd S & Pattinson Cres

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.8	9.2
Average Queue (m)	2.8	0.6
95th Queue (m)	9.3	4.4
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		2
Queuing Penalty (veh)		2
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	8.8	8.6	9.2
Average Queue (m)	2.6	0.3	0.3
95th Queue (m)	9.1	2.8	3.0
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		0	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB
Directions Served	LR
Maximum Queue (m)	8.8
Average Queue (m)	2.5
95th Queue (m)	9.0
Link Distance (m)	73.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.1	15.4
Average Queue (m)	3.2	0.5
95th Queue (m)	10.1	5.1
Link Distance (m)	93.1	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	9.1	22.1
Average Queue (m)	5.8	1.9
95th Queue (m)	12.7	9.8
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.0	84.9	76.0	25.4	62.5	56.1	15.0	33.2	30.9
Average Queue (m)	13.6	62.7	49.0	4.9	27.2	27.9	7.6	20.7	16.8
95th Queue (m)	26.3	84.6	85.3	15.2	48.0	49.3	15.4	35.1	28.3
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		8	4		1	0	15	8	1
Queuing Penalty (veh)		0	0		4	0	0	0	0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	14	23		3	17				
Queuing Penalty (veh)	98	20		16	3				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	16.1	8.9
Average Queue (m)	4.6	0.3
95th Queue (m)	12.6	2.9
Link Distance (m)	69.0	48.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	59.6	60.5	21.0	77.5	77.5	60.4
Average Queue (m)	36.8	39.1	6.3	51.5	36.0	23.4
95th Queue (m)	52.3	58.0	15.4	78.9	67.4	47.3
Link Distance (m)	98.0	98.0		72.9	72.9	145.6
Upstream Blk Time (%)				3	0	
Queuing Penalty (veh)				0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			24	21		
Queuing Penalty (veh)			134	7		

Network Summary

Network wide Queuing Penalty: 352

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	860	38	45	960	0	69	0	120	21	2	10
Future Volume (vph)	0	860	38	45	960	0	69	0	120	21	2	10
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00			1.00	
Frt		0.99		1.00	1.00			0.91			0.96	
Flt Protected		1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)		3383		1724	3510			1630			1660	
Flt Permitted		1.00		0.27	1.00			0.86			0.64	
Satd. Flow (perm)		3383		499	3510			1435			1089	
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	935	41	49	1043	0	75	0	130	23	2	11
RTOR Reduction (vph)	0	2	0	0	0	0	0	49	0	0	9	0
Lane Group Flow (vph)	0	974	0	49	1043	0	0	156	0	0	27	0
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	0%	7%	6%	5%	4%	0%	8%	0%	2%	5%	0%	11%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		107.7		107.7	107.7			20.3			20.3	
Effective Green, g (s)		107.7		107.7	107.7			20.3			20.3	
Actuated g/C Ratio		0.77		0.77	0.77			0.15			0.15	
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)		2602		383	2700			208			157	
v/s Ratio Prot		0.29			c0.30							
v/s Ratio Perm				0.10				c0.11			0.02	
v/c Ratio		0.37		0.13	0.39			0.75			0.17	
Uniform Delay, d1		5.2		4.1	5.3			57.4			52.5	
Progression Factor		1.17		0.71	0.98			1.00			1.00	
Incremental Delay, d2		0.4		0.6	0.4			14.2			0.5	
Delay (s)		6.5		3.6	5.6			71.6			53.0	
Level of Service		A		A	A			E			D	
Approach Delay (s)		6.5			5.5			71.6			53.0	
Approach LOS		A			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.9%	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)	0	1003	20	11	819	205	13	14	4	107	16	199
Future Volume (vph)	0	1003	20	11	819	205	13	14	4	107	16	199
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		0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes		1.00		1.00	0.99			1.00			1.00	0.98
Flpb, ped/bikes		1.00		0.99	1.00			1.00			0.99	1.00
Frt		1.00		1.00	0.97			0.98			1.00	0.85
Flt Protected		1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)		3402		1816	3339			1842			1752	1571
Flt Permitted		1.00		0.23	1.00			0.85			0.73	1.00
Satd. Flow (perm)		3402		448	3339			1600			1334	1571
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	1090	22	12	890	223	14	15	4	116	17	216
RTOR Reduction (vph)	0	1	0	0	11	0	0	3	0	0	0	155
Lane Group Flow (vph)	0	1111	0	12	1102	0	0	30	0	0	133	61
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	4%	7%	0%	0%	5%	4%	0%	0%	0%	5%	0%	2%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			2			4			4	
Permitted Phases				2			4			4		4
Actuated Green, G (s)		108.5		108.5	108.5			19.5			19.5	19.5
Effective Green, g (s)		108.5		108.5	108.5			19.5			19.5	19.5
Actuated g/C Ratio		0.78		0.78	0.78			0.14			0.14	0.14
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)		2636		347	2587			222			185	218
v/s Ratio Prot		0.33			c0.33							
v/s Ratio Perm				0.03				0.02			c0.10	0.04
v/c Ratio		0.42		0.03	0.43			0.13			0.72	0.28
Uniform Delay, d1		5.3		3.6	5.3			52.8			57.6	54.0
Progression Factor		0.57		0.75	0.64			1.00			1.00	1.00
Incremental Delay, d2		0.5		0.2	0.5			0.3			12.5	0.7
Delay (s)		3.5		2.9	3.9			53.1			70.2	54.7
Level of Service		A		A	A			D			E	D
Approach Delay (s)		3.5			3.8			53.1			60.6	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

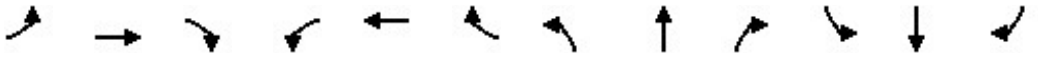
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	893	6	9	961	5	7	0	8	14	1	50
Future Volume (vph)	34	893	6	9	961	5	7	0	8	14	1	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0			6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1694	3440		1820	3499			1721			1821	1575
Flt Permitted	0.26	1.00		0.29	1.00			0.86			0.73	1.00
Satd. Flow (perm)	469	3440		546	3499			1513			1386	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)	37	971	7	10	1045	5	8	0	9	15	1	54
RTOR Reduction (vph)	0	0	0	0	0	0	0	16	0	0	0	50
Lane Group Flow (vph)	37	978	0	10	1050	0	0	1	0	0	16	4
Confl. Peds. (#/hr)	8		3	3		8	3		6	6		3
Heavy Vehicles (%)	7%	6%	0%	0%	4%	50%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Effective Green, g (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.08			0.08	0.08
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)	392	2879		457	2929			116			106	121
v/s Ratio Prot		0.28			c0.30							
v/s Ratio Perm	0.08			0.02				0.00			c0.01	0.00
v/c Ratio	0.09	0.34		0.02	0.36			0.01			0.15	0.03
Uniform Delay, d1	2.0	2.6		1.9	2.7			59.7			60.3	59.8
Progression Factor	1.00	1.00		0.67	0.57			1.00			1.00	1.00
Incremental Delay, d2	0.5	0.3		0.1	0.3			0.0			0.7	0.1
Delay (s)	2.5	2.9		1.3	1.8			59.7			61.0	59.9
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		2.9			1.8			59.7			60.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.1%	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)	0	1009	68	54	959	0	83	0	53	0	0	0
Future Volume (vph)	0	1009	68	54	959	0	83	0	53	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.99				
Flpb, ped/bikes		1.00		1.00	1.00			1.00				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3537		1786	3579			1707				
Flt Permitted		1.00		0.22	1.00			0.97				
Satd. Flow (perm)		3537		418	3579			1707				
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	1097	74	59	1042	0	90	0	58	0	0	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	1169	0	59	1042	0	0	128	0	0	0	0
Confl. Peds. (#/hr)			3	3			3		6			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		111.2		111.2	111.2			15.8				
Effective Green, g (s)		111.2		111.2	111.2			15.8				
Actuated g/C Ratio		0.79		0.79	0.79			0.11				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Vehicle Extension (s)		3.0		3.0	3.0			3.0				
Lane Grp Cap (vph)		2809		332	2842			192				
v/s Ratio Prot		c0.33			0.29							
v/s Ratio Perm				0.14				0.07				
v/c Ratio		0.42		0.18	0.37			0.66				
Uniform Delay, d1		4.4		3.4	4.2			59.6				
Progression Factor		0.44		1.00	1.00			1.00				
Incremental Delay, d2		0.4		1.2	0.4			8.4				
Delay (s)		2.4		4.6	4.5			67.9				
Level of Service		A		A	A			E				
Approach Delay (s)		2.4			4.5			67.9			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	62.1%	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)	0	1535	55	46	1087	0	44	0	62	9	1	11
Future Volume (vph)	0	1535	55	46	1087	0	44	0	62	9	1	11
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		1.00	1.00			0.99			1.00	
Frt		0.99		1.00	1.00			0.92			0.93	
Flt Protected		1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)		3549		1825	3544			1680			1641	
Flt Permitted		1.00		0.11	1.00			0.85			0.82	
Satd. Flow (perm)		3549		217	3544			1465			1371	
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	1668	60	50	1182	0	48	0	67	10	1	12
RTOR Reduction (vph)	0	1	0	0	0	0	0	37	0	0	11	0
Lane Group Flow (vph)	0	1727	0	50	1182	0	0	78	0	0	12	0
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	9%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		114.1		114.1	114.1			13.9			13.9	
Effective Green, g (s)		114.1		114.1	114.1			13.9			13.9	
Actuated g/C Ratio		0.81		0.81	0.81			0.10			0.10	
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)		2892		176	2888			145			136	
v/s Ratio Prot		c0.49			0.33							
v/s Ratio Perm				0.23				c0.05			0.01	
v/c Ratio		0.60		0.28	0.41			0.54			0.09	
Uniform Delay, d1		4.7		3.1	3.6			60.0			57.3	
Progression Factor		1.09		0.63	0.52			1.00			1.00	
Incremental Delay, d2		0.8		3.6	0.4			3.8			0.3	
Delay (s)		5.9		5.6	2.3			63.8			57.6	
Level of Service		A		A	A			E			E	
Approach Delay (s)		5.9			2.4			63.8			57.6	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.0%	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	1568	26	9	967	192	21	36	10	108	18	191
Future Volume (vph)	0	1568	26	9	967	192	21	36	10	108	18	191
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		0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes		1.00		1.00	0.99			1.00			1.00	0.97
Flpb, ped/bikes		1.00		1.00	1.00			1.00			0.99	1.00
Frt		1.00		1.00	0.98			0.98			1.00	0.85
Flt Protected		1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)		3601		1825	3418			1840			1811	1576
Flt Permitted		1.00		0.10	1.00			0.82			0.71	1.00
Satd. Flow (perm)		3601		198	3418			1532			1335	1576
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	1704	28	10	1051	209	23	39	11	117	20	208
RTOR Reduction (vph)	0	1	0	0	9	0	0	5	0	0	0	124
Lane Group Flow (vph)	0	1731	0	10	1251	0	0	68	0	0	137	84
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	1%	1%	0%	0%	3%	1%	0%	0%	0%	1%	0%	1%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			2			4			4	
Permitted Phases				2			4			4		4
Actuated Green, G (s)		108.3		108.3	108.3			19.7			19.7	19.7
Effective Green, g (s)		108.3		108.3	108.3			19.7			19.7	19.7
Actuated g/C Ratio		0.77		0.77	0.77			0.14			0.14	0.14
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)		2785		153	2644			215			187	221
v/s Ratio Prot		c0.48			0.37							
v/s Ratio Perm				0.05				0.04			c0.10	0.05
v/c Ratio		0.62		0.07	0.47			0.32			0.73	0.38
Uniform Delay, d1		6.9		3.8	5.7			54.1			57.6	54.6
Progression Factor		0.27		0.45	0.39			1.00			1.00	1.00
Incremental Delay, d2		0.9		0.7	0.6			0.8			13.8	1.1
Delay (s)		2.7		2.4	2.8			54.9			71.4	55.7
Level of Service		A		A	A			D			E	E
Approach Delay (s)		2.7			2.8			54.9			61.9	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	5	8	100	92	10
Future Volume (Veh/h)	6	5	8	100	92	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	9	109	100	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	232	106	111			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	232	106	111			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	751	949	1479			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	118	111
Volume Left	7	9	0
Volume Right	5	0	11
cSH	823	1479	1700
Volume to Capacity	0.01	0.01	0.07
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.4	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	6	102	10	11	86
Future Volume (Veh/h)	6	6	102	10	11	86
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	7	111	11	12	93
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	234	116			122	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	116			122	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	749	936			1465	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	14	122	105
Volume Left	7	0	12
Volume Right	7	11	0
cSH	832	1700	1465
Volume to Capacity	0.02	0.07	0.01
Queue Length 95th (m)	0.4	0.0	0.2
Control Delay (s)	9.4	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	5	8	107	84	8
Future Volume (Veh/h)	5	5	8	107	84	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	9	116	91	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	230	96	100			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	230	96	100			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	754	961	1493			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	125	100
Volume Left	5	9	0
Volume Right	5	0	9
cSH	845	1493	1700
Volume to Capacity	0.01	0.01	0.06
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.3	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	5	218	10	10	311
Future Volume (Veh/h)	6	5	218	10	10	311
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	237	11	11	338
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked						
vC, conflicting volume	602	242			248	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	602	242			248	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	458	796			1318	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	12	248	349
Volume Left	7	0	11
Volume Right	5	11	0
cSH	557	1700	1318
Volume to Capacity	0.02	0.15	0.01
Queue Length 95th (m)	0.5	0.0	0.2
Control Delay (s)	11.6	0.0	0.3
Lane LOS	B		A
Approach Delay (s)	11.6	0.0	0.3
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	13	22	201	308	21
Future Volume (Veh/h)	12	13	22	201	308	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	14	24	218	335	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked						
vC, conflicting volume	612	346	358			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	612	346	358			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	98			
cM capacity (veh/h)	447	697	1201			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	242	358
Volume Left	13	24	0
Volume Right	14	0	23
cSH	549	1201	1700
Volume to Capacity	0.05	0.02	0.21
Queue Length 95th (m)	1.2	0.5	0.0
Control Delay (s)	11.9	1.0	0.0
Lane LOS	B	A	
Approach Delay (s)	11.9	1.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	38.9%	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)	84	1430	16	20	1056	18	19	1	20	87	1	119
Future Volume (vph)	84	1430	16	20	1056	18	19	1	20	87	1	119
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00			0.99			0.98	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1807	3571		1825	3565			1707			1788	1589
Flt Permitted	0.22	1.00		0.13	1.00			0.82			0.77	1.00
Satd. Flow (perm)	423	3571		258	3565			1439			1439	1589
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	1554	17	22	1148	20	21	1	22	95	1	129
RTOR Reduction (vph)	0	0	0	0	1	0	0	19	0	0	0	96
Lane Group Flow (vph)	91	1571	0	22	1167	0	0	25	0	0	96	33
Confl. Peds. (#/hr)	17		8	8		17	11		18	18		11
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	110.9	110.9		110.9	110.9			17.1			17.1	17.1
Effective Green, g (s)	110.9	110.9		110.9	110.9			17.1			17.1	17.1
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.12			0.12	0.12
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)	335	2828		204	2823			175			175	194
v/s Ratio Prot		c0.44			0.33							
v/s Ratio Perm	0.22			0.09				0.02			c0.07	0.02
v/c Ratio	0.27	0.56		0.11	0.41			0.14			0.55	0.17
Uniform Delay, d1	3.9	5.4		3.3	4.5			54.9			57.8	55.1
Progression Factor	1.00	1.00		0.72	0.66			1.00			1.00	1.00
Incremental Delay, d2	2.0	0.8		1.0	0.4			0.4			3.5	0.4
Delay (s)	5.8	6.2		3.4	3.4			55.3			61.3	55.5
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		6.2			3.4			55.3			58.0	
Approach LOS		A			A			E			E	

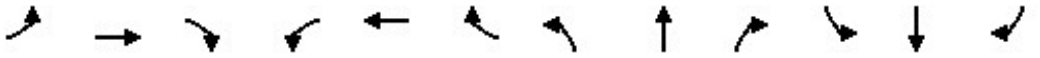
Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	12	11	195	18	18	317
Future Volume (Veh/h)	12	11	195	18	18	317
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	12	212	20	20	345
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			230			
pX, platoon unblocked						
vC, conflicting volume	607	222			232	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	607	222			232	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	453	818			1336	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	25	232	365
Volume Left	13	0	20
Volume Right	12	20	0
cSH	576	1700	1336
Volume to Capacity	0.04	0.14	0.01
Queue Length 95th (m)	1.0	0.0	0.3
Control Delay (s)	11.5	0.0	0.6
Lane LOS	B		A
Approach Delay (s)	11.5	0.0	0.6
Approach LOS	B		

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		41.4%	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)	0	1604	73	31	1106	0	67	0	39	0	0	0
Future Volume (vph)	0	1604	73	31	1106	0	67	0	39	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.98				
Flpb, ped/bikes		1.00		1.00	1.00			0.98				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3547		1789	3579			1677				
Flt Permitted		1.00		0.08	1.00			0.97				
Satd. Flow (perm)		3547		152	3579			1677				
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	1743	79	34	1202	0	73	0	42	0	0	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1820	0	34	1202	0	0	96	0	0	0	0
Confl. Peds. (#/hr)			8	8			11		18			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		103.0		103.0	103.0			24.0				
Effective Green, g (s)		103.0		103.0	103.0			24.0				
Actuated g/C Ratio		0.74		0.74	0.74			0.17				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Lane Grp Cap (vph)		2609		111	2633			287				
v/s Ratio Prot		c0.51			0.34							
v/s Ratio Perm				0.22				0.06				
v/c Ratio		0.70		0.31	0.46			0.33				
Uniform Delay, d1		10.0		6.3	7.4			51.0				
Progression Factor		0.42		1.00	1.00			1.00				
Incremental Delay, d2		1.3		7.0	0.6			3.1				
Delay (s)		5.5		13.3	7.9			54.1				
Level of Service		A		B	A			D				
Approach Delay (s)		5.5			8.1			54.1			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	61.7	63.7	20.7	67.0	71.8	34.2	28.4
Average Queue (m)	43.4	39.2	5.9	31.3	34.9	30.8	10.0
95th Queue (m)	76.8	71.1	15.2	64.7	65.3	40.6	22.5
Link Distance (m)	60.2	60.2	61.8	61.8	61.8	32.2	25.4
Upstream Blk Time (%)	2	1		1	1	31	1
Queuing Penalty (veh)	13	8		2	3	69	0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	61.5	64.6	9.0	47.7	71.9	19.8	52.6	66.2
Average Queue (m)	26.7	23.3	2.6	22.2	21.7	7.1	34.4	23.9
95th Queue (m)	54.0	50.7	9.1	40.4	45.9	15.8	52.8	40.8
Link Distance (m)	61.8	61.8		99.7	99.7	15.2	80.2	
Upstream Blk Time (%)	0	0				2		
Queuing Penalty (veh)	0	0				0		
Storage Bay Dist (m)			5.9					48.3
Storage Blk Time (%)			3	18			3	2
Queuing Penalty (veh)			11	2			6	2

Intersection: 7: Pattinson Cres & Clarkson Rd S

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	20.6	16.4
Average Queue (m)	5.0	6.4
95th Queue (m)	14.5	14.3
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		23
Queuing Penalty (veh)		50
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB
Directions Served	LR	TR
Maximum Queue (m)	8.8	15.0
Average Queue (m)	3.0	5.2
95th Queue (m)	9.7	13.3
Link Distance (m)	66.2	1.8
Upstream Blk Time (%)		18
Queuing Penalty (veh)		38
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	47.4
Average Queue (m)	4.1	9.8
95th Queue (m)	10.9	32.7
Link Distance (m)	73.1	66.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.1	21.4
Average Queue (m)	3.7	1.0
95th Queue (m)	10.7	7.8
Link Distance (m)	93.1	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Fellen Pl & Clarkson Rd N

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	16.7	22.6
Average Queue (m)	7.9	1.7
95th Queue (m)	14.4	9.5
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	24.8	70.2	58.0	25.4	28.6	42.9	8.9	20.9	20.2
Average Queue (m)	5.3	33.7	19.1	2.7	12.2	14.7	3.7	3.5	7.9
95th Queue (m)	15.3	74.7	46.4	12.2	29.9	35.3	10.8	11.8	17.7
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		2					6		
Queuing Penalty (veh)		0					0		
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	0	16		1	9				
Queuing Penalty (veh)	2	6		3	1				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	15.6	16.6
Average Queue (m)	6.9	0.8
95th Queue (m)	13.5	6.3
Link Distance (m)	46.3	37.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	38.7	45.3	22.2	78.0	78.0	78.6
Average Queue (m)	19.2	23.2	8.2	35.8	22.1	30.7
95th Queue (m)	36.7	41.5	20.4	70.3	52.3	55.7
Link Distance (m)	99.7	99.7		73.4	73.4	167.8
Upstream Blk Time (%)				1	0	
Queuing Penalty (veh)				0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			14	16		
Queuing Penalty (veh)			68	9		

Network Summary

Network wide Queuing Penalty: 293

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	62.1	62.4	27.4	33.1	41.7	34.4	22.1
Average Queue (m)	42.2	43.9	9.4	12.1	15.1	23.0	5.0
95th Queue (m)	77.4	75.8	18.4	26.2	34.8	39.6	15.9
Link Distance (m)	60.2	60.2	63.8	63.8	63.8	32.2	25.4
Upstream Blk Time (%)	3	2				7	0
Queuing Penalty (veh)	26	20				7	0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	34.1	38.3	13.5	34.1	43.0	19.8	51.9	58.4
Average Queue (m)	15.8	19.8	2.3	14.4	18.3	12.9	35.7	25.1
95th Queue (m)	30.9	37.2	8.8	30.2	33.2	23.1	51.9	44.0
Link Distance (m)	63.8	63.8		98.0	98.0	15.2	80.0	
Upstream Blk Time (%)						21		
Queuing Penalty (veh)						0		
Storage Bay Dist (m)			5.9					48.3
Storage Blk Time (%)			7	16			3	0
Queuing Penalty (veh)			38	2			6	1

Intersection: 7: Clarkson Rd S & Pattinson Cres

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.8	9.2
Average Queue (m)	1.4	2.3
95th Queue (m)	6.7	8.7
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		4
Queuing Penalty (veh)		4
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	8.8	9.3	9.2
Average Queue (m)	2.9	1.2	0.9
95th Queue (m)	9.6	6.3	5.3
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		1	0
Queuing Penalty (veh)		1	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	9.0
Average Queue (m)	2.3	0.5
95th Queue (m)	8.6	3.6
Link Distance (m)	73.3	49.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	9.1	8.6	31.8
Average Queue (m)	3.1	0.3	2.6
95th Queue (m)	9.9	2.8	15.2
Link Distance (m)	93.1	80.0	31.8
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.5	35.6
Average Queue (m)	5.1	2.7
95th Queue (m)	13.4	14.2
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		0
Queuing Penalty (veh)		1
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.1	77.6	76.0	25.4	65.1	75.9	15.0	33.2	33.2
Average Queue (m)	13.8	57.7	52.4	6.0	39.6	39.8	8.6	25.2	13.6
95th Queue (m)	26.8	88.4	87.0	16.1	62.4	61.5	17.5	38.6	26.4
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		9	7		1	0	19	19	1
Queuing Penalty (veh)		0	0		9	2	0	0	0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	18	25		3	20				
Queuing Penalty (veh)	132	22		19	4				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

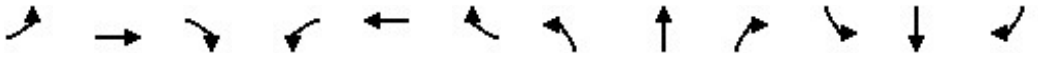
Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	15.4	8.6
Average Queue (m)	4.2	0.8
95th Queue (m)	12.0	5.0
Link Distance (m)	69.0	48.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	81.1	95.1	21.0	83.3	77.5	46.1
Average Queue (m)	43.7	47.2	7.7	55.6	42.3	25.2
95th Queue (m)	67.4	73.1	17.7	85.8	75.6	41.7
Link Distance (m)	98.0	98.0		72.9	72.9	145.6
Upstream Blk Time (%)		0		4	2	
Queuing Penalty (veh)		0		0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			29	23		
Queuing Penalty (veh)			180	7		

Network Summary

Network wide Queuing Penalty: 481



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	981	32	39	965	0	81	0	141	21	2	10
Future Volume (vph)	0	981	32	39	965	0	81	0	141	21	2	10
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00			1.00	
Frt		1.00		1.00	1.00			0.91			0.96	
Flt Protected		1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)		3390		1728	3510			1630			1661	
Flt Permitted		1.00		0.23	1.00			0.86			0.64	
Satd. Flow (perm)		3390		424	3510			1435			1103	
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	1066	35	42	1049	0	88	0	153	23	2	11
RTOR Reduction (vph)	0	2	0	0	0	0	0	48	0	0	9	0
Lane Group Flow (vph)	0	1099	0	42	1049	0	0	193	0	0	27	0
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	0%	7%	6%	5%	4%	0%	8%	0%	2%	5%	0%	11%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		104.9		104.9	104.9			23.1			23.1	
Effective Green, g (s)		104.9		104.9	104.9			23.1			23.1	
Actuated g/C Ratio		0.75		0.75	0.75			0.17			0.17	
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)		2540		317	2629			236			181	
v/s Ratio Prot		c0.32			0.30							
v/s Ratio Perm				0.10				c0.13			0.02	
v/c Ratio		0.43		0.13	0.40			0.82			0.15	
Uniform Delay, d1		6.5		4.9	6.3			56.4			50.0	
Progression Factor		1.19		0.82	1.04			1.00			1.00	
Incremental Delay, d2		0.5		0.8	0.4			19.4			0.4	
Delay (s)		8.3		4.8	7.0			75.9			50.4	
Level of Service		A		A	A			E			D	
Approach Delay (s)		8.3			6.9			75.9			50.4	
Approach LOS		A			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.3%	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	1104	25	11	824	215	12	14	4	128	13	250
Future Volume (vph)	0	1104	25	11	824	215	12	14	4	128	13	250
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		0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes		1.00		1.00	0.99			1.00			1.00	0.98
Flpb, ped/bikes		1.00		1.00	1.00			1.00			0.99	1.00
Frt		1.00		1.00	0.97			0.98			1.00	0.85
Flt Protected		1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)		3401		1818	3335			1843			1745	1571
Flt Permitted		1.00		0.20	1.00			0.86			0.72	1.00
Satd. Flow (perm)		3401		383	3335			1616			1318	1571
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	1200	27	12	896	234	13	15	4	139	14	272
RTOR Reduction (vph)	0	1	0	0	12	0	0	3	0	0	0	150
Lane Group Flow (vph)	0	1226	0	12	1118	0	0	29	0	0	153	122
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	4%	7%	0%	0%	5%	4%	0%	0%	0%	5%	0%	2%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			2			4			4	
Permitted Phases				2			4			4		4
Actuated Green, G (s)		106.0		106.0	106.0			22.0			22.0	22.0
Effective Green, g (s)		106.0		106.0	106.0			22.0			22.0	22.0
Actuated g/C Ratio		0.76		0.76	0.76			0.16			0.16	0.16
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)		2575		289	2525			253			207	246
v/s Ratio Prot		c0.36			0.34							
v/s Ratio Perm				0.03				0.02			c0.12	0.08
v/c Ratio		0.48		0.04	0.44			0.11			0.74	0.50
Uniform Delay, d1		6.5		4.3	6.2			50.6			56.3	53.9
Progression Factor		0.52		0.72	0.62			1.00			1.00	1.00
Incremental Delay, d2		0.6		0.3	0.5			0.2			12.9	1.6
Delay (s)		3.9		3.3	4.4			50.8			69.2	55.5
Level of Service		A		A	A			D			E	E
Approach Delay (s)		3.9			4.4			50.8			60.4	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.2%	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)	38	1001	7	9	982	5	7	0	8	14	1	54
Future Volume (vph)	38	1001	7	9	982	5	7	0	8	14	1	54
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1695	3440		1821	3499			1721			1821	1575
Flt Permitted	0.26	1.00		0.25	1.00			0.86			0.73	1.00
Satd. Flow (perm)	458	3440		479	3499			1513			1386	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)	41	1088	8	10	1067	5	8	0	9	15	1	59
RTOR Reduction (vph)	0	0	0	0	0	0	0	16	0	0	0	54
Lane Group Flow (vph)	41	1096	0	10	1072	0	0	1	0	0	16	5
Confl. Peds. (#/hr)	8		3	3		8	3		6	6		3
Heavy Vehicles (%)	7%	6%	0%	0%	4%	50%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Effective Green, g (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.08			0.08	0.08
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)	383	2879		400	2929			116			106	121
v/s Ratio Prot		c0.32			0.31							
v/s Ratio Perm	0.09			0.02				0.00			c0.01	0.00
v/c Ratio	0.11	0.38		0.03	0.37			0.01			0.15	0.04
Uniform Delay, d1	2.0	2.7		1.9	2.7			59.7			60.3	59.8
Progression Factor	1.00	1.00		0.63	0.55			1.00			1.00	1.00
Incremental Delay, d2	0.6	0.4		0.1	0.3			0.0			0.7	0.1
Delay (s)	2.6	3.1		1.3	1.8			59.7			61.0	59.9
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		3.1			1.8			59.7			60.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
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)	0	1137	68	55	974	0	86	0	55	0	0	0
Future Volume (vph)	0	1137	68	55	974	0	86	0	55	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.99				
Flpb, ped/bikes		1.00		1.00	1.00			1.00				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3542		1787	3579			1707				
Flt Permitted		1.00		0.19	1.00			0.97				
Satd. Flow (perm)		3542		352	3579			1707				
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	1236	74	60	1059	0	93	0	60	0	0	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	1308	0	60	1059	0	0	133	0	0	0	0
Confl. Peds. (#/hr)			3	3			3		6			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		110.8		110.8	110.8			16.2				
Effective Green, g (s)		110.8		110.8	110.8			16.2				
Actuated g/C Ratio		0.79		0.79	0.79			0.12				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Vehicle Extension (s)		3.0		3.0	3.0			3.0				
Lane Grp Cap (vph)		2803		278	2832			197				
v/s Ratio Prot		c0.37			0.30							
v/s Ratio Perm				0.17				0.08				
v/c Ratio		0.47		0.22	0.37			0.67				
Uniform Delay, d1		4.8		3.7	4.3			59.4				
Progression Factor		0.43		1.00	1.00			1.00				
Incremental Delay, d2		0.5		1.8	0.4			8.7				
Delay (s)		2.6		5.4	4.7			68.1				
Level of Service		A		A	A			E				
Approach Delay (s)		2.6			4.7			68.1			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	65.8%	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	1576	55	46	1249	0	45	0	64	9	1	12
Future Volume (vph)	0	1576	55	46	1249	0	45	0	64	9	1	12
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		1.00	1.00			0.99			1.00	
Frt		0.99		1.00	1.00			0.92			0.93	
Flt Protected		1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)		3550		1825	3544			1679			1634	
Flt Permitted		1.00		0.11	1.00			0.86			0.83	
Satd. Flow (perm)		3550		202	3544			1466			1378	
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	1713	60	50	1358	0	49	0	70	10	1	13
RTOR Reduction (vph)	0	1	0	0	0	0	0	33	0	0	12	0
Lane Group Flow (vph)	0	1772	0	50	1358	0	0	86	0	0	12	0
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	9%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		113.6		113.6	113.6			14.4			14.4	
Effective Green, g (s)		113.6		113.6	113.6			14.4			14.4	
Actuated g/C Ratio		0.81		0.81	0.81			0.10			0.10	
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)		2880		163	2875			150			141	
v/s Ratio Prot		c0.50			0.38							
v/s Ratio Perm				0.25				c0.06			0.01	
v/c Ratio		0.62		0.31	0.47			0.57			0.09	
Uniform Delay, d1		5.0		3.3	4.0			59.9			56.9	
Progression Factor		1.02		0.77	0.70			1.00			1.00	
Incremental Delay, d2		0.8		4.0	0.5			5.2			0.3	
Delay (s)		5.9		6.6	3.3			65.0			57.1	
Level of Service		A		A	A			E			E	
Approach Delay (s)		5.9			3.4			65.0			57.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.5%	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)	0	1604	26	10	1065	212	23	36	11	142	24	251
Future Volume (vph)	0	1604	26	10	1065	212	23	36	11	142	24	251
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		0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes		1.00		1.00	0.99			1.00			1.00	0.97
Flpb, ped/bikes		1.00		1.00	1.00			1.00			0.99	1.00
Frt		1.00		1.00	0.98			0.98			1.00	0.85
Flt Protected		1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)		3601		1825	3418			1837			1811	1576
Flt Permitted		1.00		0.09	1.00			0.75			0.71	1.00
Satd. Flow (perm)		3601		175	3418			1406			1333	1576
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	1743	28	11	1158	230	25	39	12	154	26	273
RTOR Reduction (vph)	0	1	0	0	10	0	0	5	0	0	0	97
Lane Group Flow (vph)	0	1770	0	11	1378	0	0	71	0	0	180	176
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	1%	1%	0%	0%	3%	1%	0%	0%	0%	1%	0%	1%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			2			4			4	
Permitted Phases				2			4			4		4
Actuated Green, G (s)		104.5		104.5	104.5			23.5			23.5	23.5
Effective Green, g (s)		104.5		104.5	104.5			23.5			23.5	23.5
Actuated g/C Ratio		0.75		0.75	0.75			0.17			0.17	0.17
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)		2687		130	2551			236			223	264
v/s Ratio Prot		c0.49			0.40							
v/s Ratio Perm				0.06				0.05			c0.14	0.11
v/c Ratio		0.66		0.08	0.54			0.30			0.81	0.67
Uniform Delay, d1		8.9		4.8	7.5			51.1			56.1	54.6
Progression Factor		0.26		0.39	0.34			1.00			1.00	1.00
Incremental Delay, d2		1.0		1.1	0.7			0.7			18.9	6.2
Delay (s)		3.4		3.0	3.3			51.8			74.9	60.8
Level of Service		A		A	A			D			E	E
Approach Delay (s)		3.4			3.3			51.8			66.4	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.5%	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)	87	1485	16	20	1202	18	22	1	20	133	1	119
Future Volume (vph)	87	1485	16	20	1202	18	22	1	20	133	1	119
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00			0.99			0.98	1.00
Frt	1.00	1.00		1.00	1.00			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1814	3572		1825	3567			1715			1788	1589
Flt Permitted	0.18	1.00		0.12	1.00			0.76			0.75	1.00
Satd. Flow (perm)	339	3572		226	3567			1329			1404	1589
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)	95	1614	17	22	1307	20	24	1	22	145	1	129
RTOR Reduction (vph)	0	0	0	0	0	0	0	19	0	0	0	67
Lane Group Flow (vph)	95	1631	0	22	1327	0	0	28	0	0	146	62
Confl. Peds. (#/hr)	17		8	8		17	11		18	18		11
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	106.9	106.9		106.9	106.9			21.1			21.1	21.1
Effective Green, g (s)	106.9	106.9		106.9	106.9			21.1			21.1	21.1
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.15			0.15	0.15
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)	258	2727		172	2723			200			211	239
v/s Ratio Prot		c0.46			0.37							
v/s Ratio Perm	0.28			0.10				0.02			c0.10	0.04
v/c Ratio	0.37	0.60		0.13	0.49			0.14			0.69	0.26
Uniform Delay, d1	5.4	7.2		4.3	6.2			51.6			56.4	52.5
Progression Factor	1.00	1.00		0.66	0.58			1.00			1.00	1.00
Incremental Delay, d2	4.0	1.0		1.4	0.6			0.3			9.4	0.6
Delay (s)	9.5	8.2		4.2	4.2			51.9			65.8	53.1
Level of Service	A	A		A	A			D			E	D
Approach Delay (s)		8.2			4.2			51.9			59.8	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.0%	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	1741	73	31	1259	0	59	0	34	0	0	0
Future Volume (vph)	0	1741	73	31	1259	0	59	0	34	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.98				
Flpb, ped/bikes		1.00		1.00	1.00			0.98				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3550		1789	3579			1677				
Flt Permitted		1.00		0.06	1.00			0.97				
Satd. Flow (perm)		3550		115	3579			1677				
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	1892	79	34	1368	0	64	0	37	0	0	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1969	0	34	1368	0	0	82	0	0	0	0
Confl. Peds. (#/hr)			8	8			11		18			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		103.0		103.0	103.0			24.0				
Effective Green, g (s)		103.0		103.0	103.0			24.0				
Actuated g/C Ratio		0.74		0.74	0.74			0.17				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Lane Grp Cap (vph)		2611		84	2633			287				
v/s Ratio Prot		c0.55			0.38							
v/s Ratio Perm				0.30				0.05				
v/c Ratio		0.75		0.40	0.52			0.29				
Uniform Delay, d1		11.0		7.0	7.9			50.5				
Progression Factor		0.43		1.00	1.00			1.00				
Incremental Delay, d2		1.6		13.9	0.7			2.5				
Delay (s)		6.4		20.8	8.7			53.0				
Level of Service		A		C	A			D				
Approach Delay (s)		6.4			8.9			53.0			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

WIDENING ROAD

Engineering
for **people**

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	62.5	60.2	23.2	57.5	71.6	40.8	24.1
Average Queue (m)	37.9	30.5	8.3	16.2	21.2	26.6	9.3
95th Queue (m)	72.1	62.0	19.9	48.6	51.3	41.3	21.1
Link Distance (m)	60.2	60.2	64.9	64.9	64.9	29.8	25.4
Upstream Blk Time (%)	2	0			0	22	0
Queuing Penalty (veh)	10	2			0	41	0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	64.6	67.2	70.2	8.9	99.8	94.7	19.5	57.8	41.7
Average Queue (m)	31.6	27.0	22.3	1.6	42.1	39.8	7.2	29.5	20.5
95th Queue (m)	55.8	54.0	51.0	7.0	88.2	83.3	18.0	48.8	34.8
Link Distance (m)	64.9	64.9	64.9		97.6	97.6	14.9	80.0	
Upstream Blk Time (%)	0	2	0		0	0	13		
Queuing Penalty (veh)	0	6	1		2	0	0		
Storage Bay Dist (m)				5.9					48.3
Storage Blk Time (%)				2	26			1	
Queuing Penalty (veh)				9	3			3	

Intersection: 7: Pattinson Cres & Clarkson Rd S

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	14.6	14.3
Average Queue (m)	4.5	5.0
95th Queue (m)	12.1	12.9
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		16
Queuing Penalty (veh)		30
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB
Directions Served	LR	TR
Maximum Queue (m)	21.2	9.2
Average Queue (m)	5.7	3.0
95th Queue (m)	16.2	9.8
Link Distance (m)	66.2	1.8
Upstream Blk Time (%)		10
Queuing Penalty (veh)		18
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	16.3	36.1
Average Queue (m)	4.7	4.3
95th Queue (m)	12.4	20.3
Link Distance (m)	73.1	66.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.1	8.3
Average Queue (m)	3.4	0.3
95th Queue (m)	10.3	2.7
Link Distance (m)	93.1	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Fellen Pl & Clarkson Rd N

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	16.1	9.3
Average Queue (m)	9.0	0.9
95th Queue (m)	15.4	5.5
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	24.8	70.2	50.7	14.5	34.7	35.6	14.7	15.5	17.1
Average Queue (m)	5.4	33.6	14.6	1.9	9.4	10.0	3.8	3.7	9.2
95th Queue (m)	15.0	78.7	42.5	8.5	26.1	28.5	11.3	11.7	17.0
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		1					9		
Queuing Penalty (veh)		0					0		
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	1	14		0	7				
Queuing Penalty (veh)	5	5		2	1				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	15.5	16.8
Average Queue (m)	5.5	1.5
95th Queue (m)	13.2	7.9
Link Distance (m)	46.3	37.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	56.2	50.0	19.7	78.0	46.0	59.7
Average Queue (m)	18.5	20.3	7.7	33.4	17.1	32.2
95th Queue (m)	37.7	38.3	15.5	65.1	39.6	51.1
Link Distance (m)	97.6	97.6		73.4	73.4	167.6
Upstream Blk Time (%)				0		
Queuing Penalty (veh)				0		
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			10	18		
Queuing Penalty (veh)			49	9		

Network Summary

Network wide Queuing Penalty: 195

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	67.0	79.8	64.6	83.1	52.7	34.0	22.0
Average Queue (m)	55.5	58.5	21.3	15.6	15.3	22.0	9.6
95th Queue (m)	82.2	91.9	52.3	47.7	34.7	37.0	22.4
Link Distance (m)	60.2	60.2	64.9	64.9	64.9	29.8	25.4
Upstream Blk Time (%)	24	10	3	1		14	0
Queuing Penalty (veh)	183	77	11	4		15	0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	71.7	86.6	83.3	8.9	85.8	101.4	19.5	80.8	50.6
Average Queue (m)	62.1	72.0	41.7	2.7	43.4	44.9	13.9	32.7	18.9
95th Queue (m)	72.1	104.6	77.7	9.1	82.4	82.3	23.0	57.4	35.0
Link Distance (m)	64.9	64.9	64.9		98.0	98.0	14.9	80.0	
Upstream Blk Time (%)	35	40	1			0	27	1	
Queuing Penalty (veh)	186	214	7			1	0	3	
Storage Bay Dist (m)				5.9					48.3
Storage Blk Time (%)				6	28			4	0
Queuing Penalty (veh)				27	3			8	0

Intersection: 7: Clarkson Rd S & Pattinson Cres

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	9.3
Average Queue (m)	2.2	2.6
95th Queue (m)	8.3	9.2
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		5
Queuing Penalty (veh)		5
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	8.7	9.0	9.0
Average Queue (m)	2.6	0.5	0.3
95th Queue (m)	9.1	3.5	3.0
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		1	0
Queuing Penalty (veh)		1	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	15.5
Average Queue (m)	1.1	0.8
95th Queue (m)	6.0	6.1
Link Distance (m)	73.3	49.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.1	15.6
Average Queue (m)	3.2	1.9
95th Queue (m)	10.1	9.4
Link Distance (m)	93.1	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	9.1	9.3
Average Queue (m)	6.7	1.2
95th Queue (m)	12.9	6.3
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.1	84.5	76.0	16.8	55.1	51.2	15.0	33.2	33.2
Average Queue (m)	17.0	71.3	62.8	4.0	27.9	26.0	5.9	21.4	13.4
95th Queue (m)	32.4	76.7	86.1	12.0	51.4	48.5	15.3	35.8	22.9
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		57	17		0		17	13	0
Queuing Penalty (veh)		0	0		0		0	0	0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	17	58		3	16				
Queuing Penalty (veh)	123	48		15	3				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

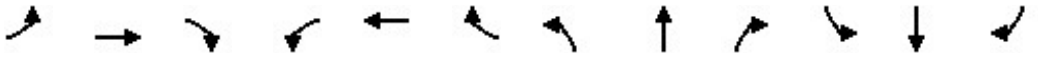
Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	14.2	21.9
Average Queue (m)	4.8	3.7
95th Queue (m)	12.3	14.4
Link Distance (m)	69.0	48.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	59.4	60.8	21.4	77.5	77.5	41.6
Average Queue (m)	34.3	36.1	8.2	49.6	32.7	24.6
95th Queue (m)	55.5	56.6	18.6	75.4	62.0	42.6
Link Distance (m)	98.0	98.0		72.9	72.9	145.6
Upstream Blk Time (%)				2	0	
Queuing Penalty (veh)				0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			22	21		
Queuing Penalty (veh)			121	6		

Network Summary

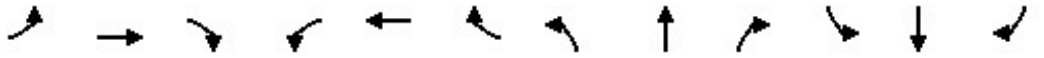
Network wide Queuing Penalty: 1063



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	860	38	45	960	0	69	0	120	21	2	10
Future Volume (vph)	0	860	38	45	960	0	69	0	120	21	2	10
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00			1.00	
Frt		0.99		1.00	1.00			0.91			0.96	
Flt Protected		1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)		3383		1724	3510			1630			1660	
Flt Permitted		1.00		0.27	1.00			0.86			0.64	
Satd. Flow (perm)		3383		499	3510			1435			1089	
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	935	41	49	1043	0	75	0	130	23	2	11
RTOR Reduction (vph)	0	2	0	0	0	0	0	49	0	0	9	0
Lane Group Flow (vph)	0	974	0	49	1043	0	0	156	0	0	27	0
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	0%	7%	6%	5%	4%	0%	8%	0%	2%	5%	0%	11%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		107.7		107.7	107.7			20.3			20.3	
Effective Green, g (s)		107.7		107.7	107.7			20.3			20.3	
Actuated g/C Ratio		0.77		0.77	0.77			0.15			0.15	
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)		2602		383	2700			208			157	
v/s Ratio Prot		0.29			c0.30							
v/s Ratio Perm				0.10				c0.11			0.02	
v/c Ratio		0.37		0.13	0.39			0.75			0.17	
Uniform Delay, d1		5.2		4.1	5.3			57.4			52.5	
Progression Factor		1.17		0.21	0.32			1.00			1.00	
Incremental Delay, d2		0.4		0.6	0.4			14.2			0.5	
Delay (s)		6.5		1.5	2.1			71.6			53.0	
Level of Service		A		A	A			E			D	
Approach Delay (s)		6.5			2.0			71.6			53.0	
Approach LOS		A			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.9%	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)	209	794	20	11	819	205	13	14	4	107	16	199
Future Volume (vph)	209	794	20	11	819	205	13	14	4	107	16	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.97			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1754	3400		1808	3339			1842			1752	1571
Flt Permitted	0.21	1.00		0.32	1.00			0.85			0.73	1.00
Satd. Flow (perm)	383	3400		611	3339			1600			1334	1571
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)	227	863	22	12	890	223	14	15	4	116	17	216
RTOR Reduction (vph)	0	1	0	0	11	0	0	3	0	0	0	186
Lane Group Flow (vph)	227	884	0	12	1102	0	0	30	0	0	133	30
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	4%	7%	0%	0%	5%	4%	0%	0%	0%	5%	0%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	108.5	108.5		95.2	95.2			19.5			19.5	19.5
Effective Green, g (s)	108.5	108.5		95.2	95.2			19.5			19.5	19.5
Actuated g/C Ratio	0.78	0.78		0.68	0.68			0.14			0.14	0.14
Clearance Time (s)	3.0	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)	397	2635		415	2270			222			185	218
v/s Ratio Prot	c0.04	0.26			0.33							
v/s Ratio Perm	c0.40			0.02				0.02			c0.10	0.02
v/c Ratio	0.57	0.34		0.03	0.49			0.13			0.72	0.14
Uniform Delay, d1	6.5	4.8		7.3	10.7			52.8			57.6	52.9
Progression Factor	2.77	0.61		0.68	0.78			1.00			1.00	1.00
Incremental Delay, d2	1.9	0.3		0.1	0.7			0.3			12.5	0.3
Delay (s)	19.7	3.2		5.1	9.0			53.1			70.2	53.2
Level of Service	B	A		A	A			D			E	D
Approach Delay (s)		6.6			9.0			53.1			59.6	
Approach LOS		A			A			D			E	

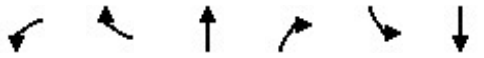
Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	3	180	82	3
Future Volume (Veh/h)	9	9	3	180	82	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	10	3	196	89	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	292	90	92			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	292	90	92			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	697	967	1503			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	199	92
Volume Left	10	3	0
Volume Right	10	0	3
cSH	810	1503	1700
Volume to Capacity	0.02	0.00	0.05
Queue Length 95th (m)	0.6	0.0	0.0
Control Delay (s)	9.6	0.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	0.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	173	4	3	88
Future Volume (Veh/h)	10	10	173	4	3	88
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	188	4	3	96
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	292	190			192	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	292	190			192	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	697	852			1381	

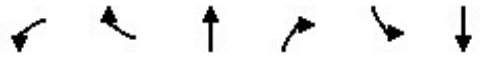
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	192	99
Volume Left	11	0	3
Volume Right	11	4	0
cSH	767	1700	1381
Volume to Capacity	0.03	0.11	0.00
Queue Length 95th (m)	0.7	0.0	0.0
Control Delay (s)	9.8	0.0	0.2
Lane LOS	A		A
Approach Delay (s)	9.8	0.0	0.2
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	8	3	169	96	2
Future Volume (Veh/h)	8	8	3	169	96	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	9	3	184	104	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	295	105	106			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	295	105	106			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	695	949	1485			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	18	187	106
Volume Left	9	3	0
Volume Right	9	0	2
cSH	802	1485	1700
Volume to Capacity	0.02	0.00	0.06
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	0.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	21.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	9	425	3	3	312
Future Volume (Veh/h)	10	9	425	3	3	312
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	10	462	3	3	339
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	808	464			465	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	790	436			437	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	98			100	
cM capacity (veh/h)	349	604			1093	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	21	465	342
Volume Left	11	0	3
Volume Right	10	3	0
cSH	437	1700	1093
Volume to Capacity	0.05	0.27	0.00
Queue Length 95th (m)	1.1	0.0	0.1
Control Delay (s)	13.7	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	13.7	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	20	6	428	295	7
Future Volume (Veh/h)	19	20	6	428	295	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	22	7	465	321	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked	0.98					
vC, conflicting volume	804	325	329			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	791	325	329			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	97	99			
cM capacity (veh/h)	350	716	1231			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	472	329
Volume Left	21	7	0
Volume Right	22	0	8
cSH	474	1231	1700
Volume to Capacity	0.09	0.01	0.19
Queue Length 95th (m)	2.3	0.1	0.0
Control Delay (s)	13.4	0.2	0.0
Lane LOS	B	A	
Approach Delay (s)	13.4	0.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	37.3%	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	893	6	9	961	5	7	0	8	14	1	50
Future Volume (vph)	34	893	6	9	961	5	7	0	8	14	1	50
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1694	3440		1820	3499			1721			1821	1575
Flt Permitted	0.26	1.00		0.29	1.00			0.86			0.73	1.00
Satd. Flow (perm)	469	3440		546	3499			1513			1386	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)	37	971	7	10	1045	5	8	0	9	15	1	54
RTOR Reduction (vph)	0	0	0	0	0	0	0	16	0	0	0	50
Lane Group Flow (vph)	37	978	0	10	1050	0	0	1	0	0	16	4
Confl. Peds. (#/hr)	8		3	3		8	3		6	6		3
Heavy Vehicles (%)	7%	6%	0%	0%	4%	50%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Effective Green, g (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.08			0.08	0.08
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)	392	2879		457	2929			116			106	121
v/s Ratio Prot		0.28			c0.30							
v/s Ratio Perm	0.08			0.02				0.00			c0.01	0.00
v/c Ratio	0.09	0.34		0.02	0.36			0.01			0.15	0.03
Uniform Delay, d1	2.0	2.6		1.9	2.7			59.7			60.3	59.8
Progression Factor	1.00	1.00		0.67	0.56			1.00			1.00	1.00
Incremental Delay, d2	0.5	0.3		0.1	0.3			0.0			0.7	0.1
Delay (s)	2.5	2.9		1.3	1.8			59.7			61.0	59.9
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		2.9			1.8			59.7			60.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	17	441	6	6	285
Future Volume (Veh/h)	17	17	441	6	6	285
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	18	479	7	7	310
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			228			
pX, platoon unblocked	1.00	1.00			1.00	
vC, conflicting volume	806	482			486	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	805	480			484	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	97			99	
cM capacity (veh/h)	349	584			1077	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	36	486	317
Volume Left	18	0	7
Volume Right	18	7	0
cSH	437	1700	1077
Volume to Capacity	0.08	0.29	0.01
Queue Length 95th (m)	2.0	0.0	0.1
Control Delay (s)	14.0	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	14.0	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		

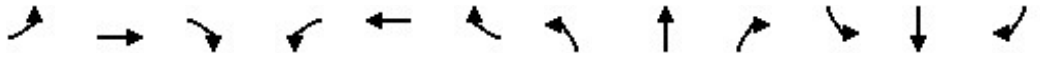
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	800	68	54	959	0	83	0	53	0	0	0
Future Volume (vph)	0	800	68	54	959	0	83	0	53	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.99				
Flpb, ped/bikes		1.00		1.00	1.00			1.00				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3528		1784	3579			1707				
Flt Permitted		1.00		0.29	1.00			0.97				
Satd. Flow (perm)		3528		544	3579			1707				
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	870	74	59	1042	0	90	0	58	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	941	0	59	1042	0	0	128	0	0	0	0
Confl. Peds. (#/hr)			3	3			3		6			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		111.2		111.2	111.2			15.8				
Effective Green, g (s)		111.2		111.2	111.2			15.8				
Actuated g/C Ratio		0.79		0.79	0.79			0.11				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Vehicle Extension (s)		3.0		3.0	3.0			3.0				
Lane Grp Cap (vph)		2802		432	2842			192				
v/s Ratio Prot		0.27			c0.29							
v/s Ratio Perm				0.11				0.07				
v/c Ratio		0.34		0.14	0.37			0.66				
Uniform Delay, d1		4.0		3.3	4.2			59.6				
Progression Factor		0.55		1.00	1.00			1.00				
Incremental Delay, d2		0.3		0.7	0.4			8.4				
Delay (s)		2.5		4.0	4.5			67.9				
Level of Service		A		A	A			E				
Approach Delay (s)		2.5			4.5			67.9			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	56.3%	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	1535	55	46	1087	0	44	0	62	9	1	11
Future Volume (vph)	0	1535	55	46	1087	0	44	0	62	9	1	11
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		1.00	1.00			0.99			1.00	
Frt		0.99		1.00	1.00			0.92			0.93	
Flt Protected		1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)		3549		1825	3544			1680			1641	
Flt Permitted		1.00		0.11	1.00			0.85			0.82	
Satd. Flow (perm)		3549		217	3544			1465			1371	
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	1668	60	50	1182	0	48	0	67	10	1	12
RTOR Reduction (vph)	0	1	0	0	0	0	0	37	0	0	11	0
Lane Group Flow (vph)	0	1727	0	50	1182	0	0	78	0	0	12	0
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	9%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		114.1		114.1	114.1			13.9			13.9	
Effective Green, g (s)		114.1		114.1	114.1			13.9			13.9	
Actuated g/C Ratio		0.81		0.81	0.81			0.10			0.10	
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)		2892		176	2888			145			136	
v/s Ratio Prot		c0.49			0.33							
v/s Ratio Perm				0.23				c0.05			0.01	
v/c Ratio		0.60		0.28	0.41			0.54			0.09	
Uniform Delay, d1		4.7		3.1	3.6			60.0			57.3	
Progression Factor		1.09		0.36	0.34			1.00			1.00	
Incremental Delay, d2		0.8		3.5	0.4			3.8			0.3	
Delay (s)		5.9		4.6	1.6			63.8			57.6	
Level of Service		A		A	A			E			E	
Approach Delay (s)		5.9			1.7			63.8			57.6	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.0%	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)	333	1235	26	9	967	192	21	36	10	108	18	191
Future Volume (vph)	333	1235	26	9	967	192	21	36	10	108	18	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1807	3597		1808	3418			1840			1811	1576
Flt Permitted	0.17	1.00		0.19	1.00			0.82			0.71	1.00
Satd. Flow (perm)	329	3597		360	3418			1532			1335	1576
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)	362	1342	28	10	1051	209	23	39	11	117	20	208
RTOR Reduction (vph)	0	1	0	0	10	0	0	5	0	0	0	165
Lane Group Flow (vph)	362	1369	0	10	1250	0	0	68	0	0	137	43
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	1%	1%	0%	0%	3%	1%	0%	0%	0%	1%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	108.3	108.3		97.3	97.3			19.7			19.7	19.7
Effective Green, g (s)	108.3	108.3		97.3	97.3			19.7			19.7	19.7
Actuated g/C Ratio	0.77	0.77		0.69	0.69			0.14			0.14	0.14
Clearance Time (s)	3.0	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)	338	2782		250	2375			215			187	221
v/s Ratio Prot	c0.06	0.38			0.37							
v/s Ratio Perm	c0.77			0.03				0.04			c0.10	0.03
v/c Ratio	1.07	0.49		0.04	0.53			0.32			0.73	0.19
Uniform Delay, d1	13.8	5.8		6.7	10.3			54.1			57.6	53.1
Progression Factor	5.00	0.31		0.46	0.53			1.00			1.00	1.00
Incremental Delay, d2	64.5	0.5		0.3	0.8			0.8			13.8	0.4
Delay (s)	133.6	2.3		3.3	6.2			54.9			71.4	53.6
Level of Service	F	A		A	A			D			E	D
Approach Delay (s)		29.8			6.1			54.9			60.7	
Approach LOS		C			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	5	8	100	92	10
Future Volume (Veh/h)	6	5	8	100	92	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	9	109	100	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	232	106	111			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	232	106	111			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	751	949	1479			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	118	111
Volume Left	7	9	0
Volume Right	5	0	11
cSH	823	1479	1700
Volume to Capacity	0.01	0.01	0.07
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.4	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	6	102	10	11	86
Future Volume (Veh/h)	6	6	102	10	11	86
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	7	111	11	12	93
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	234	116			122	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	116			122	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	749	936			1465	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	14	122	105
Volume Left	7	0	12
Volume Right	7	11	0
cSH	832	1700	1465
Volume to Capacity	0.02	0.07	0.01
Queue Length 95th (m)	0.4	0.0	0.2
Control Delay (s)	9.4	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	5	8	107	84	8
Future Volume (Veh/h)	5	5	8	107	84	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	9	116	91	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	230	96	100			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	230	96	100			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	754	961	1493			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	125	100
Volume Left	5	9	0
Volume Right	5	0	9
cSH	845	1493	1700
Volume to Capacity	0.01	0.01	0.06
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.3	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	5	551	10	10	311
Future Volume (Veh/h)	6	5	551	10	10	311
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	599	11	11	338
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	964	604			610	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933	552			558	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	276	504			957	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	12	610	349
Volume Left	7	0	11
Volume Right	5	11	0
cSH	340	1700	957
Volume to Capacity	0.04	0.36	0.01
Queue Length 95th (m)	0.8	0.0	0.3
Control Delay (s)	16.0	0.0	0.4
Lane LOS	C		A
Approach Delay (s)	16.0	0.0	0.4
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	13	22	534	308	21
Future Volume (Veh/h)	12	13	22	534	308	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	14	24	580	335	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked	0.95					
vC, conflicting volume	974	346	358			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	946	346	358			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	98	98			
cM capacity (veh/h)	270	697	1201			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	604	358
Volume Left	13	24	0
Volume Right	14	0	23
cSH	395	1201	1700
Volume to Capacity	0.07	0.02	0.21
Queue Length 95th (m)	1.7	0.5	0.0
Control Delay (s)	14.8	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	14.8	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	1430	16	20	1056	18	19	1	20	87	1	119
Future Volume (vph)	84	1430	16	20	1056	18	19	1	20	87	1	119
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00			0.99			0.98	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1807	3571		1825	3565			1707			1788	1589
Flt Permitted	0.22	1.00		0.13	1.00			0.82			0.77	1.00
Satd. Flow (perm)	423	3571		258	3565			1439			1439	1589
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	1554	17	22	1148	20	21	1	22	95	1	129
RTOR Reduction (vph)	0	0	0	0	1	0	0	19	0	0	0	96
Lane Group Flow (vph)	91	1571	0	22	1167	0	0	25	0	0	96	33
Confl. Peds. (#/hr)	17		8	8		17	11		18	18		11
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	110.9	110.9		110.9	110.9			17.1			17.1	17.1
Effective Green, g (s)	110.9	110.9		110.9	110.9			17.1			17.1	17.1
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.12			0.12	0.12
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)	335	2828		204	2823			175			175	194
v/s Ratio Prot		c0.44			0.33							
v/s Ratio Perm	0.22			0.09				0.02			c0.07	0.02
v/c Ratio	0.27	0.56		0.11	0.41			0.14			0.55	0.17
Uniform Delay, d1	3.9	5.4		3.3	4.5			54.9			57.8	55.1
Progression Factor	1.00	1.00		0.75	0.69			1.00			1.00	1.00
Incremental Delay, d2	2.0	0.8		1.0	0.4			0.4			3.5	0.4
Delay (s)	5.8	6.2		3.5	3.5			55.3			61.3	55.5
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		6.2			3.5			55.3			58.0	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	12	11	528	18	18	317
Future Volume (Veh/h)	12	11	528	18	18	317
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	12	574	20	20	345
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			230			
pX, platoon unblocked	0.96	0.96			0.96	
vC, conflicting volume	969	584			594	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	947	547			557	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	98			98	
cM capacity (veh/h)	273	516			974	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	25	594	365
Volume Left	13	0	20
Volume Right	12	20	0
cSH	352	1700	974
Volume to Capacity	0.07	0.35	0.02
Queue Length 95th (m)	1.7	0.0	0.5
Control Delay (s)	16.0	0.0	0.7
Lane LOS	C		A
Approach Delay (s)	16.0	0.0	0.7
Approach LOS	C		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		41.4%	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)	0	1271	73	31	1106	0	67	0	39	0	0	0
Future Volume (vph)	0	1271	73	31	1106	0	67	0	39	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.98				
Flpb, ped/bikes		1.00		1.00	1.00			0.98				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3539		1789	3579			1677				
Flt Permitted		1.00		0.14	1.00			0.97				
Satd. Flow (perm)		3539		269	3579			1677				
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	1382	79	34	1202	0	73	0	42	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1458	0	34	1202	0	0	96	0	0	0	0
Confl. Peds. (#/hr)			8	8			11		18			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		103.0		103.0	103.0			24.0				
Effective Green, g (s)		103.0		103.0	103.0			24.0				
Actuated g/C Ratio		0.74		0.74	0.74			0.17				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Lane Grp Cap (vph)		2603		197	2633			287				
v/s Ratio Prot		c0.41			0.34							
v/s Ratio Perm				0.13				0.06				
v/c Ratio		0.56		0.17	0.46			0.33				
Uniform Delay, d1		8.3		5.6	7.4			51.0				
Progression Factor		0.51		1.00	1.00			1.00				
Incremental Delay, d2		0.8		1.9	0.6			3.1				
Delay (s)		5.0		7.5	7.9			54.1				
Level of Service		A		A	A			D				
Approach Delay (s)		5.0			7.9			54.1			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	65.9	60.2	27.9	58.0	59.2	41.3	30.0
Average Queue (m)	43.1	34.0	6.8	16.9	20.5	29.3	11.1
95th Queue (m)	81.9	69.7	19.2	44.2	45.7	40.5	23.6
Link Distance (m)	60.2	60.2	64.9	64.9	64.9	29.8	25.4
Upstream Blk Time (%)	4	0			0	33	3
Queuing Penalty (veh)	18	2			0	73	0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	51.3	46.4	39.5	19.6	98.4	95.0	19.5	58.4	52.1
Average Queue (m)	30.3	20.8	18.9	1.9	42.1	42.9	7.5	33.4	25.0
95th Queue (m)	47.4	34.9	36.0	9.2	81.6	82.2	18.9	53.4	42.8
Link Distance (m)	64.9	64.9	64.9		97.6	97.6	14.9	80.0	
Upstream Blk Time (%)					0	0	7		
Queuing Penalty (veh)					1	0	0		
Storage Bay Dist (m)				5.9					48.3
Storage Blk Time (%)				3	30			2	1
Queuing Penalty (veh)				13	3			6	2

Intersection: 7: Pattinson Cres & Clarkson Rd S

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.9	9.3
Average Queue (m)	3.1	6.4
95th Queue (m)	9.7	13.4
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		27
Queuing Penalty (veh)		58
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB
Directions Served	LR	TR
Maximum Queue (m)	15.7	20.5
Average Queue (m)	4.1	6.2
95th Queue (m)	11.9	15.3
Link Distance (m)	66.2	1.8
Upstream Blk Time (%)		23
Queuing Penalty (veh)		48
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	14.7	61.1
Average Queue (m)	2.6	16.1
95th Queue (m)	9.6	42.8
Link Distance (m)	73.1	66.6
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.1	9.3
Average Queue (m)	5.5	0.6
95th Queue (m)	12.5	4.3
Link Distance (m)	93.1	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Fellen Pl & Clarkson Rd N

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	9.0	16.2
Average Queue (m)	7.0	0.8
95th Queue (m)	12.8	6.3
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.1	76.0	70.2	25.2	46.6	40.0	15.0	16.5	33.2
Average Queue (m)	7.1	35.2	18.8	3.2	14.0	13.4	5.2	6.1	8.4
95th Queue (m)	18.7	69.4	52.3	13.7	33.6	31.8	12.4	15.4	19.4
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		2	0				15		1
Queuing Penalty (veh)		0	0				0		0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	2	17		0	8				
Queuing Penalty (veh)	8	6		1	1				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	16.0	36.5
Average Queue (m)	6.7	1.5
95th Queue (m)	13.7	12.6
Link Distance (m)	46.3	37.5
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	48.8	60.0	22.2	78.0	66.4	66.6
Average Queue (m)	17.6	22.3	10.4	34.4	22.4	35.7
95th Queue (m)	36.0	44.6	21.1	68.9	48.9	59.3
Link Distance (m)	97.6	97.6		73.4	73.4	167.6
Upstream Blk Time (%)				0		
Queuing Penalty (veh)				0		
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			18	18		
Queuing Penalty (veh)			90	10		

Network Summary

Network wide Queuing Penalty: 339

Intersection: 3: Clarkson Rd S/Private Access & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	L	T	T	LTR	LTR
Maximum Queue (m)	67.1	76.8	22.7	43.7	35.0	34.0	21.2
Average Queue (m)	62.2	57.1	10.4	12.8	15.4	18.9	6.1
95th Queue (m)	65.2	84.0	22.1	31.5	30.6	36.3	17.2
Link Distance (m)	60.2	60.2	64.9	64.9	64.9	29.8	25.4
Upstream Blk Time (%)	49	5				14	0
Queuing Penalty (veh)	402	43				16	0
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Private Access/Clarkson Rd N & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	69.2	27.9	46.6	19.7	104.7	103.4	19.5	69.6	58.2
Average Queue (m)	67.3	7.6	18.5	2.4	54.5	53.3	13.8	40.8	29.2
95th Queue (m)	68.9	22.0	36.2	10.1	95.1	94.2	24.6	65.7	50.3
Link Distance (m)	64.9	64.9	64.9		98.0	98.0	14.9	80.0	
Upstream Blk Time (%)	61				0	1	28		
Queuing Penalty (veh)	334				2	4	0		
Storage Bay Dist (m)				5.9					48.3
Storage Blk Time (%)				5	30			8	4
Queuing Penalty (veh)				25	3			21	6

Intersection: 7: Clarkson Rd S & Pattinson Cres

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.2	9.2
Average Queue (m)	3.6	2.3
95th Queue (m)	11.2	8.7
Link Distance (m)	82.6	9.2
Upstream Blk Time (%)		9
Queuing Penalty (veh)		10
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Clarkson Rd S & Valentine Grdns

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	8.8	9.0	8.5
Average Queue (m)	2.7	0.3	0.3
95th Queue (m)	9.2	3.0	2.8
Link Distance (m)	66.2	1.8	9.2
Upstream Blk Time (%)		2	0
Queuing Penalty (veh)		2	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Clarkson Rd S & Matena Ave

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	8.8	15.5
Average Queue (m)	1.4	0.5
95th Queue (m)	6.6	5.1
Link Distance (m)	73.3	49.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Clarkson Rd N & Pengilley Pl

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (m)	9.1	15.1
Average Queue (m)	3.1	0.8
95th Queue (m)	10.0	6.0
Link Distance (m)	93.1	31.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Clarkson Rd N & Fellen Pl

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	15.4	28.0
Average Queue (m)	5.1	2.9
95th Queue (m)	13.3	13.8
Link Distance (m)	72.4	31.8
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Private Access & Lakeshore Road W

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (m)	25.1	77.6	83.6	25.2	61.9	60.0	15.0	33.2	30.5
Average Queue (m)	18.3	71.7	64.6	5.2	34.7	35.4	8.6	25.8	14.3
95th Queue (m)	34.7	76.1	81.7	16.3	56.3	56.8	17.8	39.2	25.8
Link Distance (m)		65.6	65.6		60.2	60.2	10.4	28.6	28.6
Upstream Blk Time (%)		91	12		0	0	24	30	1
Queuing Penalty (veh)		0	0		0	3	0	0	0
Storage Bay Dist (m)	11.2			12.0					
Storage Blk Time (%)	8	90		4	21				
Queuing Penalty (veh)	59	78		21	4				

Intersection: 19: Clarkson Rd N & 1111 Clarkson Rd

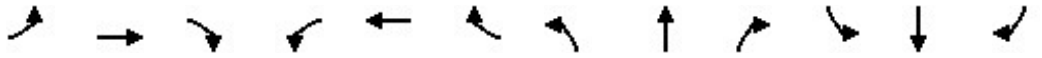
Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	9.0	6.8	28.2
Average Queue (m)	5.5	0.2	5.1
95th Queue (m)	12.4	2.2	17.6
Link Distance (m)	69.0	59.5	48.0
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 305: Meadow Wood Rd/Dummy Leg & Lakeshore Road W

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	TR	L	T	T	LTR
Maximum Queue (m)	43.2	53.5	21.3	77.5	87.5	53.3
Average Queue (m)	22.7	31.6	6.4	56.8	35.1	19.4
95th Queue (m)	42.7	52.7	16.7	84.1	64.3	39.1
Link Distance (m)	98.0	98.0		72.9	72.9	145.6
Upstream Blk Time (%)				3	1	
Queuing Penalty (veh)				0	0	
Storage Bay Dist (m)			6.7			
Storage Blk Time (%)			15	22		
Queuing Penalty (veh)			95	7		

Network Summary

Network wide Queuing Penalty: 1136



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	981	32	39	965	0	81	0	141	21	2	10
Future Volume (vph)	0	981	32	39	965	0	81	0	141	21	2	10
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00			1.00	
Frt		1.00		1.00	1.00			0.91			0.96	
Flt Protected		1.00		0.95	1.00			0.98			0.97	
Satd. Flow (prot)		3390		1728	3510			1630			1661	
Flt Permitted		1.00		0.23	1.00			0.86			0.64	
Satd. Flow (perm)		3390		424	3510			1435			1103	
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	1066	35	42	1049	0	88	0	153	23	2	11
RTOR Reduction (vph)	0	2	0	0	0	0	0	48	0	0	9	0
Lane Group Flow (vph)	0	1099	0	42	1049	0	0	193	0	0	27	0
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	0%	7%	6%	5%	4%	0%	8%	0%	2%	5%	0%	11%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		104.9		104.9	104.9			23.1			23.1	
Effective Green, g (s)		104.9		104.9	104.9			23.1			23.1	
Actuated g/C Ratio		0.75		0.75	0.75			0.17			0.17	
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)		2540		317	2629			236			181	
v/s Ratio Prot		c0.32			0.30							
v/s Ratio Perm				0.10				c0.13			0.02	
v/c Ratio		0.43		0.13	0.40			0.82			0.15	
Uniform Delay, d1		6.5		4.9	6.3			56.4			50.0	
Progression Factor		1.19		0.25	0.35			1.00			1.00	
Incremental Delay, d2		0.5		0.8	0.4			19.4			0.4	
Delay (s)		8.3		2.0	2.6			75.9			50.4	
Level of Service		A		A	A			E			D	
Approach Delay (s)		8.3			2.6			75.9			50.4	
Approach LOS		A			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.3%	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)	220	884	25	11	824	215	12	14	4	128	13	250
Future Volume (vph)	220	884	25	11	824	215	12	14	4	128	13	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.97			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1755	3399		1810	3335			1843			1745	1571
Flt Permitted	0.20	1.00		0.29	1.00			0.86			0.72	1.00
Satd. Flow (perm)	365	3399		553	3335			1616			1318	1571
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)	239	961	27	12	896	234	13	15	4	139	14	272
RTOR Reduction (vph)	0	1	0	0	12	0	0	3	0	0	0	229
Lane Group Flow (vph)	239	987	0	12	1118	0	0	29	0	0	153	43
Confl. Peds. (#/hr)	11		9	9		11	4		5	5		4
Heavy Vehicles (%)	4%	7%	0%	0%	5%	4%	0%	0%	0%	5%	0%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	106.0	106.0		92.3	92.3			22.0			22.0	22.0
Effective Green, g (s)	106.0	106.0		92.3	92.3			22.0			22.0	22.0
Actuated g/C Ratio	0.76	0.76		0.66	0.66			0.16			0.16	0.16
Clearance Time (s)	3.0	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)	382	2573		364	2198			253			207	246
v/s Ratio Prot	c0.05	0.29			0.34							
v/s Ratio Perm	c0.43			0.02				0.02			c0.12	0.03
v/c Ratio	0.63	0.38		0.03	0.51			0.11			0.74	0.17
Uniform Delay, d1	7.9	5.8		8.3	12.2			50.6			56.3	51.1
Progression Factor	3.17	0.56		0.70	0.81			1.00			1.00	1.00
Incremental Delay, d2	2.9	0.4		0.2	0.8			0.2			12.9	0.3
Delay (s)	27.8	3.6		5.9	10.7			50.8			69.2	51.5
Level of Service	C	A		A	B			D			E	D
Approach Delay (s)		8.3			10.6			50.8			57.8	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	3	213	70	3
Future Volume (Veh/h)	9	9	3	213	70	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	10	3	232	76	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	316	78	79			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	316	78	79			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	676	983	1519			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	235	79
Volume Left	10	3	0
Volume Right	10	0	3
cSH	801	1519	1700
Volume to Capacity	0.02	0.00	0.05
Queue Length 95th (m)	0.6	0.0	0.0
Control Delay (s)	9.6	0.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	0.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	23.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	206	4	3	76
Future Volume (Veh/h)	10	10	206	4	3	76
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	224	4	3	83
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	315	226			228	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	315	226			228	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	676	813			1340	

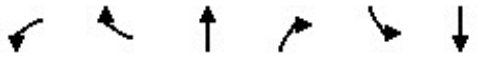
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	228	86
Volume Left	11	0	3
Volume Right	11	4	0
cSH	739	1700	1340
Volume to Capacity	0.03	0.13	0.00
Queue Length 95th (m)	0.7	0.0	0.1
Control Delay (s)	10.0	0.0	0.3
Lane LOS	B		A
Approach Delay (s)	10.0	0.0	0.3
Approach LOS	B		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		21.1%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	8	3	202	84	2
Future Volume (Veh/h)	8	8	3	202	84	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	9	3	220	91	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	318	92	93			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	318	92	93			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	674	965	1501			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	18	223	93
Volume Left	9	3	0
Volume Right	9	0	2
cSH	794	1501	1700
Volume to Capacity	0.02	0.00	0.05
Queue Length 95th (m)	0.5	0.0	0.0
Control Delay (s)	9.6	0.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	0.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	23.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	9	446	3	3	381
Future Volume (Veh/h)	10	9	446	3	3	381
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	10	485	3	3	414
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	906	486			488	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	887	453			454	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	98			100	
cM capacity (veh/h)	304	587			1071	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	21	488	417
Volume Left	11	0	3
Volume Right	10	3	0
cSH	394	1700	1071
Volume to Capacity	0.05	0.29	0.00
Queue Length 95th (m)	1.3	0.0	0.1
Control Delay (s)	14.6	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	14.6	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		33.7%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	20	6	449	364	7
Future Volume (Veh/h)	19	20	6	449	364	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	22	7	488	396	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked	0.97					
vC, conflicting volume	902	400	404			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	886	400	404			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	97	99			
cM capacity (veh/h)	305	650	1155			

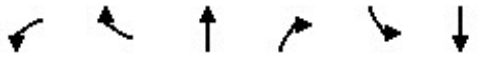
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	495	404
Volume Left	21	7	0
Volume Right	22	0	8
cSH	419	1155	1700
Volume to Capacity	0.10	0.01	0.24
Queue Length 95th (m)	2.6	0.1	0.0
Control Delay (s)	14.6	0.2	0.0
Lane LOS	B	A	
Approach Delay (s)	14.6	0.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	38.4%	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)	38	1001	7	9	982	5	7	0	8	14	1	54
Future Volume (vph)	38	1001	7	9	982	5	7	0	8	14	1	54
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1695	3440		1821	3499			1721			1821	1575
Flt Permitted	0.26	1.00		0.25	1.00			0.86			0.73	1.00
Satd. Flow (perm)	458	3440		479	3499			1513			1386	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)	41	1088	8	10	1067	5	8	0	9	15	1	59
RTOR Reduction (vph)	0	0	0	0	0	0	0	16	0	0	0	54
Lane Group Flow (vph)	41	1096	0	10	1072	0	0	1	0	0	16	5
Confl. Peds. (#/hr)	8		3	3		8	3		6	6		3
Heavy Vehicles (%)	7%	6%	0%	0%	4%	50%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Effective Green, g (s)	117.2	117.2		117.2	117.2			10.8			10.8	10.8
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.08			0.08	0.08
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)	383	2879		400	2929			116			106	121
v/s Ratio Prot		c0.32			0.31							
v/s Ratio Perm	0.09			0.02				0.00			c0.01	0.00
v/c Ratio	0.11	0.38		0.03	0.37			0.01			0.15	0.04
Uniform Delay, d1	2.0	2.7		1.9	2.7			59.7			60.3	59.8
Progression Factor	1.00	1.00		0.67	0.56			1.00			1.00	1.00
Incremental Delay, d2	0.6	0.4		0.1	0.3			0.0			0.7	0.1
Delay (s)	2.6	3.1		1.4	1.8			59.7			61.0	59.9
Level of Service	A	A		A	A			E			E	E
Approach Delay (s)		3.1			1.8			59.7			60.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	17	462	6	6	354
Future Volume (Veh/h)	17	17	462	6	6	354
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	18	502	7	7	385
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			228			
pX, platoon unblocked	0.99	0.99			0.99	
vC, conflicting volume	904	506			509	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	898	494			498	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			99	
cM capacity (veh/h)	305	569			1054	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	36	509	392
Volume Left	18	0	7
Volume Right	18	7	0
cSH	397	1700	1054
Volume to Capacity	0.09	0.30	0.01
Queue Length 95th (m)	2.3	0.0	0.2
Control Delay (s)	15.0	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	15.0	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		34.7%	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)	0	917	68	55	974	0	86	0	55	0	0	0
Future Volume (vph)	0	917	68	55	974	0	86	0	55	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.99				
Flpb, ped/bikes		1.00		1.00	1.00			1.00				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3534		1785	3579			1707				
Flt Permitted		1.00		0.25	1.00			0.97				
Satd. Flow (perm)		3534		469	3579			1707				
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	997	74	60	1059	0	93	0	60	0	0	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	1069	0	60	1059	0	0	133	0	0	0	0
Confl. Peds. (#/hr)			3	3			3		6			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		110.8		110.8	110.8			16.2				
Effective Green, g (s)		110.8		110.8	110.8			16.2				
Actuated g/C Ratio		0.79		0.79	0.79			0.12				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Vehicle Extension (s)		3.0		3.0	3.0			3.0				
Lane Grp Cap (vph)		2796		371	2832			197				
v/s Ratio Prot		c0.30			0.30							
v/s Ratio Perm				0.13				0.08				
v/c Ratio		0.38		0.16	0.37			0.67				
Uniform Delay, d1		4.4		3.5	4.3			59.4				
Progression Factor		0.53		1.00	1.00			1.00				
Incremental Delay, d2		0.4		0.9	0.4			8.7				
Delay (s)		2.7		4.4	4.7			68.1				
Level of Service		A		A	A			E				
Approach Delay (s)		2.7			4.7			68.1			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	59.8%	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	1576	55	46	1249	0	45	0	64	9	1	12
Future Volume (vph)	0	1576	55	46	1249	0	45	0	64	9	1	12
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	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			0.99	
Flpb, ped/bikes		1.00		1.00	1.00			0.99			1.00	
Frt		0.99		1.00	1.00			0.92			0.93	
Flt Protected		1.00		0.95	1.00			0.98			0.98	
Satd. Flow (prot)		3550		1825	3544			1679			1634	
Flt Permitted		1.00		0.11	1.00			0.86			0.83	
Satd. Flow (perm)		3550		202	3544			1466			1378	
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	1713	60	50	1358	0	49	0	70	10	1	13
RTOR Reduction (vph)	0	1	0	0	0	0	0	33	0	0	12	0
Lane Group Flow (vph)	0	1772	0	50	1358	0	0	86	0	0	12	0
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	2%	0%	0%	9%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases				2			4			4		
Actuated Green, G (s)		113.6		113.6	113.6			14.4			14.4	
Effective Green, g (s)		113.6		113.6	113.6			14.4			14.4	
Actuated g/C Ratio		0.81		0.81	0.81			0.10			0.10	
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)		2880		163	2875			150			141	
v/s Ratio Prot		c0.50			0.38							
v/s Ratio Perm				0.25				c0.06			0.01	
v/c Ratio		0.62		0.31	0.47			0.57			0.09	
Uniform Delay, d1		5.0		3.3	4.0			59.9			56.9	
Progression Factor		1.02		0.51	0.48			1.00			1.00	
Incremental Delay, d2		0.8		3.9	0.5			5.2			0.3	
Delay (s)		5.9		5.6	2.4			65.0			57.1	
Level of Service		A		A	A			E			E	
Approach Delay (s)		5.9			2.5			65.0			57.1	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.5%	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)	368	1236	26	10	1065	212	23	36	11	142	24	251
Future Volume (vph)	368	1236	26	10	1065	212	23	36	11	142	24	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	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
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.98			0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1807	3597		1809	3418			1837			1811	1576
Flt Permitted	0.14	1.00		0.18	1.00			0.75			0.71	1.00
Satd. Flow (perm)	259	3597		349	3418			1406			1333	1576
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)	400	1343	28	11	1158	230	25	39	12	154	26	273
RTOR Reduction (vph)	0	1	0	0	11	0	0	5	0	0	0	142
Lane Group Flow (vph)	400	1370	0	11	1377	0	0	71	0	0	180	131
Confl. Peds. (#/hr)	19		20	20		19	8		7	7		8
Heavy Vehicles (%)	1%	1%	0%	0%	3%	1%	0%	0%	0%	1%	0%	1%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Actuated Green, G (s)	104.5	104.5		93.5	93.5			23.5			23.5	23.5
Effective Green, g (s)	104.5	104.5		93.5	93.5			23.5			23.5	23.5
Actuated g/C Ratio	0.75	0.75		0.67	0.67			0.17			0.17	0.17
Clearance Time (s)	3.0	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)	281	2684		233	2282			236			223	264
v/s Ratio Prot	c0.08	0.38			0.40							
v/s Ratio Perm	c0.98			0.03				0.05			c0.14	0.08
v/c Ratio	1.42	0.51		0.05	0.60			0.30			0.81	0.50
Uniform Delay, d1	19.3	7.3		8.0	12.9			51.1			56.1	52.9
Progression Factor	3.33	0.30		0.43	0.54			1.00			1.00	1.00
Incremental Delay, d2	206.5	0.6		0.3	1.0			0.7			18.9	1.5
Delay (s)	270.8	2.7		3.7	8.0			51.8			74.9	54.3
Level of Service	F	A		A	A			D			E	D
Approach Delay (s)		63.3			8.0			51.8			62.5	
Approach LOS		E			A			D			E	

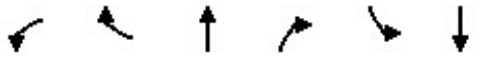
Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	5	8	103	92	10
Future Volume (Veh/h)	6	5	8	103	92	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	9	112	100	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					57	
pX, platoon unblocked						
vC, conflicting volume	236	106	111			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	236	106	111			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	748	949	1479			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	121	111
Volume Left	7	9	0
Volume Right	5	0	11
cSH	820	1479	1700
Volume to Capacity	0.01	0.01	0.07
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.5	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.5	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	6	105	10	11	86
Future Volume (Veh/h)	6	6	105	10	11	86
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	7	114	11	12	93
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	236	120			125	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	236	120			125	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	746	932			1462	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	14	125	105
Volume Left	7	0	12
Volume Right	7	11	0
cSH	828	1700	1462
Volume to Capacity	0.02	0.07	0.01
Queue Length 95th (m)	0.4	0.0	0.2
Control Delay (s)	9.4	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	5	8	110	84	8
Future Volume (Veh/h)	5	5	8	110	84	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	9	120	91	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)					104	
pX, platoon unblocked						
vC, conflicting volume	234	96	100			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	96	100			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	750	961	1493			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	129	100
Volume Left	5	9	0
Volume Right	5	0	9
cSH	843	1493	1700
Volume to Capacity	0.01	0.01	0.06
Queue Length 95th (m)	0.3	0.1	0.0
Control Delay (s)	9.3	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	5	606	10	10	411
Future Volume (Veh/h)	6	5	606	10	10	411
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	5	659	11	11	447
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			107			
pX, platoon unblocked	0.93	0.93			0.93	
vC, conflicting volume	1134	664			670	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1105	599			605	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	214	465			902	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	12	670	458
Volume Left	7	0	11
Volume Right	5	11	0
cSH	276	1700	902
Volume to Capacity	0.04	0.39	0.01
Queue Length 95th (m)	1.0	0.0	0.3
Control Delay (s)	18.6	0.0	0.4
Lane LOS	C		A
Approach Delay (s)	18.6	0.0	0.4
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	13	22	589	408	21
Future Volume (Veh/h)	12	13	22	589	408	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	14	24	640	443	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked	0.93					
vC, conflicting volume	1142	454	466			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1116	454	466			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	98	98			
cM capacity (veh/h)	209	606	1095			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	664	466
Volume Left	13	24	0
Volume Right	14	0	23
cSH	317	1095	1700
Volume to Capacity	0.09	0.02	0.27
Queue Length 95th (m)	2.1	0.5	0.0
Control Delay (s)	17.4	0.6	0.0
Lane LOS	C	A	
Approach Delay (s)	17.4	0.6	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	1485	16	20	1202	18	22	1	20	133	1	119
Future Volume (vph)	87	1485	16	20	1202	18	22	1	20	133	1	119
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	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00			0.99			0.98	1.00
Frt	1.00	1.00		1.00	1.00			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1814	3572		1825	3567			1715			1788	1589
Flt Permitted	0.18	1.00		0.12	1.00			0.76			0.75	1.00
Satd. Flow (perm)	339	3572		226	3567			1329			1404	1589
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)	95	1614	17	22	1307	20	24	1	22	145	1	129
RTOR Reduction (vph)	0	0	0	0	0	0	0	19	0	0	0	67
Lane Group Flow (vph)	95	1631	0	22	1327	0	0	28	0	0	146	62
Confl. Peds. (#/hr)	17		8	8		17	11		18	18		11
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		4
Actuated Green, G (s)	106.9	106.9		106.9	106.9			21.1			21.1	21.1
Effective Green, g (s)	106.9	106.9		106.9	106.9			21.1			21.1	21.1
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.15			0.15	0.15
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)	258	2727		172	2723			200			211	239
v/s Ratio Prot		c0.46			0.37							
v/s Ratio Perm	0.28			0.10				0.02			c0.10	0.04
v/c Ratio	0.37	0.60		0.13	0.49			0.14			0.69	0.26
Uniform Delay, d1	5.4	7.2		4.3	6.2			51.6			56.4	52.5
Progression Factor	1.00	1.00		0.68	0.61			1.00			1.00	1.00
Incremental Delay, d2	4.0	1.0		1.4	0.6			0.3			9.4	0.6
Delay (s)	9.5	8.2		4.3	4.4			51.9			65.8	53.1
Level of Service	A	A		A	A			D			E	D
Approach Delay (s)		8.2			4.4			51.9			59.8	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	12	11	583	18	18	417
Future Volume (Veh/h)	12	11	583	18	18	417
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	12	634	20	20	453
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			230			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	1137	644			654	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1114	589			600	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			98	
cM capacity (veh/h)	212	478			918	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	25	654	473
Volume Left	13	0	20
Volume Right	12	20	0
cSH	289	1700	918
Volume to Capacity	0.09	0.38	0.02
Queue Length 95th (m)	2.1	0.0	0.5
Control Delay (s)	18.6	0.0	0.6
Lane LOS	C		A
Approach Delay (s)	18.6	0.0	0.6
Approach LOS	C		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		46.6%	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)	0	1373	73	31	1259	0	59	0	34	0	0	0
Future Volume (vph)	0	1373	73	31	1259	0	59	0	34	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			7.0				
Lane Util. Factor		0.95		1.00	0.95			1.00				
Frpb, ped/bikes		1.00		1.00	1.00			0.98				
Flpb, ped/bikes		1.00		1.00	1.00			0.98				
Frt		0.99		1.00	1.00			0.95				
Flt Protected		1.00		0.95	1.00			0.97				
Satd. Flow (prot)		3542		1789	3579			1677				
Flt Permitted		1.00		0.12	1.00			0.97				
Satd. Flow (perm)		3542		229	3579			1677				
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	1492	79	34	1368	0	64	0	37	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1568	0	34	1368	0	0	82	0	0	0	0
Confl. Peds. (#/hr)			8	8			11		18			
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			2			4				
Permitted Phases				2			4					
Actuated Green, G (s)		103.0		103.0	103.0			24.0				
Effective Green, g (s)		103.0		103.0	103.0			24.0				
Actuated g/C Ratio		0.74		0.74	0.74			0.17				
Clearance Time (s)		6.0		6.0	6.0			7.0				
Lane Grp Cap (vph)		2605		168	2633			287				
v/s Ratio Prot		c0.44			0.38							
v/s Ratio Perm				0.15				0.05				
v/c Ratio		0.60		0.20	0.52			0.29				
Uniform Delay, d1		8.8		5.7	7.9			50.5				
Progression Factor		0.50		1.00	1.00			1.00				
Incremental Delay, d2		0.9		2.7	0.7			2.5				
Delay (s)		5.3		8.4	8.7			53.0				
Level of Service		A		A	A			D				
Approach Delay (s)		5.3			8.6			53.0			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group


Engineering
for people

City of Mississauga

Clarkson Road and Lakeshore Road Intersection Improvements EA

Safety Performance Report

January 29, 2021

B001266

SUBMITTED BY CIMA CANADA INC.
400–3027 Harvester Road
Burlington, ON L7N 3G7
T: 289-288-0287 F: 289-288-0285
cima.ca

CONTACT
Stephen Keen
Stephen.keen@cima.ca
T: 289-288-0287, 6834

Table of Contents

List of Tables

List of Figures

1. Introduction

CIMA+ was retained by the City of Mississauga (the City) to conduct an Environmental Assessment (EA) that will evaluate how existing transportation conditions may be improved at the intersections of Lakeshore Road West & Clarkson Road North and Lakeshore Road West & Clarkson Road South. There are various potential alternatives that may be considered, including realignment of one or both intersections, widening of Lakeshore Road West and implementation of one or more roundabouts.

A safety performance review of the existing conditions is one of the components of this study. The purpose of this report is to present a review of existing traffic safety conditions throughout the study area. The findings of this report will assist the project team in addressing any potential safety issues in the design of the preferred alternative.

For this study, CIMA+ conducted the following tasks:

- Collision analysis;
- Field investigation; and
- Study findings and recommendations.

This report documents the above noted tasks and identified issues within the study area.

2. Study Area

Lakeshore Road West is a major east-west arterial road traversing the City of Mississauga urban area. Within the EA study area, Lakeshore Road West has a 5-lane cross-section (two lanes per direction + two-way left turn lane). There are four signalized intersections within the study area along Lakeshore Road West, as illustrated in **Figure 1**. The study area intersections include:

- Lakeshore Road West & Clarkson Village Plaza entrance;
- Lakeshore Road West & Clarkson Road South;
- Lakeshore Road West & Clarkson Road North; and
- Lakeshore Road West & Meadow Wood Road.

Figure 1: Study Area

Lakeshore Road West & Clarkson Road North is a four-legged intersection, where the south leg is the access to a commercial plaza. Lakeshore Road West & Clarkson Road South is also a four-legged intersection, where the north leg is an exit-only access to a drive-thru (currently not operational).

Clarkson Road North and South are classified as major and minor collectors, respectively. The roadway has a 2-lane cross-section, with Clarkson Road North being fully urbanized and Clarkson Road South having a “semi-urban” cross-section (sidewalks are provided, but curbs are not). While Clarkson Road mainly serves residential neighbourhoods, the road is an important connection, as Clarkson Road North is the only north-south connector across a CN railroad between Southdown Road and Lorne Park Road, an almost 3km long section of Lakeshore Road.

Meadow Wood Road is a north-south 2-lane cross-section collector roadway. It forms a three-legged signalized intersection with Lakeshore Road West, where the south leg provides access to residential areas. There are two commercial driveways on the north side of Lakeshore Road West and directly across from Meadow Wood Road, which are not controlled by the traffic signal.

The land use surrounding the study area is predominantly residential along Clarkson Road North and South, while Lakeshore Road West presents characteristics of a commercial area with a plaza on the north side and other small restaurants/business on both north and south sides. A gas station with 2 access point is present on the north side of Lakeshore Road West between the intersections of Clarkson Road South and Clarkson Road North.

The current posted speed limit along Lakeshore Road West and Clarkson Road is 40 km/h. It is important to note that the posted speed limit on Lakeshore Road West was reduced from 50 km/h to 40 km/h approximately between October 12, 2020 and October 26, 2020.

3. Collision History

The following sections outline the analysis of the collision data that was provided by the City, as well as a review of the safety performance of the intersection based on the City's safety performance functions (SPF).

3.1. Descriptive Collision Analysis

Historical collision data was provided by the City for the intersections of Lakeshore Road West & Clarkson Road North and Lakeshore West & Clarkson Road South, for the 6-year period between January 2014 and December 2019. The intersection of Lakeshore Road West & Meadow Wood Road is not included in the scope of the collision analysis; however, it was reviewed in the field investigation to identify any potential deficiencies or safety risks.

A total of 24 collisions were identified in the study area during the study period. **Figure 2** provides a collision diagram for the two intersections.

Out of the 24 collisions in the study area, 17 (71%) occurred at the intersection of Lakeshore Road West & Clarkson Road North. The remaining 7 (29%) collisions occurred at the intersection of Lakeshore Road West and Clarkson Road South. 7 out of the 17 collisions at Lakeshore West & Clarkson Road North were reported as non-fatal injury, and 1 out of 7 collisions at Lakeshore West & Clarkson Road South were reported as non-fatal injury. No fatal collisions were reported within the study area during the 5-year study period. A total of 5 collisions involving pedestrians were reported within the study area.

A review of the collision records provided was undertaken, in further detail, to identify predominant collision impact types, directions and any contributing factors, such as environmental and road surface conditions as well as driver behaviour. The review included the following elements:

- Annual trends;
- Collision distribution by severity;
- Predominant collision impact types;
- Environmental and road surface conditions;
- Time of day; and
- Combination of the above, when applicable.

Collisions at each intersection are reviewed in more detail in the following sections below.

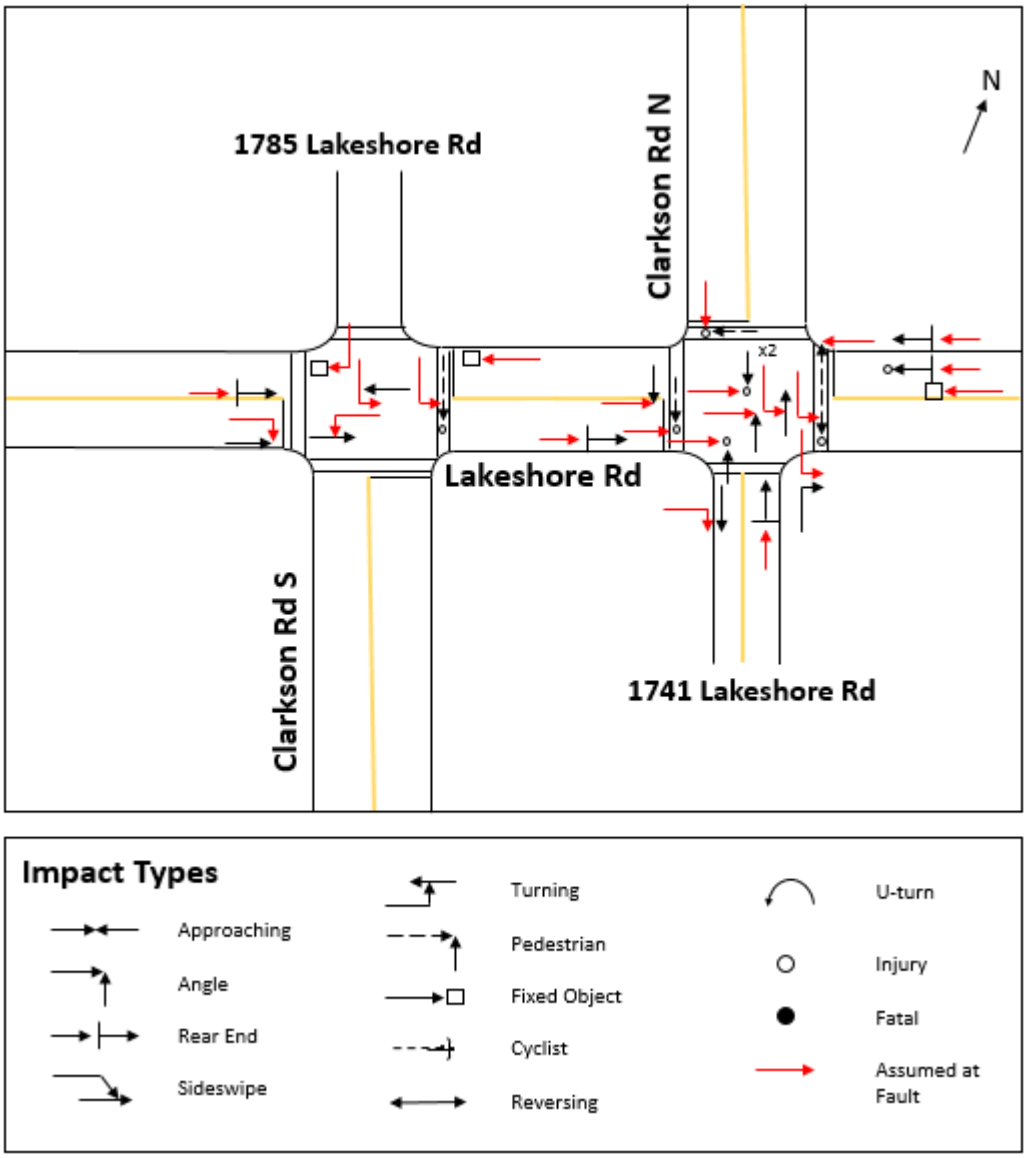


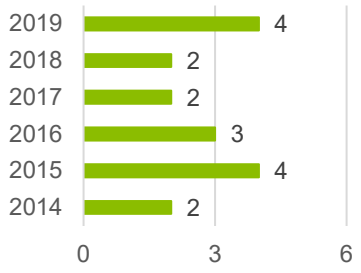
Figure 2: Collision Diagram (2014 – 2019)

3.1.1. Lakeshore Road West & Clarkson Road North

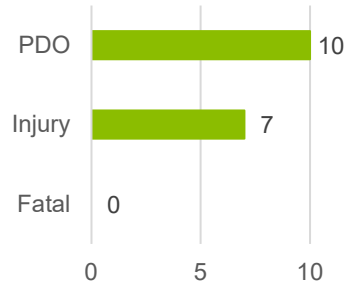
A total of 17 collisions were reported at the intersection of Lakeshore Road West & Clarkson Road North, between 2014 and 2019. An overview of the collision history at the intersection is provided in **Table 1.**

Table 1: Collisions Analysis - Lakeshore Rd W & Clarkson Rd N

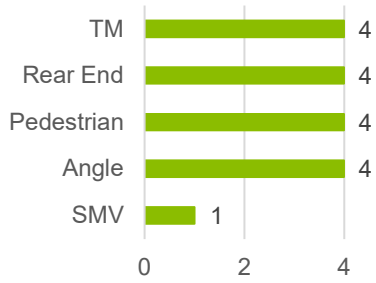
Collisions by Year



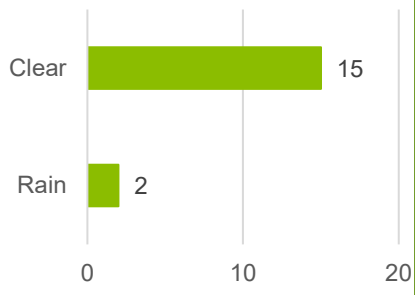
Severity



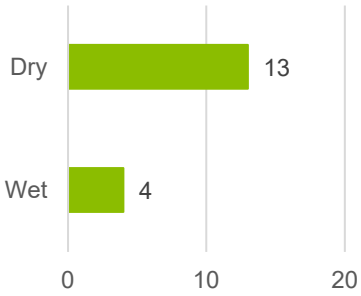
Collision Type[1]



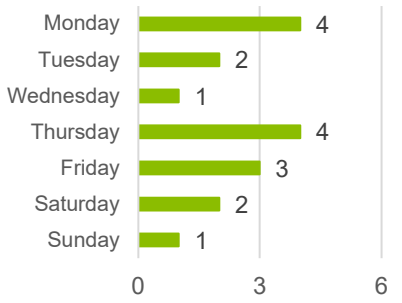
Environment Condition



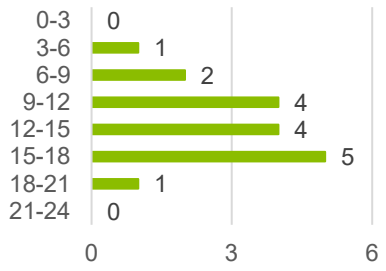
Road Surface Condition



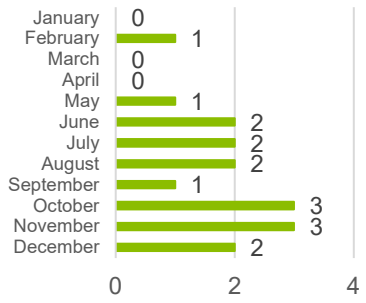
Day of the Week



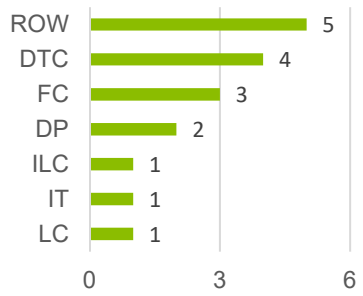
Time of Day



Month



Driver Action[2]



Other notes

Pedestrian collisions: 4 reported. In 2 occasions, drivers failed to yield right of way.
Cyclist Collisions: None

[1] PDO: Property Damage Only; TM: Turning Movement; SMV: Single Motor Vehicle.
2 LC: Lost Control; IT: Improper Turn; ILC: Improper lane change; FC: Followed to Close; ROW: Failed to yield right-of-way; DP: Driving properly; DTC: Disobeyed traffic control.

Based on the information summarized in **Table 1**, the following observations can be made for the intersection of Lakeshore Road West & Clarkson Road North:

- No clear annual trend can be identified;
- 7 out of 17 (41%) collisions were reported as injury collisions, which is a relatively high proportion. 4 out of these 7 collisions involved pedestrians, and the remaining 3 included 1 rear-end, 1 Angle and 1 SMV collision;
- No predominant collision impact type was identified. Angle, Pedestrian, Rear-end and Turning movement collisions account for 4 collisions (24%) each, with the remaining collision being a single motor vehicle (SMV) collision;
- 3 out of 4 (75%) turning movement collisions involved a southbound left-turning vehicle;
- Clear and dry were the most common environmental and road surface conditions (88% and 76%, respectively); and
- 2 collisions occurred in the AM peak period (6:00-9:00), 5 collisions occurred in the PM peak period (15:00-18:00) and 4 collisions occurred in both the late morning period (9:00-12:00) and the early afternoon period (12:00-15:00);.

Angle, turning movement and pedestrian collisions were selected to review in further detail to identify any potential patterns, since these collision types have the greatest potential for injuries.

For angle collisions, all ‘at-fault’ drivers were travelling eastbound on Lakeshore Road West. The driver actions were reported as ‘disobeyed traffic control’, due to vehicles failing to stop on red at the intersection.

For turning movement collisions, it was found that 3 out of 4 (75%) collisions involved southbound left-turning vehicles with driver actions reported as ‘failed to yield right-of-way’ (2 collisions) and ‘improper turn’ (1 collision).

In 2 of the 4 pedestrian collisions, pedestrians did not have the right-of-way when crossing. Additionally, 2 collisions were reported to take place on the east crosswalk and during wet surface conditions. A more detailed description of the reported pedestrian collisions is summarized in **Table 2**.

Other factors were reviewed, such as time of day, environmental conditions and road surface conditions in order to determine any other potential patterns; however, no noticeable patterns were identified.

Table 2: Pedestrian-Related Collisions - Clarkson Rd N

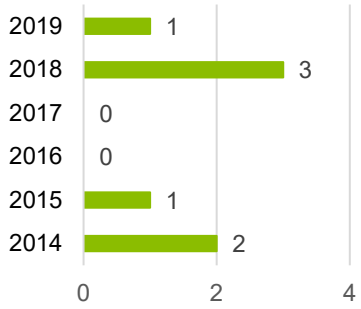
Collision Location	Description
North Crosswalk	An Eastbound pedestrian was struck by a Southbound vehicle going ahead. The driver was reported to be inattentive and to have failed to yield the right of way. The collision occurred during daylight and with clear weather and dry surface conditions.
West Crosswalk	A pedestrian was struck by an Eastbound vehicle going ahead. The pedestrian was reported to have entered the intersection without the right of way. The driver was reported to be driving properly. The collision occurred during daylight with clear weather and dry surface conditions.
East Crosswalk	A pedestrian was struck by a Southbound vehicle heading Eastbound. The driver was reported to have failed to yield the right of way. The collision occurred during daylight with rain and wet surface conditions.
East Crosswalk	A pedestrian was struck by a Westbound vehicle going ahead. The pedestrian was reported to have entered the intersection without the right of way. The driver was reported to be driving properly. The collision occurred during daylight with rain and wet surface conditions.

3.1.2. Lakeshore Road West & Clarkson Road South

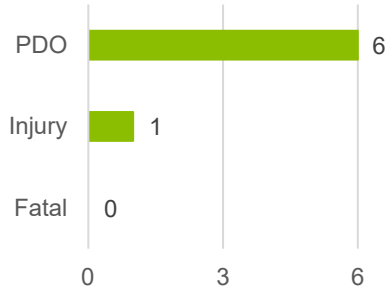
A total of 7 collisions were reported at the intersection of Lakeshore Road West & Clarkson Road South between 2014 and 2019. An overview of the collision history at the intersection is provided in **Table 3.**

Table 3: Collisions Analysis - Lakeshore Rd W & Clarkson Rd S

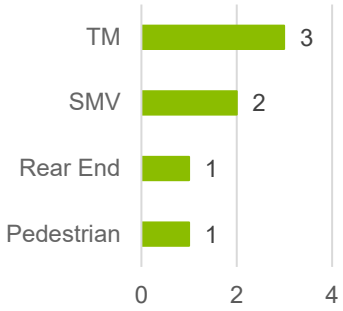
Collisions by Year



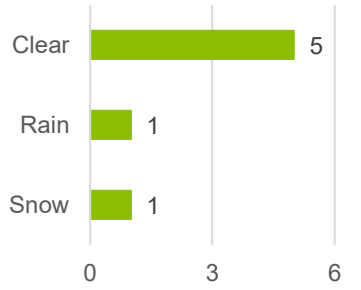
Severity



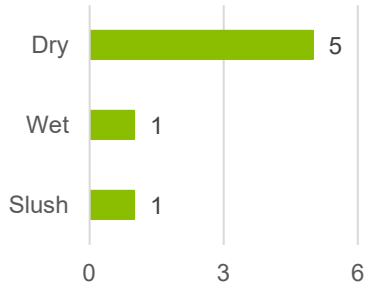
Collision Type[3]



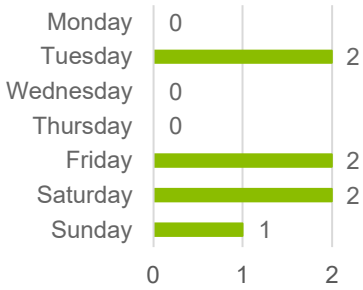
Environment Condition



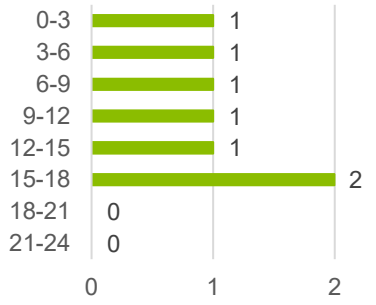
Road Surface Condition



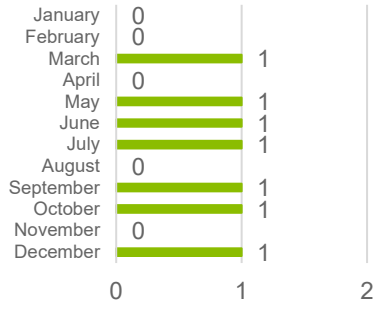
Day of the Week



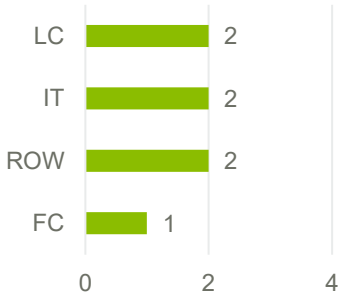
Time of Day



Month



Driver Action[4]



Other notes

Pedestrian collisions: 1 reported. Driver failed to yield right of way.
Cyclist Collisions: None

[3] PDO: Property Damage Only; TM: Turning Movement; SMV: Single Motor Vehicle.
4 LC: Lost Control; IT: Improper Turn; ILC: Improper lane change; FC: Followed to Close; ROW: Failed to yield right-of-way; DP: Driving properly; DTC: Disobeyed traffic control.

Based on the information summarized in the table above, the following observations can be made for the intersection of Lakeshore Road West & Clarkson Road South:

- No clear annual trend can be identified;
- Most collisions involved property damage only (6 out of 7 or 86%);
- Turning movement collisions were the predominant collision impact type with 3 collisions (43%), followed by single motor vehicle with 2 collisions (29%);
- Clear and dry were the most common environmental and road surface conditions (71% each);
- 1 collision occurred in the AM peak period (6:00-9:00), 2 collisions occurred in the PM peak period (15:00-18:00) and 1 collision occurred in both the late morning period (9:00-12:00) and the early afternoon period (12:00-15:00); and
- 1 pedestrian collision was reported.

The pedestrian collision reported at this intersection is described in more detail in **Table 4**.

Table 4: Pedestrian-Related Collisions - Clarkson Rd S

Collision Location	Description
East Crosswalk	A pedestrian was struck by a Southbound vehicle heading Eastbound. The driver was reported to have failed to yield the right of way. The collision occurred during daylight and with snow and slush surface conditions.

3.2. Statistical Collision Analysis

CIMA+ reviewed the results of the Mississauga network screening, completed in 2012 using locally calibrated safety performance functions (SPF), to investigate whether the intersections present potential for safety improvement (PSI). In this analysis, the expected collision frequency associated with a location is compared with its peers (similar locations in terms of geometry, traffic control, and traffic volume) in a jurisdiction. If the expected collision frequency for the subject location is larger than the expected collision frequency of its peers, it shows that the subject location has a potential for safety improvement. The expected collision frequency for the subject locations are calculated using Empirical Bayes (EB) method by combining the observed number of collisions with those calculated using SPFs. The difference of these two values, if positive, is the PSI for the subject location.

Table 5 summarizes the results from the PSI analysis. The results show that the intersection of Clarkson Road South has PSI zero, meaning that their safety performance is equivalent to or better than similar sites; the Clarkson Road North intersection presents a PSI of 7.0 Equivalent PDO (EPDO) collisions, which means that there is opportunity for improvement compared to similar sites; and the same is the case for the Meadow Wood Road intersection, with a PSI of 4.0.

Table 5: SPF Results (2002 - 2006 Data)

Intersection	PDO Obs.	FI Obs.	PDO SPF	FI SPF	PDO Exp.	FI Exp.	PSI (EPDO)
Clarkson Rd N	20	1	12.22	0.74	19.23	0.86	7.01
Clarkson Rd S	7	3	20.99	0.22	8.36	0.48	0.0
Meadow Wood Rd	12	3	7.25	0.64	11.26	1.64	4.01

Legend: PDO: Property Damage Only; FI: Fatal & Injury; Obs.: Observed; SPF: Safety Performance Function; Exp.: Expected; PSI: Potential for Safety Improvement; EPDO: Equivalent Property Damage Only.

It should be noted that the Mississauga SPFs were developed in 2012 using data from 2002 to 2006, and these is the most recent data available. However, a comparison with the 2014 to 2019 observed collisions can provide additional insight:

- The Clarkson Road North intersection presented an average of 4 PDO collisions per year and 0.2 injury collisions per year between 2002 and 2006. For the period between 2014 and 2019, PDO collisions were reduced to 1.7 collisions per year (-57%) and injury collisions were increased to 1.2 (+500%) collisions per year; and
- The Clarkson Road South intersection presented an average of 1.4 PDO collisions per year and 0.6 injury collisions per year between 2002 and 2006. For the period between 2014 and 2019, PDO collisions were reduced to 1.0 collisions per year (-28%) and injury collisions were reduced to 1 (-67%) collisions per year.

Based on these observations, injury collisions at the intersection of Lakeshore West & Clarkson Road North raise concern. The main contributor to this is the 4 pedestrian collisions, which were all reported to result in injuries.

Recent collision records were not provided for the Meadow Wood Road intersection; therefore, a similar comparison cannot be completed.

3.3. Summary of Collision History

The following is a summary of findings based on the descriptive and statistical collision analyses for the study area:

- A total of 24 collisions were reported in the study area between January 2014 and December 2019: 17 at the intersection of Lakeshore Road West & Clarkson Road North and 7 at the intersection of Lakeshore Road West & Clarkson Road South;
- A total of 5 pedestrian collisions were reported within the study area, 2 of which on the Clarkson Road North east crosswalk and during rain/wet surface conditions;
- For angle collisions at Clarkson Road North, all ‘at-fault’ drivers were reported as ‘disobeyed traffic control’ and were travelling eastbound on Lakeshore Road West.;
- 3 out of 4 (75%) turning movement collisions involved a southbound left-turning vehicle at Clarkson Road North;
- The intersection of Clarkson Road South presents a PSI zero, meaning that their safety performance is equivalent to or better than similar sites;

- The intersections of Clarkson Road North and Meadow Wood Road present a PSI of 7.0 and 4.0 Equivalent PDO (EPDO) collisions, respectively. This means that there is opportunity for improvement compared to similar sites; and
- No other relevant patterns were identified.

4. Field Investigation

CIMA+ undertook a daytime field investigation on Thursday, October 1st, 2020 and a nighttime investigation on Saturday, October 17th, 2020, to identify any potential safety and operational issues in the study area. During the field investigation, the study team observed the conformance, consistency and conditions of site geometrics, traffic control devices, physical characteristics and roadside safety and road user interface with the study area. The following sections summarize our field investigation findings.

4.1. Geometry

The roadway geometry of Lakeshore Road West was observed during the field visit. There is no horizontal or vertical curvature present within the study area; however, a vertical curve is present east of the study area limits and on approach to the intersection of Meadow Wood Road (**Figure 3**). This curvature does not affect the visibility to the traffic signals on either Clarkson Road North or Meadow Wood Road.

Figure 3: Vertical Curve - Westbound Approach to Meadow Wood Rd

The lane widths along Lakeshore Road West vary within the study area. The right (curb) lanes between the Shopping Plaza entrance and 30 metres east of Clarkson Road North were measured to be between 4.0 metres and 4.3 meters. While between 30 metres east of Clarkson Road North and Meadow Wood Road were 3.4 metres. The left lanes were all consistent along Lakeshore Road West with 3.2 metres in width. The right lane is shared with bicycles and includes “sharrow” markings within the study area. On-street parking is also present on the north side of Lakeshore Road West between Clarkson Road North and Meadow Wood Road. The right (curb) lanes between Clarkson Road North and Meadow Wood Road

The measured lane widths for the left lanes are within the range outlined in the 2017 Transportation Association of Canada (TAC) Design Guide, which has a recommended lower limit of 3.0 metres and a recommended upper limit of 3.7 metres for an urban roadway with a design speed of 60 km/h or less[5]. TAC also recommends a lower limit of 4.3 metres and an upper limit of 4.9 metres for shared lanes with side-by-side operation. Where on-street parking is present, the upper limit of the width is recommended to allow adequate separation of cyclists from potential opening car doors.[6] The lane widths for the shared right lane on Lakeshore between 30 metres east of Clarkson Road North and Meadow Wood Road are not within the recommended limits by TAC, especially for side-by-side operation of bicycles and vehicles.

4.2. Signs

Wc-19 and Wc-19t (side-by-side operation) signs are present along Lakeshore Road West and within the study area, in order to inform drivers and cyclists that the roadway is being shared. A Wc-19 sign and speed limit sign are located on the south side of Lakeshore Road West, approximately 63 metres west of Clarkson Road South. These signs are installed on a hydro pole at a horizontal offset of approximately 3.5 metres from the edge of the outer travel lane, as illustrated on **Figure 4**. Similarly, a speed limit sign and a Wc-23 (Bridge Ices) sign are located at approximately 4.0 metres from the edge of the outer travel lane on the southbound direction along Clarkson Road North (**Figure 5**).

[5] TAC Geometric Design Guide for Canadian Roads 2017, Chapter 4 Cross Section Elements, Table 4.2.3
[6] TAC Geometric Design Guide for Canadian Roads 2017, Chapter 5, page 28

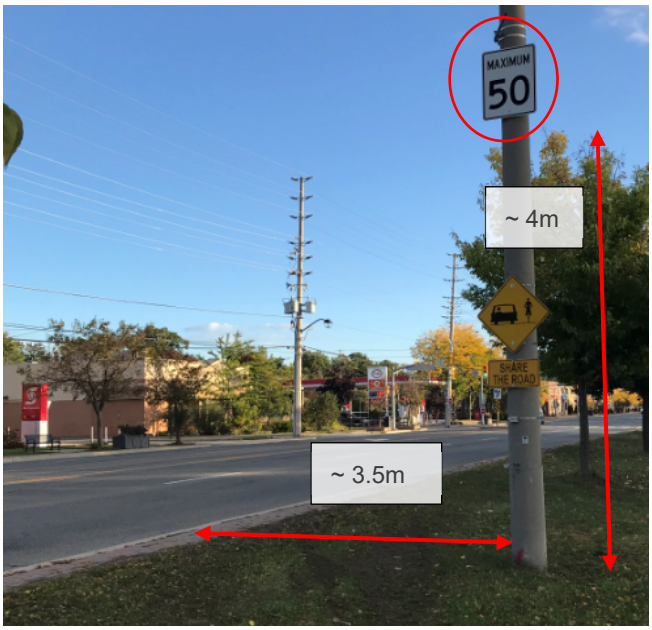


Figure 4: Sign Offsets on Lakeshore Road West [7]

Figure 5: Wc-23 (Bridge Ices) Sign and Speed Limit Sign – Southbound Direction along Clarkson Road North

According to OTM Book 1B – Sign Design Principles, the offset for horizontal mounting of ground-mounted signs for an urban area with a raised curb should be between 30 centimetres and 2 metres from the outside edge of the outer traffic lane.[8] Signs that are farther away from the travel

[7] During a second site visit on October 26, 2020, new posted speed limit signs were observed displaying 40 km/h instead of 50 km/h. The vertical location of the new speed limit sign was lower and closer to the Wc-19 sign.
[8] OTM Book 1B Sign Design Principles, Section 12.2

lane are more difficult for drivers to find because they are not in the expected location. Additionally, the vertical mount offset of the speed limit sign was estimated to be approximately 4 metres from the base of the pole. Per OTM Book 1B, mounting height should be between 1.5 and 2.5 metres, and between 2 and 3 metres in areas with pedestrians.

Finally, multiple locations in the study area have two signs mounted on the same pole, as illustrated in **Figure 4** and **Figure 5**. According to OTM Book 1B, signs should normally be placed individually on separate posts, except where one sign supplements the other – which is not the case in the study area.

4.3. Pavement Condition and Pavement Markings

During the field investigation, the pavement on Lakeshore Road West was observed to be in fair to good condition. Although minor cracking and small irregularities could be observed, no major discomfort was experienced when driving at the speed limit.

Some faded crosswalks were observed at the intersections of Clarkson Road North and Clarkson Road South.

Figure 6: Faded Crosswalk at Lakeshore Rd West & Clarkson Rd North

4.4. Roadside Safety

A hydro pole line on the east side of Clarkson Road South is located approximately 1 metre off the edge of the travel lane with no curb present (**Figure 7**). According to the Geometric Design Guide for Canadian Roads – Chapter 7, the minimum clear zone that is to be provided for a roadway with a design speed 50 km/h and an average daily traffic (ADT) greater than 6,000 is 4.5 metres. The location of this pole could potentially increase the risk of collisions with fixed objects.

Figure 7: Pole located close to travel lane

Additionally, guide rails are provided on both the east and west sides of the Clarkson Road North on approach to the bridge over a creek. The guide rails have turned down approach end treatments (**Figure 8**) and appear to be too short, potentially allowing errant vehicles to fall into the embankment by going behind the barrier (although barrier curbs are provided, which may provide some additional protection at low speeds).

Figure 8: Guide Rail with Turned Down Approach End Treatment

4.5. Active Transportation Facilities

Sidewalks are present, within the study area, on the north and south side of Lakeshore Road West, east and west side of Clarkson Road North and Clarkson Road South, and on the east side of Meadow Wood Road. The sidewalks on the north side of Lakeshore Road West, both sides of

Clarkson Road North and Clarkson Road South are located between 1.5 metres and 4.5 metres from the edge of the through lanes. While the sidewalks on the south side of Lakeshore Road West are located between 3.5 metres and 7 metres from the edge of the through lanes. The sidewalk on the east side of Meadow Wood Road is located approximately 3.5 metres from the edge of the through lane. All sidewalks within the study area are between 1.5 and 4.2 meters wide, which conforms to AODA requirements,[9] and were generally in good condition.

Each intersection within the study area has crosswalks on all approaches. They are high visibility crosswalks that range between 2.4 and 3.25 metres in width. The west side crosswalk at Clarkson Road North has a width of approximately 2.4 metres. According to OTM Book 11 – Pavement Markings, the crosswalk width should be determined by the width of the connected sidewalks and must be at least 2.5 metres wide.[10]

During the field investigation, it was also observed that obstacles were directly aligned with some crosswalks. This was the case on the northeast quadrant at Clarkson Road South (signal pole) and southeast quadrant at Clarkson Road North (controller cabinet). These obstacles may impose difficulty for users with wheelchairs and other mobility devices to complete the crossing (may require manoeuvering around). These obstacles are illustrated in **Figure 9**.

Additionally, the tactile plates on the north side of the east crosswalk at Clarkson Road South extend beyond the crosswalk width, towards the stop bar. This could potentially guide visually impaired pedestrians to cross the road outside of the marked crosswalk.

[9] O.Reg. 191/11 – Integrated Accessibility Standards, Part IV.1 80.23
[10] OTM Book 11 Pavement Markings, page 80

NE quadrant at Clarkson Rd S **SE quadrant at Clarkson Rd N**

Figure 9: Obstacles Aligned with Crosswalks

Pedestrian signal heads are provided at all intersections in the study area, with the north/south crossings requiring the use of a pushbutton in order to call the pedestrian phase. The pedestrian push buttons at all intersections within the study area do not comply with the requirements outlined in the Accessibility of Ontarians with Disabilities Act (AODA), with the exception of Lakeshore Road West & Clarkson Village Plaza entrance. An example of a non-compliant existing pedestrian push button is shown in **Figure 10**.

Figure 10: Non-AODA Pedestrian Push Button

Additionally, the pedestrian signal head on the NW quadrant at the intersection Lakeshore Road West & Meadow Wood Road presents a lateral offset of approximately 6 metres (**Figure 11**).

According to OTM Book 12 – Traffic Signals, pedestrian signal heads should be located within 1.5 metres of the edge of the crosswalk laterally[11].

Figure 11: Pedestrian Signal Head Location - NW Quadrant at Meadow Wood Rd

No dedicated bicycle facilities are provided on Lakeshore Road West within the study area, resulting in bicyclists having to share the road with vehicular traffic. The roadway has painted sharrows, and Wc-19 / Wc-19t 'Share the Road' (side-by-side operation) signs. As mentioned in Section 4.1, the curb lanes along Lakeshore Road West between the Shopping Plaza entrance and 30 metres east of Clarkson Road North were measured to be between 4.0 metres and 4.3 meters. While the lane widths between 30 metres east of Clarkson Road North and Meadow Wood Road were 3.4 metres. Based on OTM Book 18 – Cycling Facilities, the suggested minimum width for narrow urban roadways is 3.0 metres, with a desired width of 4.0 metres. For wide urban roadways, the minimum and desired lane widths are 4.0 metres and 4.5 metres, respectively.[12] For lane widths less than 4.0 metres, OTM suggests the use of the "Shared Use Lane Single File" sign (Wc-24 and Wc-24t) with the optional sharrow marking located in the centre of the lane.

Based on the OTM Book 18 – Cycling Facilities Nomograph, illustrated in **Figure 12**, a separate facility such as separate bicycle lanes, buffered paved shoulders or in-boulevard active

[11] OTM Book 12 Traffic Signals, Section 5.7 page 126
[12] OTM Book 18 – Cycling Facilities, Table 4.1.

transportation pathway would be desirable for Lakeshore Road West, especially considering future growth in traffic volumes.[13]

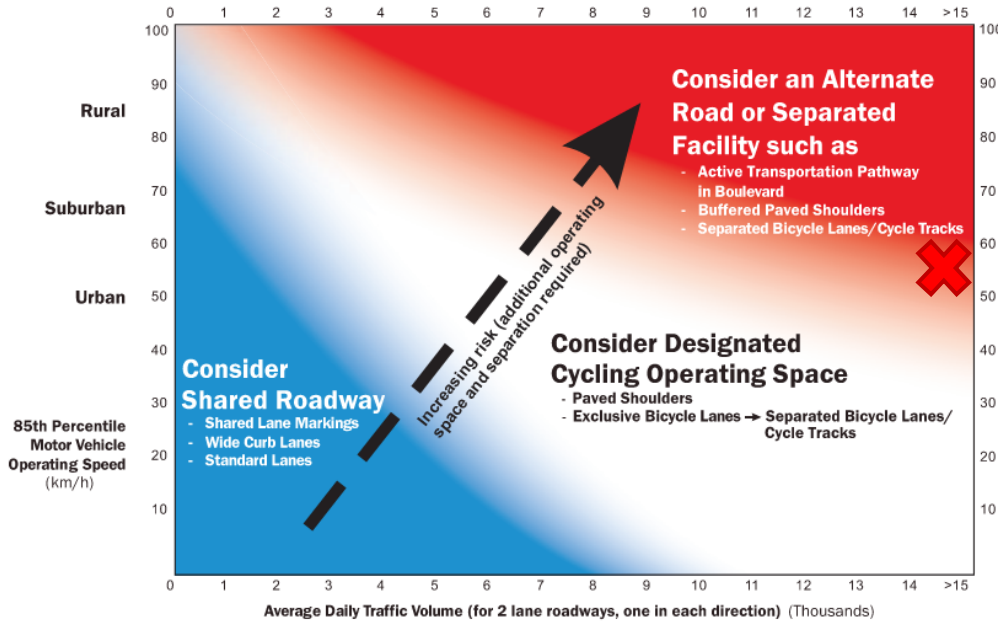


Figure 12: Desirable Cycling Facility Nomograph[14]

Pedestrian and cyclist volumes along the Lakeshore Road West corridor were relatively low during CIMA+'s field investigation.

4.6. Traffic Signals

The traffic signals in the eastbound direction at Clarkson Road South and the ones in the westbound direction at Clarkson Road North (i.e., the two 'upstream' signals) have oversize highway signal heads (300-mm lenses for all indications), while the westbound signal at Clarkson Road South and the eastbound signal at Clarkson Road North (i.e., the 'downstream' signals) have highway size signal heads (300-mm lens for red indication and 200-mm lenses for amber and green indications). The two intersections are approximately 75 meters apart, which is less than the minimum distance that is usually sufficient to allow drivers to recognize and react to each device (215 metres). The apparent purpose of the existing configuration is to emphasize the first intersection from the perspective of an approaching driver. However, the signal operation is not simultaneous, which still presents potential for confusion between the two signals

[13] 2006 Average Annual Daily Traffic for Lakeshore Road West, obtained from the Mississauga Network Screening datasheet, ranges from 23,000 to 30,000; 85th percentile speed, obtained through a speed study completed on October 28, 2020 was found to be 56 km/h for the eastbound direction and 57 km/h for the westbound direction.
[14] OTM Book 18 Cycling Facilities, Figure 3.3 page 30

Additionally, the secondary traffic signal head for the northbound approach at Clarkson Road South is not visible in advance of the intersection (**Figure 13**). Per OTM Book 12 guidance, at least one, and preferably both signal heads, should be located within 10° of the driver's cone of vision in order for the driver to clearly see and recognize the signals. Assuming that the 85th percentile speed on Clarkson Road does not exceed 60 km/h,[15] the minimum distance from which signals must be clearly visible is 110 metres. All other signal heads within the study area were observed to be visible to the drivers from the minimum distance.

Figure 13: Signal Head Location - Clarkson Road South

The clearance timings for the eastbound and westbound approaches at the intersection of Lakeshore Road West & Clarkson Road South were found to be 1 second longer for the amber timing and 0.4 seconds shorter for the all-red. Similarly, the all-red timing at the Lakeshore Road West & Clarkson Road North was found to be 1.2 second shorter. This is based on OTM Book 12[16] for a 40 km/h posted speed limit and a clearing distance[17] of 27 metres for Clarkson Road South and 36 metres for Clarkson Road North. The short all-red timing present along Lakeshore Road West does not provide sufficient time for drivers to clear the intersection. As discussed in Section 3.1.1, for angle collisions at Clarkson Road North, all 'at-fault' drivers were reported as 'disobeyed traffic control' and were travelling eastbound on Lakeshore Road West.

[15] Based on a comparison of road and traffic characteristics between Clarkson Road South and Lakeshore Road West. Refer to footnote 13 in Section 4.5.
[16] OTM Book 12 – Table 4, Table 5
[17] Clearing distance: width of intersecting road to be crossed from the near side stop line to the far outside edge of the crosswalk + 6.0 metres of the average passenger vehicle

4.7. Traffic Operations and Conflicts

During the field investigation completed by CIMA+, potential traffic conflicts were identified. An exit-only driveway of an Esso gas station is located on the north side of Lakeshore Road West, between Clarkson Road North and Clarkson Road South. The conflict was observed when vehicles exiting the Esso gas station would turn left to proceed eastbound. As illustrated in **Figure 14**, vehicles completing this manoeuvre are in potential conflict with vehicles travelling eastbound and westbound along Lakeshore Road West. Particularly, vehicles turning from the side streets may surprise drivers exiting the gas station.

Figure 14: Potential Conflict at Gas Station on Lakeshore Road West

Another potential conflict identified is between the turning vehicles and pedestrians crossing at the 'inner' crosswalks of Clarkson Road North and Clarkson Road South. As shown in **Figure 15**, there is a high concentration of conflicting points between pedestrians and vehicles caused by lane changes and turning movements.

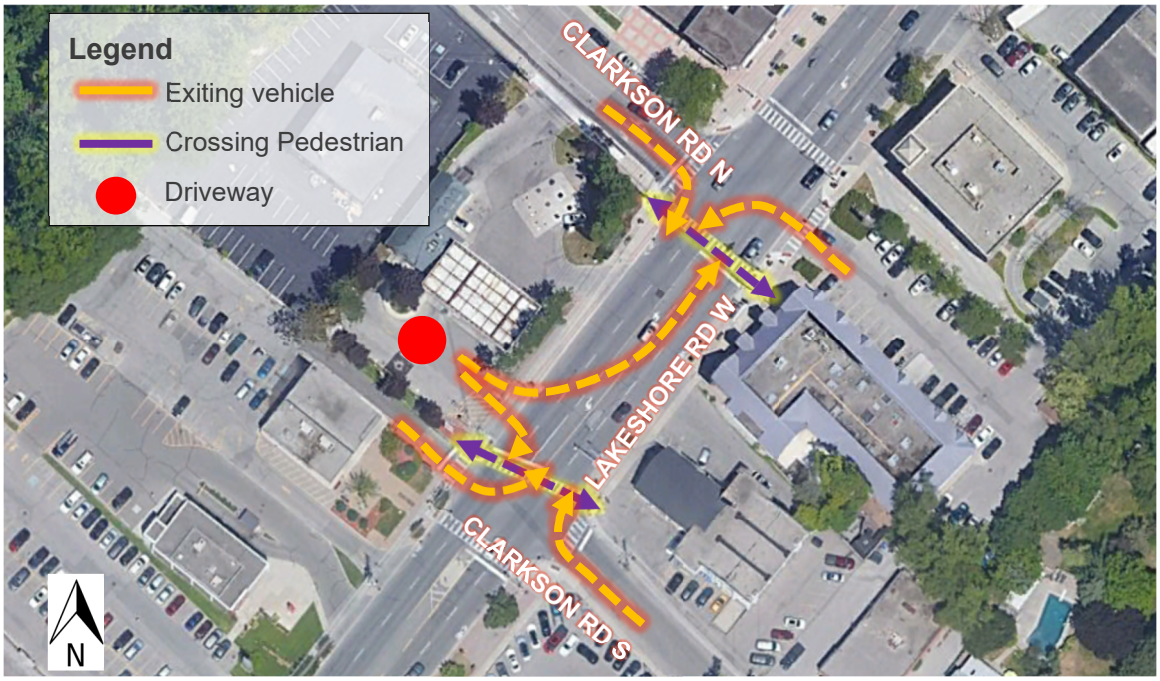


Figure 15: Potential Conflicts at 'Inner' Crosswalks on Lakeshore Road West

Two driveways located on the north side of Lakeshore Road West are directly across the northbound approach of the intersection of Lakeshore Road West & Meadow Wood Road (**Figure 16**). The sidewalk is perpendicular to the driveways, and the crosswalks are aligned with the driveways. This creates the potential for conflicts between vehicles entering and exiting the driveways (especially those reversing) and pedestrians crossing along Lakeshore Road West. Additionally, since these driveways are not part of an intersection approach, east-west pedestrian signal heads are not present, which could provide a false sense of security to pedestrians when walking on the north sidewalk.

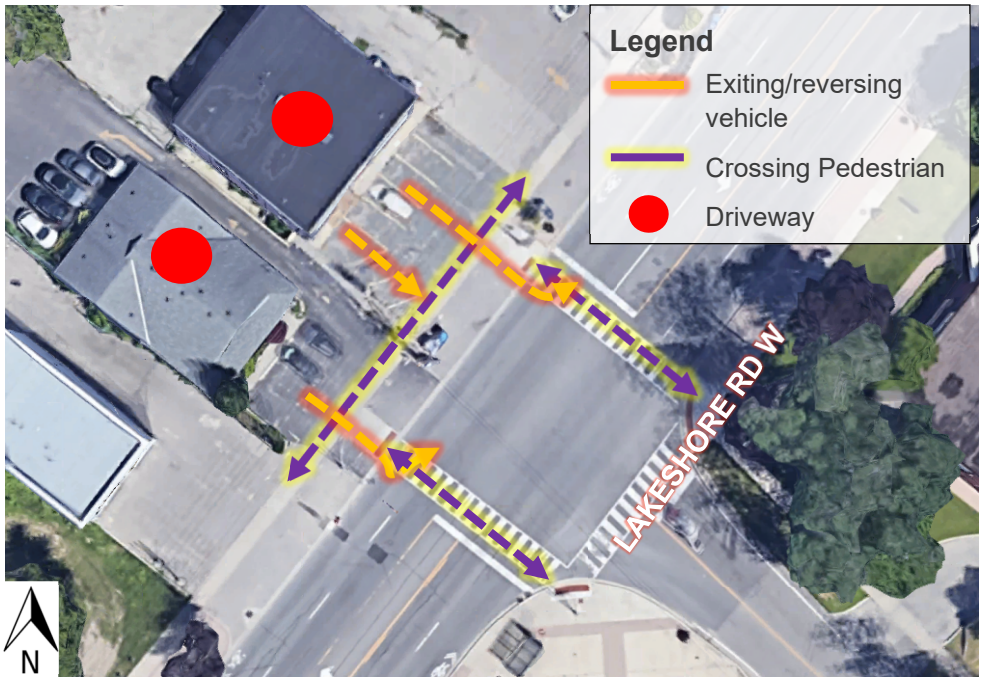


Figure 16: Potential Conflict at Driveways at Lakeshore Road West

4.8. Nighttime Review

A nighttime review was completed on Saturday October 17th, 2020 at approximately 20:00. No major concerns were identified; signs and pavement markings were clearly visible and have adequate reflectivity.

Reflective backboards are not present at any of the signals in the study area, as shown in **Figure 17**. Although they are not a requirement, reflective backboards are a low-cost option to improve signal visibility and of the overall intersection.

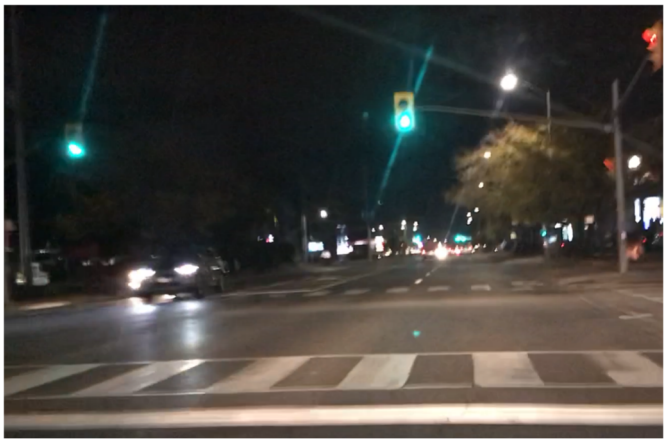


Figure 17: Traffic Signal Head with No Reflective Backboards

5. Study Findings and Recommendations

The following are the main findings based on the review of collision history of the section of Lakeshore Road West within the study area:

- A total of 24 collisions were reported in the study area between January 2014 and December 2019: 17 at the intersection of Lakeshore Road West & Clarkson Road North and 7 at the intersection of Lakeshore Road West & Clarkson Road South;
- A total of 5 pedestrian collisions were reported within the study area, 2 of which on the Clarkson Road North east crosswalk and during rain/wet surface conditions;
- For angle collisions at Clarkson Road North, all 'at-fault' drivers were reported as 'disobeyed traffic control' and were travelling eastbound on Lakeshore Road West.;
- 3 out of 4 (75%) turning movement collisions involved a southbound left-turning vehicle at Clarkson Road North;
- The intersection of Clarkson Road South presents a PSI zero, meaning that their safety performance is equivalent to or better than similar sites;
- The intersections of Clarkson Road North and Meadow Wood Road present a PSI of 7.0 and 4.0 Equivalent PDO (EPDO) collisions, respectively. This means that there is opportunity for improvement compared to similar sites; and
- No other relevant patterns were identified.

The findings from the field investigation and recommendations to address them are summarized in **Table 6**. We note that these recommendations are based on the existing configuration of Lakeshore West & Clarkson Road. Some of the findings may be automatically eliminated or mitigated through the design process if the intersection is reconfigured.

Table 6: Summary of Findings and Recommendations

Finding	Recommendation
Excessive horizontal offset of ground-mounted signs	Relocate ground-mounted signs along Lakeshore Road West and Clarkson Road North to a horizontal offset between 30 centimetres and 2 metres from the curb (reinstall each sign on individual posts).
Faded crosswalk pavement markings	Repaint faded crosswalk markings.
Utility/illumination poles within the clear zone	Consider relocating the hydro poles on the east side of Clarkson Road South outside the clear zone. Alternatively, consider installing barrier curb to provide additional protection at low speeds.
Obstacles aligned with crosswalks	Relocate obstacles aligned with the NE quadrant crosswalk at Clarkson Road South, and at the SE quadrant at Clarkson Road North. Alternatively, consider realigning crosswalks.

Finding	Recommendation
Tactile plates extending to the stop bar	Replace tactile plates to match the width of the crosswalk on the NE quadrant at Clarkson Road South
Secondary traffic signal head not visible in advance of intersection	If feasible, consider relocating the secondary traffic signal head for the northbound direction at Clarkson Road South to be visible within 110 metres in advance of the intersection.
Discrepancy on vehicular clearance intervals on the east-west direction at Clarkson Road North and Clarkson Road South	Shorten the amber interval at the specified intersection from 4 to 3 seconds. Increase the all-red interval to 2.4 seconds and 3.2 seconds for Clarkson South and Clarkson North, respectively.
Non-AODA pushbuttons	Upgrade all pushbuttons to meet AODA requirements.
Potential conflict at gas station exit on Lakeshore Road West	Re-design exit-only access at gas station to be right-out only, along with a left-turn movement prohibition.
Potential conflict at 'inner' crosswalks on Lakeshore Road West	Consider removing the 'inner' pedestrian crosswalks at Clarkson Road North and Clarkson Road South.
Pedestrian signal head located 6 metres from crosswalk	Relocate the pedestrian signal head on the NW quadrant of Lakeshore Road West & Meadow Wood Road, in order for the lateral distance between the crosswalk and the pedestrian signal head to be within 1.5 metres.
Potential conflict at driveways at Lakeshore Road West	If feasible, consider the removal of the west crosswalk to reduce potential conflicts with vehicles exiting the driveways.
Absence of dedicated bicycle facilities	Consider adding dedicated bike lanes on Burnhamthorpe Road West (separate facility such as separate bicycle lanes, buffered paved shoulders or in-boulevard active transportation pathway). Recommendation to be addressed as part of the Multi-Modal Review.
No reflective signal backboards	Consider adding 3-inch retroreflective sheeting to signal backboards.

Page intentionally left blank.

SUBMITTED BY CIMA CANADA INC.
400–3027 Harvester Road
Burlington, ON L7N 3G7
T: 289 288-0287 F: 289 288-0285
cima.ca