Appendix A

Certification Form

Individuals submitting reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Mississauga's Official Plan, Transportation Master Plan, and Transportation Impact Study Guidelines.

By submitting the attached report (and any associated documents) and signing this document, I acknowledge that:

- I have reviewed and have a sound understanding of the objectives, needs, and requirements of the City of Mississauga's Official Plan, Transportation Master Plan, and the Transportation Impact Study Guidelines as they apply to this submission;
- I have sound knowledge of industry standard practices pertaining to the preparation of development-related transportation study reports;
- I have substantial experience (more than five years) in completing development-related transportation studies and strong background knowledge of the transportation planning and engineering principles underpinning these studies; and
- I am registered as a Professional Engineer (P.Eng.), Licensed Engineering Technologist (LET), Certified Engineering Technologist (C.E.T.), or Registered Professional Planner (RPP) in good standing in the Province of Ontario with specific training in transportation planning and engineering.

Dated at Barrie (City) this 6th day of December, 2023.

Name: Michael Cullip B.Eng. & Mgmt., M.Eng, P.Eng.

Professional Title: Vice President

Signature:

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TATHAM ENGINEERING

Enhancing our communities

376, 390 Derry Road West & 0 Oaktree Circle

TRAFFIC IMPACT STUDY

Ballymore (Uptown Meadowvale) Corp.

File 423394 | December 6, 2023

Document Control

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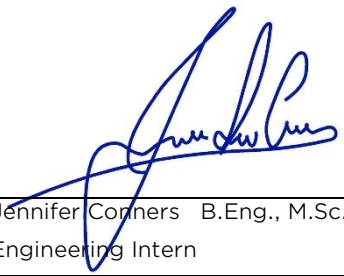	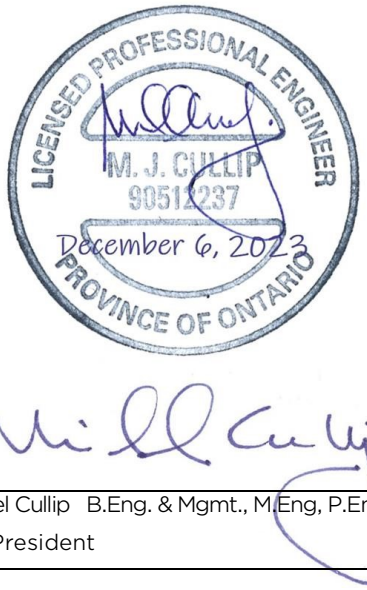
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Issue	Date	Description
1	December 6, 2023	Final Report

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1 Introduction

Tatham Engineering Limited was retained by 2799580 Ontario Limited to prepare a Traffic Impact Study in support of the proposed mixed-use development to be located at 376 and 390 Derry Road West and 0 Oaktree Circle in the City of Mississauga. This property is legally described as Part of Lot 10, Concession 1, City of Mississauga and Block 176, Plan 43M-1484, City of Mississauga. The development site location is illustrated in Figure 1.

1.1 STUDY PURPOSE

The purpose of this study is to address the requirements of the Regional Municipality of Peel (Region) and the City of Mississauga (City) with respect to potential traffic impacts associated with this proposed development on the local road network. This study has been prepared in support of Official Plan Amendment and Zoning By-law Amendment applications for the development.

1.2 CONSULTATION WITH AGENCIES

Prior to commencing this study, a pre-consultation was conducted with the Transportation departments of both the City and Region to confirm the scope of work. The approved Terms of Reference are presented in Appendix A, based on which, the following have been considered:

- the existing operations of the road system through the study area prior to the proposed development;
- the growth in the traffic volumes not otherwise attributed to the development (i.e. from overall growth in the area and/or other developments);
- the number of trips the proposed development is likely to generate;
- site access, circulation and parking provision;
- the operations of the study area road system upon completion of the development;
- the resulting impacts and the need for mitigating measures (if required) to ensure acceptable overall road operations; and
- Transportation Demand Management opportunities.

1.3 REPORT FORMAT

The Traffic Impact Study report is structured as follows:

- Chapter 1: introduction and study purpose
- Chapter 2: existing conditions, detailing the road system and corresponding traffic operations
- Chapter 3: future conditions prior to the completion of the proposed development (referred to as future background conditions), and the expected growth in traffic levels and the resulting operating conditions
- Chapter 4: proposed development and associated details, including land use, access, traffic volumes and parking
- Chapter 5: future conditions, with completion of the proposed development (referred to as future total conditions)
- Chapter 6: Transportation Demand Management (TDM)
- Chapter 7: summary of the report and key findings

2 Existing Conditions

This chapter will describe the road network, traffic volumes and operations for the existing conditions.

2.1 ROAD NETWORK

The road network to be addressed by this study consists of the following roads:

- Derry Road West;
- McLaughlin Road;
- St. Barbara Boulevard;
- Maritz Drive/Derrycrest Drive; and
- Novo Star Drive/Arrowsmith Drive.

Additional details of the study area road sections and intersections are provided below, with mapping provided in Figure 1.

Derry Road West

Derry Road West is an arterial roadway under the jurisdiction of the Region. This road traverses the study area in a general west-east orientation, with a 6 lane urban cross-section providing 3 travel lanes per direction and auxiliary turning lanes at major intersections. In the vicinity of the project site, Derry Road West is relatively flat and straight. The posted speed limit is 70 km/h. Land uses along the road include residential and commercial properties.

McLaughlin Road

McLaughlin Road is a major collector road under the jurisdiction of the City. This road traverses the study area in a general north-south orientation, with a 4 lane urban cross-section providing 2 travel lanes per direction and auxiliary turning lanes at major intersections. In the vicinity of the project site, McLaughlin Road is relatively flat and straight. The posted speed limit is 70 km/h. Land uses along the road include residential and commercial properties.

St. Barbara Boulevard

St. Barbara Boulevard is a local road under the jurisdiction of the City. This road traverses the study area in a general north-south orientation, with a 2 lane urban cross-section providing 1 travel lane per direction. In the vicinity of the project site, McLaughlin Road is relatively flat and straight. The posted speed limit is 40 km/h. Land uses along the road include residential and commercial properties.

Maritz Drive/Derrycrest Drive

Maritz Drive/Derrycrest Drive is a major collector roadway under the jurisdiction of the City. This road traverses the study area in a general north-south orientation, with a 4 lane urban cross-section providing 2 travel lanes per direction. To the north of Derry Road West, this road is known as Derrycrest Drive, whereas to the south of Derry Road West, it is known as Maritz Drive. In the vicinity of the project site, both Maritz Drive and Derrycrest Drive are relatively flat with some horizontal curves. The posted speed limit is 50 km/h. Land uses along the road include open land, residential and commercial properties.

Novo Star Drive/Arrowsmith Drive

Novo Star Drive/Arrowsmith Drive is a 2 lane east-west local road under the jurisdiction of the City. This road traverses the study area in a general west-east orientation, with a 2 lane urban cross-section providing 1 travel lane per direction. To the east of McLaughlin Road, this road is known as Novo Star Drive, whereas to the west of McLaughlin Road, it is known as Arrowsmith Drive. Land uses along the road include an elementary school and residential properties.

Longview Place

Longview Place is a 2 lane north-south local road under the jurisdiction of the City. Ultimately it is planned that Longview Place will be extended to Derry Road West to align opposite St. Barbara Boulevard (thus becoming the 4th leg of this signalized intersection).

2.1.1 Intersections

The following intersections have been included in the traffic operations assessment:

- Derry Road West and McLaughlin Road;
- Derry Road West and St. Barbara Boulevard;
- Derry Road West and Derrycrest Drive/Martiz Drive; and
- McLaughlin Road and Novo Star Drive/Arrowsmith Drive

Details pertaining to the intersection configuration and control are provided in Figure 2.

2.2 ACTIVE TRANSPORTATION NETWORK

2.2.1 Pedestrian Infrastructure

Within the study area, sidewalks are present along both sides of all of noted roads, along with painted crosswalks provided at all of the study intersections. Overall, the sidewalks are in good condition and well-maintained, which means that no immediate improvements are necessary to enhance pedestrian access to the site.

2.2.2 Cyclist Infrastructure

Figure 3 illustrates the existing cycling network in the study area. As depicted on the cycling network map, a shared paved multi-use trail (cyclists and pedestrians) separated from the road is provided along Derry Road West to the west of McLaughlin Road and to the east of Maritz Drive/Derrycrest Drive. At present, no dedicated bicycle facility is provided along Derry Road West in the immediate vicinity of this project site.

The *2018 Mississauga Cycling Master Plan* proposed several cycling network infrastructure improvements in the area. These include extending the Derry Road West multi-use trail along the site frontage, developing a new multi-use trail next to Fletcher's Creek, implementing a separated bike lane along McLaughlin Road, and establishing a shared route (bike and vehicles) along Novo Star Drive and Arrowsmith Drive. At present, no specific timeline has been established for the commencement of construction for these improvements.

2.2.3 Public Transit

In terms of public transit, the study area is primarily served by Mississauga Transit (miWAY) and Brampton Transit, as illustrated in Figure 4. Within the study area, the closest bus stops are located at the intersections of Derry Road West with McLaughlin Road (260 metres to the west) and with St. Barbara Boulevard (130 metres to the east). The following fixed route bus services are accessible via the noted stops:

- Bus stop at Derry Road West and St. Barbara Boulevard
  - Brampton Transit 6: James Potter - This route generally runs north-south from Queen Street West to Derry Road and operates on a headway of 10 minutes;
  - miWAY Route 18: McLaughlin-Derry- This route runs east-west from Sheridan College (Davis Campus) to Westwood Square with headways of approximately 10 minutes; and
  - miWAY Route 42: Derry - This route runs east-west from Meadowvale Town Center to Westwood Mall on Derry Road with headways of approximately 20 minutes.
- Bus stop at Derry Road West& McLaughlin Road
  - miWAY Route 66: McLaughlin - This route runs north-south from Sheridan College Brampton Campus to City Centre Transit Terminal with headways of approximately 10 minutes.

All routes operate daily from 4.30 AM to 10:48 PM, Monday to Friday, and with 10 to 20 minute headways during typical weekdays.

Hurontario Light Rail Transit (LRT)

The Hurontario LRT project will bring 20km of fast, reliable, rapid transit along the Hurontario Street corridor, which is located approximately 1.2 km east of the project site, approximately 15 minutes walking. The construction of this project is currently underway, with completion anticipated in 2024.

2.3 TRAFFIC VOLUMES

2.3.1 Traffic Counts

To determine existing traffic volumes, traffic counts were conducted at the study area intersections on Tuesday, April 18, 2023, from 7:00 to 10:00 and 15:00 to 18:00. The observed peak hour traffic volumes, considered reflective of typical weekday conditions, are illustrated in Figure 5 with detailed count sheets provided in Appendix B.

2.3.2 Factors & Adjustments

COVID-19

To evaluate the potential residual effects of the COVID-19 pandemic, the 2023 traffic counts were compared with the latest available traffic counts (2017) conducted in this area. The 2017 traffic volume was adjusted to 2023 (same-year condition) by applying general background traffic growth rate of 0.5 percent (refer to Section 3.2.1 for details). When comparing the adjusted 2017 data to the actual 2023 volumes, a substantial decrease in traffic was observed. Specifically, the adjusted 2017 traffic volumes along Derry Road West were approximately 24% higher than the 2023 volumes during both peak hours. A similar pattern was observed along McLaughlin Road, where the adjusted 2017 volumes were approximately 10% higher than the 2023 volumes during peak periods.

Even though public restrictions have been lifted, the persistent decrease in traffic is likely attributable to residual impacts of the pandemic, such as the continued prevalence of remote work situations. This trend has fundamentally altered commuting habits, leading to a shift in overall traffic patterns. As such, the 2023 traffic counts represent a realistic representation of what can be considered the new normative conditions, making further traffic adjustments unnecessary. Notwithstanding, to assess traffic projections without consideration for the COVID-19 residual impacts, a sensitivity analysis was conducted as part of this study for both the 2036 background and total conditions, as further detailed in this report.

2.4 TRAFFIC OPERATIONS

The capacity, and hence operations, of a road system is effectively dictated by its intersections. To establish a baseline from which the future traffic volumes and operations can be assessed, the existing intersection operations were reviewed based on the following:

- the 2023 traffic volumes;
- the existing intersection configuration and control (including existing signal timing plans as provided by the Region and City and included in Appendix C); and
- procedures outlined in the *2000 Highway Capacity Manual*[1] (using Synchro v.11 software).

For signalized intersections, the analysis considers the following:

- average delay (measured in seconds);
- level of service (LOS); and
- volume to capacity (v/c) for all movements.

With respect to the noted metrics:

- a level of service 'A' corresponds to the best operating conditions with minimal delays, whereas a level of service 'F' corresponds to poor operations resulting from high intersection delays; and
- a v/c ratio of less than 1.0 indicates the intersection movement/ approach is operating at less than capacity while a v/c ratio of 1.0 indicates capacity has been reached.
- As per the City of Mississauga Traffic Impact Study Guidelines, an overall volume-to-capacity (v/c) ratio of 0.85 or less is considered acceptable for signalized intersections, and a v/c of 1.0 or less is acceptable for individual movements.

A summary of the analysis is provided in Table 1, whereas detailed worksheets are included in Appendix D.

Based on the existing volumes, all study intersections currently provide acceptable overall levels of service (LOS D or better) with acceptable delays (9 to 50 seconds) during both peak hours. With respect to the v/c ratio, the intersection of Derry Road West and McLaughlin Road operates with an overall v/c of 0.91 and 0.95 during both peak periods (suggesting that the intersection is nearing capacity); all other study intersections operate with a v/c of 0.70 or less (suggesting that there is reserve capacity).

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[1] *Highway Capacity Manual*. Transportation Research Board, Washington DC, 2000.

Table 1: Intersection Operations – 2023

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & McLaughlin Road	EB L	Signal	29	C	0.36	**81**	**F**	0.90
	EB T	Signal	44	D	0.65	38	D	0.37
	EB R	Yield	0	A	0.18	0	A	0.06
	WB L	Signal	**95**	**F**	0.89	24	C	0.56
	WB T	Signal	39	D	0.32	43	D	0.77
	WB R	Yield	0	A	0.06	0	A	0.24
	NB L	Signal	**81**	**F**	0.63	79	E	0.75
	NB T	Signal	42	D	0.50	56	E	0.87
	NB R	Signal	36	D	0.15	56	E	0.07
	SB L	Signal	74	E	0.65	**85**	**F**	0.73
	SB T	Signal	69	E	0.98	44	D	0.56
	SB R	Signal	32	C	0.05	36	D	0.09
	Overall	**Signal**	**50**	**D**	**0.95**	**45**	**D**	**0.91**
Derry Road West & S. Barbara Boulevard	EBL	Signal	8	A	0.13	36	C	0.62
	EB T	Signal	9	A	0.52	4	A	0.22
	WB T	Signal	10	A	0.25	7	A	0.46
	WB R	Signal	7	A	0.05	4	A	0.24
	SB L	Signal	73	E	0.86	78	E	0.64
	SB R	Signal	46	D	0.08	67	E	0.18
	Overall	**Signal**	**18**	**B**	**0.61**	**9**	**A**	**0.62**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	3	A	0.25	10	B	0.22
	EB T	Signal	7	A	0.44	11	B	0.27
	EB R	Signal	6	A	0.23	12	B	0.07
	WB L	Signal	78	E	0.59	13	B	0.08
	WB T	Signal	5	A	0.21	18	B	0.48
	WB R	Signal	5	A	0.09	12	B	0.01
	NB L	Signal	75	E	0.52	**191**	**F**	1.25
	NB TR	Signal	72	E	0.42	52	D	0.46
	SB L	Signal	72	E	0.35	76	E	0.04
	SB T	Signal	71	E	0.31	79	E	0.30
	SB R	Signal	68	E	0.04	75	E	0.01
	Overall	**Signal**	**13**	**B**	**0.46**	**44**	**D**	**0.70**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	**92**	**F**	0.68	**80**	**F**	0.53
	EB T R	Signal	73	E	0.47	73	E	0.17
	WB L	Signal	**125**	**F**	0.76	74	E	0.26
	WB TR	Signal	70	E	0.23	72	E	0.08
	NB L	Signal	12	B	0.35	2	A	0.14
	NB TR	Signal	3	A	0.28	3	A	0.46
	SB L	Signal	2	A	0.06	6	A	0.14
	SB TR	Signal	8	A	0.68	7	A	0.36
	Overall	**Signal**	**15**	**B**	**0.67**	**9**	**A**	**0.48**

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR–left-right

In terms of individual movements, only a single instance of overcapacity has been identified. Specifically, the northbound left turn movement at the intersection of Derry Road West and

Maritz Drive/Derrycrest Drive is operating above capacity, with a v/c ratio of 1.25 during the PM peak period. This congestion can be primarily attributed to the increased traffic volume making left turns onto Derry Road West at this specific time. While the number of vehicle lanes is expected to remain the same, signal timing optimizations can be considered to provide further green time for this movement. All other movements at the study intersections are operating with a reserve capacity of v/c of 0.98 or less. As such, no improvements are required to support existing conditions.

3 Future Background Conditions

This chapter will describe the road network and background traffic volumes expected for 2026, 2031 and 2036 horizon years. The 2026 horizon reflects the full build-out of the proposed development, whereas the 2031 and 2036 horizons consider conditions 5 and 10 years beyond build out.

3.1 ROAD NETWORK

As part of the proposed Ravine residential development (320 Derry Road West) a new municipal access will be constructed connecting Longview Place to Derry Road West opposite St. Barbara Boulevard, thereby creating a fourth leg to this intersection. However, it is understood that this property was sold in 2022 and the stipulations from this previous proposal are no longer applicable. Nevertheless, to conduct a conservative analysis, the proposal from the previous plan has been incorporated into this current study, including consideration for the Longview Place connection by 2026.

No other road improvements are currently being proposed by the City of Mississauga or the Peel Region for the study area road network, other than routine maintenance. As such, with the exception of the Longview Place connection, all road sections as described in Chapter 2.1 have been maintained through the analyses of the future horizons.

3.2 TRAFFIC VOLUMES

Background traffic volumes expected for 2026, 2031 and 2036 horizon years have been determined based on the existing traffic volumes, projected growth and consideration for other development-specific traffic volumes.

3.2.1 Background Growth

Through discussions with the Peel Region Transportation Planning Department, it was determined that the traffic volumes along Derry Road West, are projected to experience a compounded annual growth rate of 0.5%. This estimate was derived from a combination of sources, such as socioeconomic data and the outcomes of the Region's Travel Demand Forecasting Model. As a major road, Derry Road influences traffic volumes and flow patterns on all adjacent roads. In this regard, the projected traffic growth rates for Derry Road can effectively serve as a representative indicator for the overall local road network growth. Therefore, the projected annual growth of 0.5% was also applied to McLaughlin Road, St. Barbara Boulevard, Maritz Drive, Derrycrest Drive, Novo Star Drive and Arrowsmith Drive.

3.2.2 Background Development

Several additional developments, which will contribute additional traffic volumes to the study area road network, have been considered. A map depicting the location of each development is provided in Figure 6; figures illustrating the trip distribution and assignment through the study area for such are provided in Appendix E.

Film Studio – 6967 Maritz Drive

This development will consist construction of a new 570,000 ft^2 building, with a north and the south block containing stages and support space for film production and 870 above ground parking spaces. Traffic volumes associated with this development were obtained from the respective traffic study[2]. Upon completion, this proposed development is expected to generate a total of 668 new trips during the weekday AM peak hour and 400 new trips during the weekday PM peak hour. For the purpose of this study, it was assumed that this development will be fully built and in operation by 2026.

Self-Storage Facility - 250 Derry Road West

This development will consist of a 6-storey, 155,767 ft^2 self-storage building, to be located just east of the subject development on Derry Road West. In absence of a site-specific traffic study, traffic volumes associated with this development were established utilizing the development details and trip generation rates from the *ITE Trip Generation Manual* for the following land use:

- Mini Warehouse (ITE code 151)

Upon completion, this proposed development is expected to generate a total of 26 new trips during the weekday AM peak hour and 28 new trips during the weekday PM peak hour (refer to Table 2). The resulting trips have been assigned to the road network based on the trip distribution noted in Section 4.6.3. This project is currently under review. However, for the purpose of this study, it was assumed to be fully occupied by 2026.

The Ravine Residential Development - 320 Derry Road West

According to the City, this property was sold in 2022 and the stipulations from the previous proposal are no longer applicable. Nevertheless, to conduct a conservative analysis, the previous proposal for 37 detached residential units has been considered, with trip estimates derived from the *ITE Trip Generation Manual* for the following land use:

- single family detached (ITE code 210)

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[2] *Transportation Impact Study - Studio Bottega – 6967 Maritz Drive*. CGH Transportation, September 2022 Revision.

Upon completion, this proposed development is expected to generate a total of 26 new trips during the weekday AM peak hour and 35 new trips during the PM peak hour (refer to Table 2). The resulting trips have been assigned to the road network based on the trip distribution noted in Section 4.6.3. For the purpose of this study, we assume that the property will be fully constructed and occupied by 2026.

Summary of Background Development Trips

Background Development trip rates and resulting trip estimates are provided in Table 2.

Table 2: Trip Generation – Background Development

LAND USE	RATE/ ESTIMATE	VARIABLE/ SIZE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			In	Out	Total	In	Out	Total
Film Studio	as per TIS	570,000 ft²	562	107	668	222	178	400
Self Storage Facility	rate	1000 ft² GFA	0.05	0.04	0.09	0.07	0.08	0.15
	estimate	155,767 ft²	8	6	14	11	12	23
The Ravine Development	rate	units	0.18	0.52	0.70	0.59	0.35	0.94
	estimate	37	7	19	26	22	13	35
Total Trips			**577**	**132**	**708**	**255**	**203**	**458**

3.2.3 Future Traffic Volumes

The future background traffic volumes for the 2026, 2031 and 2036 horizons are provided in Figure 7 through Figure 9. The volumes are based on the following:

- 2023 volumes;
- anticipated background growth; and
- anticipated background development.

3.3 TRAFFIC OPERATIONS

The subject intersections were again analyzed for each horizon year given the projected background volumes. Traffic signal timings have been optimized to ensure efficient operations. The results are summarized in Table 3 through Table 5 for the respective horizon years with detailed worksheets provided in Appendix D.

Table 3: Intersection Operations – 2026 Background

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & McLaughlin Road (Optimized)	EB L	Signal	28	C	0.41	78	E	0.95
	EB T	Signal	54	D	0.93	32	C	0.43
	EB R	Yield	0	A	0.18	0	A	0.06
	WB L	Signal	65	E	0.89	27	C	0.60
	WB T	Signal	36	D	0.42	41	D	0.81
	WB R	Yield	0	A	0.06	0	A	0.25
	NB L	Signal	68	E	0.69	**86**	**F**	0.88
	NB T	Signal	33	C	0.49	51	D	0.93
	NB R	Signal	28	C	0.09	28	C	0.05
	SB L	Signal	58	E	0.63	**94**	**F**	0.89
	SB T	Signal	49	D	0.94	36	D	0.60
	SB R	Signal	24	C	0.05	30	C	0.09
	Overall	**Signal**	**43**	**D**	**0.93**	**42**	**D**	**0.96**
Derry Road West & S. Barbara Boulevard/ Longview Place	EB L	Signal	14	B	0.16	**83**	**F**	0.88
	EB T	Signal	21	C	0.68	11	B	0.30
	EB R	Signal	12	B	0.00	9	A	0.00
	WB L	Signal	15	B	0.17	6	A	0.08
	WB T	Signal	11	B	0.29	10	A	0.55
	WB R	Signal	9	A	0.04	7	A	0.27
	NB L	Signal	58	E	0.06	70	E	0.07
	NB TR	Signal	58	E	0.04	69	E	0.03
	SB L	Signal	75	E	0.95	72	E	0.62
	SB TR	Signal	35	D	0.08	49	D	0.13
	Overall	**Signal**	**25**	**C**	**0.78**	**14**	**B**	**0.81**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	28	C	0.40	20	B	0.3
	EB T	Signal	44	D	0.83	18	B	0.35
	EB R	Signal	44	D	0.72	16	B	0.18
	WB L	Signal	45	D	0.73	34	C	0.65
	WB T	Signal	7	A	0.23	28	C	0.67
	WB R	Signal	7	A	0.09	19	B	0.01
	NB L	Signal	72	E	0.66	62	E	0.95
	NB TR	Signal	62	E	0.40	31	C	0.46
	SB L	Signal	61	E	0.33	59	E	0.03
	SB T	Signal	59	E	0.23	61	E	0.25
	SB R	Signal	58	E	0.04	58	E	0.01
	Overall	**Signal**	**37**	**D**	**0.77**	**31**	**C**	**0.80**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	77	E	0.55	**80**	**F**	0.54
	EB T R	Signal	74	E	0.50	73	E	0.17
	WB L	Signal	**165**	**F**	0.89	75	E	0.31
	WB TR	Signal	70	E	0.20	72	E	0.06
	NB L	Signal	13	B	0.37	2	A	0.15
	NB TR	Signal	3	A	0.29	3	A	0.48
	SB L	Signal	5	A	0.03	4	A	0.08
	SB TR	Signal	12	B	0.69	5	A	0.38
	Overall	**Signal**	**17**	**B**	**0.69**	**8**	**A**	**0.50**

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR – left-right

Table 4: Intersection Operations – 2031 Background

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & McLaughlin Road	EB L	Signal	27	C	0.43	**90**	**F**	0.99
	EB T	Signal	51	D	0.92	32	C	0.45
	EB R	Yield	0	A	0.19	0	A	0.06
	WB L	Signal	76	E	0.93	28	C	0.63
	WB T	Signal	35	C	0.42	42	D	0.83
	WB R	Yield	0	A	0.06	0	A	0.25
	NB L	Signal	69	E	0.70	**90**	**F**	0.91
	NB T	Signal	33	C	0.51	54	D	0.94
	NB R	Signal	28	C	0.10	28	C	0.06
	SB L	Signal	60	E	0.67	**101**	**F**	0.92
	SB T	Signal	57	E	0.98	37	D	0.62
	SB R	Signal	24	C	0.05	29	C	0.09
	Overall	**Signal**	**45**	**D**	**0.95**	**43**	**D**	**0.99**
Derry Road West & S. Barbara Boulevard/ Longview Place	EB L	Signal	14	B	0.16	**110**	**F**	0.97
	EB T	Signal	21	C	0.70	11	B	0.31
	EB R	Signal	12	B	0.00	9	A	0.00
	WB L	Signal	16	B	0.17	6	A	0.09
	WB T	Signal	11	B	0.29	10	A	0.56
	WB R	Signal	9	A	0.04	7	A	0.28
	NB L	Signal	58	E	0.06	70	E	0.07
	NB TR	Signal	58	E	0.04	69	E	0.03
	SB L	Signal	**81**	**F**	0.97	72	E	0.63
	SB TR	Signal	35	D	0.09	49	D	0.13
	Overall	**Signal**	**26**	**C**	**0.80**	**15**	**B**	**0.88**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	29	C	0.41	21	C	0.33
	EB T	Signal	45	D	0.86	19	B	0.37
	EB R	Signal	44	D	0.73	17	B	0.18
	WB L	Signal	45	D	0.73	37	D	0.69
	WB T	Signal	7	A	0.23	30	C	0.7
	WB R	Signal	7	A	0.10	20	B	0.01
	NB L	Signal	72	E	0.66	61	E	0.95
	NB TR	Signal	62	E	0.42	30	C	0.47
	SB L	Signal	61	E	0.33	58	E	0.03
	SB T	Signal	59	E	0.23	61	E	0.26
	SB R	Signal	57	E	0.04	58	E	0.01
	Overall	**Signal**	**38**	**D**	**0.78**	**32**	**C**	**0.82**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	77	E	0.56	**81**	**F**	0.55
	EB T R	Signal	74	E	0.53	73	E	0.18
	WB L	Signal	**172**	**F**	0.91	75	E	0.32
	WB TR	Signal	70	E	0.21	72	E	0.07
	NB L	Signal	15	B	0.39	3	A	0.16
	NB TR	Signal	3	A	0.30	3	A	0.49
	SB L	Signal	5	A	0.04	4	A	0.09
	SB TR	Signal	12	B	0.71	5	A	0.39
	Overall	**Signal**	**17**	**B**	**0.71**	**8**	**A**	**0.51**

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR – left-right

Table 5: Intersection Operations – 2036 Background

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & McLaughlin Road	EB L	Signal	28	C	0.45	**84**	**F**	0.97
	EB T	Signal	61	E	0.97	33	C	0.47
	EB R	Yield	0	A	0.19	0	A	0.06
	WB L	Signal	**86**	**F**	0.96	29	C	0.65
	WB T	Signal	36	D	0.45	45	D	0.87
	WB R	Yield	0	A	0.06	0	A	0.26
	NB L	Signal	71	E	0.72	**94**	**F**	0.93
	NB T	Signal	33	C	0.51	57	E	0.96
	NB R	Signal	28	C	0.11	27	C	0.06
	SB L	Signal	58	E	0.65	**106**	**F**	0.94
	SB T	Signal	57	E	0.98	37	D	0.62
	SB R	Signal	24	C	0.06	29	C	0.09
	Overall	**Signal**	**48**	**D**	**0.97**	**45**	**D**	**0.98**
Derry Road West & S. Barbara Boulevard/ Longview Place	EB L	Signal	14	B	0.17	22	C	0.54
	EB T	Signal	22	C	0.71	11	B	0.32
	EB R	Signal	12	B	0.00	9	A	0.00
	WB L	Signal	16	B	0.17	9	A	0.09
	WB T	Signal	11	B	0.30	18	B	0.66
	WB R	Signal	9	A	0.05	13	B	0.31
	NB L	Signal	58	E	0.06	70	E	0.07
	NB TR	Signal	58	E	0.04	69	E	0.03
	SB L	Signal	**88**	**F**	1.00	73	E	0.64
	SB TR	Signal	35	D	0.11	48	D	0.03
	Overall	**Signal**	**27**	**C**	**0.82**	**18**	**B**	**0.62**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	30	C	0.43	21	C	0.34
	EB T	Signal	48	D	0.89	19	B	0.38
	EB R	Signal	46	D	0.75	17	B	0.18
	WB L	Signal	44	D	0.73	39	D	0.71
	WB T	Signal	7	A	0.24	30	C	0.71
	WB R	Signal	7	A	0.10	20	B	0.01
	NB L	Signal	72	E	0.66	70	E	0.98
	NB TR	Signal	62	E	0.43	31	C	0.49
	SB L	Signal	61	E	0.34	58	E	0.03
	SB T	Signal	59	E	0.24	61	E	0.26
	SB R	Signal	57	E	0.04	58	E	0.01
	Overall	**Signal**	**39**	**D**	**0.79**	**33**	**C**	**0.84**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	77	E	0.57	76	E	0.48
	EB T R	Signal	75	E	0.55	71	E	0.16
	WB L	Signal	**180**	**F**	0.93	73	E	0.28
	WB TR	Signal	69	E	0.21	70	E	0.06
	NB L	Signal	18	B	0.43	3	A	0.17
	NB TR	Signal	3	A	0.31	4	A	0.51
	SB L	Signal	6	A	0.04	5	A	0.10
	SB TR	Signal	13	B	0.73	6	A	0.40
	Overall	**Signal**	**18**	**B**	**0.73**	**8**	**A**	**0.52**

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR – left-right

As indicated, all study intersections are expected to continue to provide good overall operation (LOS D or better) with acceptable delays through the 2036 horizon under background conditions during both peak hours.

The intersection of Derry Road West and McLaughlin Road will continue to operate with a v/c ratio approaching capacity (v/c of 0.91 and 0.95) during both peak periods through the 2036 horizon. All other study intersections are expected to operate with reserve overall capacity through the 2036 horizon. In terms of individual movements, with the optimization of the traffic signal all movements from all study intersections are expected to operate with a reserve capacity of v/c of 0.98 or less. As such, no improvements are required to support existing conditions.

3.4 SENSITIVITY ANALYSIS

As discussed in Chapter 2, a sensitivity analysis was conducted for the 2036 background condition to consider traffic levels that might be expected should the COVID-19 residual impact cease (i.e. if traffic volumes were not impacted by COVID-19).

3.4.1 Traffic Volumes

To obtain pre-pandemic traffic levels, the projected 2036 volumes on Derry Road West and McLaughlin Road were adjusted upward by 24 and 10%, respectively. For turn movements that surpassed the pre-pandemic baseline volumes, no adjustment factor was applied. The 2036 horizon pre pandemic volumes are illustrated in Figure 10.

3.4.2 Traffic Operations

All study intersections were re-evaluated, assuming the projected traffic levels for the 2036 horizon pre-pandemic condition, the results of which are summarized in Table 6 with detailed worksheets provided in Appendix G. As with the previous analyses, the signal timings have been optimized to ensure efficient operations.

As can be seen, with the exception of the intersection of Derry Road West and McLaughlin Road, all study intersections are expected to continue to provide acceptable overall operations (LOS D or better) with acceptable delays. The Derry Road West with McLaughlin Road intersection is expected to operate at overall LOS E under both peak periods. In terms of capacity, with the exception of the McLaughlin Road and Novo Star Drive/Arrowsmith Drive, all study intersections are projected to operate at or above acceptable overall capacity.

As discussed in Chapter 2.3.2, the persistent decrease in traffic is likely attributable to residual impacts of the pandemic. Thus, any adjustments made to the traffic volume to represent pre-pandemic conditions should be considered exceptionally conservative.

Table 6: Intersection Operations – 2036 Background (Pre-Pandemic)

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & McLaughlin Road	EB L	Signal	28	C	0.47	**130**	**F**	1.09
	EB T	Signal	**108**	**F**	1.12	40	D	0.57
	EB R	Yield	0	A	0.21	0	A	0.07
	WB L	Signal	**99**	**F**	1.00	32	C	0.70
	WB T	Signal	40	D	0.53	76	E	1.03
	WB R	Yield	0	A	0.06	0	A	0.26
	NB L	Signal	**83**	**F**	0.78	72	E	0.75
	NB T	Signal	39	D	0.61	**105**	**F**	1.10
	NB R	Signal	33	C	0.16	33	C	0.06
	SB L	Signal	64	E	0.72	93	F	0.84
	SB T	Signal	**97**	**F**	1.10	47	D	0.69
	SB R	Signal	26	C	0.08	37	D	0.11
	Overall	**Signal**	**74**	**E**	**1.09**	**66**	**E**	**1.07**
Derry Road West & S. Barbara Boulevard/ Longview Place	EB L	Signal	15	B	0.21	39	D	0.58
	EB T	Signal	27	C	0.87	12	B	0.39
	EB R	Signal	12	B	0.00	9	A	0.00
	WB L	Signal	23	C	0.17	9	A	0.11
	WB T	Signal	12	B	0.37	23	C	0.81
	WB R	Signal	9	A	0.05	14	B	0.40
	NB L	Signal	58	E	0.06	70	E	0.07
	NB TR	Signal	58	E	0.04	69	E	0.03
	SB L	Signal	**170**	**F**	1.23	73	E	0.64
	SB TR	Signal	37	D	0.24	48	D	0.03
	Overall	**Signal**	**40**	**D**	**1.00**	**21**	**C**	**0.74**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	30	C	0.55	25	C	0.34
	EB T	Signal	55	D	0.98	19	B	0.46
	EB R	Signal	42	D	0.77	16	B	0.19
	WB L	Signal	64	E	0.88	80	E	0.92
	WB T	Signal	8	A	0.30	35	D	0.87
	WB R	Signal	7	A	0.11	19	B	0.01
	NB L	Signal	72	E	0.66	**151**	**F**	1.22
	NB TR	Signal	66	E	0.57	34	C	0.61
	SB L	Signal	61	E	0.37	58	E	0.05
	SB T	Signal	60	E	0.29	61	E	0.31
	SB R	Signal	57	E	0.04	58	E	0.01
	Overall	**Signal**	**43**	**D**	**0.90**	**50**	**D**	**1.05**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	76	E	0.56	76	E	0.48
	EB T R	Signal	76	E	0.57	71	E	0.16
	WB L	Signal	180	F	0.93	73	E	0.28
	WB TR	Signal	69	E	0.20	70	E	0.06
	NB L	Signal	33	C	0.53	3	A	0.17
	NB TR	Signal	3	A	0.31	4	A	0.55
	SB L	Signal	5	A	0.04	5	A	0.12
	SB TR	Signal	15	B	0.80	6	A	0.40
	Overall	**Signal**	**20**	**B**	**0.80**	**8**	**A**	**0.57**

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR – left-right

4 Proposed Development

This chapter will provide additional details with respect to the proposed development, including its location, the projected site generated traffic volumes and the assignment of such to the adjacent road network.

4.1 LOCATION

The subject site, as previously highlighted in Figure 1, occupies the properties at 376 and 390 Derry Road West, and 0 Oaktreet Circle. The site lies on the south side of Derry Road West, approximately 100 metres east of the intersection of Derry Road West with McLaughlin Road, near the north extent of the City of Mississauga.

4.2 LAND USES

4.2.1 Existing

The site has an area of 23,448 m^2 and is currently vacant. The area surrounding the property is of mixed commercial and residential uses, with residential subdivisions located east and south of the site and commercial properties located north, east and west along Derry Road West.

4.2.2 Proposed

Based on the preliminary site plan (refer to in Figure 11), the proposed project will be executed in two distinct phases, which include the construction of the following elements:

Phase 1

124 total residential units including:

- 120 condominium townhouse units
- 2 freehold detached units
- 2 freehold semi-detached units

Phase 2

4,026 ft^2 (374 m^2) commercial building

In the context of this analysis, it is anticipated that Phase 1 of the project will reach completion and full occupancy by 2026 with completion and occupancy of Phase 2 by 2031.

4.3 SITE ACCESS

4.3.1 Location & Configuration

The site will be served by a right-in/right-out (RIRO) on Derry Road West which will provide access for the 120 condominium units and the commercial building. Access for the proposed 4 freehold residential units will be provided via direct driveways onto Oaktree Circle.

The proposed RIRO access will be designed in accordance with the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads*[3], the Region's *Road Characterization Study* (RCS)[4] and as per the Region's Controlled Access By-law 62-2013. The access will provide one travel lane per direction with a minimum width of 9 metres including 4.0 to 5.0 metre entry/exit lanes. The Regional standards also recommended that a minimum 15 metres curb turning radius be provided.

It is noted that as this project proposes access onto a Regional road, an access application will be required in accordance with the Region's Controlled Access By-law 62-2013.

4.3.2 Access Spacing

TAC requirements were reviewed for assessment of the proposed site access spacing, which suggest a minimum tangent length of 20 metres between driveways (spacing between curb extension to curb extension). As identified in the site plan, the proposed driveway will provide adequate separation from the nearest adjacent access points, providing a spacing length of 87 metres from the nearest west driveway and 35 metres from the nearest east driveway, thus satisfying TAC guidelines.

4.3.3 Sight Line Assessment

Along urban main street roads, RCS suggests that individual site access should be reviewed in terms of safety. In this regard, the sight lines along Derry Road West at the site access have been reviewed in context of the minimum stopping sight distance and intersection sight distance requirements as per the TAC guidelines, which are further explained below.

- The minimum stopping sight distance provides sufficient distance for an approaching motorist to observe a hazard in the road and bring their vehicle to a complete stop prior to the hazard.

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[3] *Geometric Design Guide for Canadian Roads, Chapter 9.* Transportation Association of Canada. June 2017.
[4] *Region of Peel Road Characterization Study*. Peel Region, May 2013.

- Intersection sight distance allows a vehicle to enter a main road from a side street (or site access) and attain the appropriate operating speed without significantly impacting the operating speed of an approaching vehicle.

The corresponding sight distance requirements for a design speed of 80 km/h (reflective of the 70 km/h speed limit + 10 km/h) are provided Table 7, as are the available sight distances along Derry Road West at the site access.

Table 7: Sight Line Assessment

INTERSECTION	DESIGN SPEED	STOPPING SIGHT DISTANCE	INTERSECTION SIGHT DISTANCE		SIGHT DISTANCE TO/FROM	
			Left Turn	Right Turn	East	West
Site Access	80 km/h	130	--	145	--	>200

Derry Road West is a straight and flat roadway with available sight distances to/from the west of the site access in excess of 200 metres, stretching beyond the intersection of Derry Road West with McLaughlin Road. As such, the available sight lines satisfy the TAC requirements for minimum stopping and intersection sight distances. Moreover, given that the site access is a RIRO, no left turns are expected at the site driveway. It can be concluded that no issues related to sight line and corner clearances were identified.

4.3.4 Future Site Access

It is important to mention that if both 346/358 Derry Road West (D'Iorio property) and 320 Derry Road West properties are developed, the subjected project will gain access to the signalized intersection of Derry Road West and St. Barbara Boulevard. With the development of the D'Iorio property, an emergency access easement would be granted, and 2 new access points (Waterhouse Crescent) onto the new Longview Place connector road would be provided. At present, there are no prospects for the development of both properties; however, as per the City requirements, a sensitivity analysis that assumes site access to this location has been conducted (refer to Section 5.4 for details).

4.4 SITE CIRCULATION

4.4.1 Vehicles

In terms of site circulation, a vehicle turning assessment has been completed to consider the maneuvering requirements of a firetruck and a garbage truck. The assessment also considers passenger vehicle access to the visitor parking area. In all instances, the internal aisle layout

and parking area can accommodate the design vehicles considered. Templates illustrating the swept paths of a fire truck, city waste collection and passenger vehicles are discussed below with resulting figures provided in Appendix H. Based on the proposed configuration, there is an adequate manoeuvring area on-site to enable garbage and other similar service trucks to enter/exit the site in a forward manner without adversely affecting the adjacent public roadways.

Fire Truck

A 15.16 metre long and 2.54 metre wide fire truck was modelled accessing the site. The Mississauga Fire Station 121 is located south of the proposed project site off Mavis Road. Therefore, the fire truck is likely to ingress the site from Derry Road West, west of the project site.

City Waste Collection Truck

A 10.46 metre long and 2.55 metre wide garbage truck was modelled entering the site. The garbage truck will drive in along the internal roadway, pick up the trash and exit the property from the same driveway onto Derry Road West.

Passenger Vehicles

There are a few critical parking spaces where the aisle configuration creates a situation where vehicle manoeuvrability may be limited. As such, manoeuvres of a passenger vehicle into and out of these critical spaces have been simulated and confirmed.

4.4.2 Pedestrians & Cyclists

Internal sidewalks will be provided throughout the development to provide a means of connectivity for pedestrians and cyclists to the external systems.

4.5 SITE PARKING

4.5.1 Vehicle Parking

As per the *City of Mississauga Zoning By-law*[5], the respective parking requirements are as follows:

- 2.0 spaces per residential unit + 0.25 visitor space per condominium unit; and
- 3.0 to 5.0 spaces per 100 m^2 GFA of commercial space (depending on ultimate use).

[5] *City of Mississauga Zoning By-law No. 0225-2007* Section 3.1.2.1.1 and 3.1.2.2 (Precinct 4)

Based on the above requirements, the site is required to provide 2 spaces per residential unit, 30 visitor parking spaces for the residential use and 11 to 19 parking spaces for the commercial building.

As per the site plan, the following parking supply will be provided:

- 2 parking spaces per residential unit (minimum 1 on the driveway and 1 in the garage);
- 30 residential visitor parking spaces; and
- 17 commercial parking spaces.

The proposed residential parking supply complies with the city's by-law requirements. The proposed commercial parking supply satisfies the by-law provisions for a parking ratio of up to 4.55 spaces per 100 m^2. Should a higher commercial rate (5.0 spaces per 100 m^2) be applicable (based on the ultimate use), 2 additional parking spaces will be required. However, there is opportunity for shared use of parking between the commercial building and the residential visitor parking to address any shortfall.

4.5.2 Bicycle Parking

As per the *City of Mississauga Zoning By-law*[6], a commercial use is required to supply the following bicycle parking spaces:

- Class A (indoor spaces): 0.10 to 0.15 spaces per 100 m^2; and
- Class B (outdoor spaces): 0.10 to 0.20 spaces per 100 m^2.

The parking rate ranges reflect the bicycle parking requirements for various non-residential uses. The rates applicable to the proposed commercial block will depend on the end uses (i.e. bank, restaurant, retail store, office, etc.). Regardless, given the limited size of the commercial block (374 m^2), the bicycle parking requirements will be minimal with 1 Class A space required and up to 2 Class B spaces).

4.6 SITE TRAFFIC

4.6.1 Mode Split Summary

According to the 2016 Transportation Tomorrow Survey (2016 TTS) data, on average 14% of the residents that live in the project area (GTA Zone 3620) utilize alternative modes of transportation, such as transit and walking as summarized in Table 8. The 2016 TTS Data sheet is provided in Appendix I.

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[6] *City of Mississauga Zoning By-law No. 0225-2007* Section 3.1.6.6

Table 8: Mode Split Summary

TRAVEL MODE	MODE SPLIT	
	AM	PM
Transit	11%	12%
Walking	5%	1%
Cycling	0%	0%
Auto Passenger	18%	17%
Auto Driver	**66%**	**70%**

4.6.2 Trip Generation

The number of vehicle trips to be generated by the proposed development has been determined based on type of use, development size and trip generation rates published in the *ITE Trip Generation Manual, 11th Edition*. Based on the proposed development, trip rates for the following land-uses have been applied:

- single family detached (ITE code 210);
- single family attached (ITE code 215); and
- small office building (ITE code 712) assumed for the commercial component.

The associated trip rates and trip estimates are provided in Table 9. As noted, 68 gross trips will result in the AM peak hour and 80 in the PM peak hour (total of inbound and outbound trips).

Transit Reduction

Due to the close proximity to transit services and the implementation of the Hurontario LRT, a 10% transit reduction was assumed for the residential use (Phase 1). Due to the limited size of the commercial building, no transit reduction was applied to this component of the project.

Table 9: Trip Generation – 376 & 390 Derry Road West

LAND USE	ITE CODE	VARIABLE/ SIZE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			In	Out	Total	In	Out	Total
single family detached	210	units	0.15	0.33	0.48	0.32	0.25	0.57
		4	1	2	3	2	1	3
single family attached	215	units	0.18	0.52	0.70	0.59	0.35	0.94
		120	18	40	58	39	29	68
Phase 1 Gross Trips			**19**	**42**	**61**	**41**	**30**	**71**
small office building	712	1000 ft² GFA	1.37	0.30	1.67	0.73	1.43	2.16
		4,026	6	1	7	3	6	9
Phase 2 Gross Trips			**6**	**1**	**7**	**3**	**6**	**9**
Phase 1 + Phase 2 Gross Trips			**25**	**43**	**68**	**44**	**36**	**80**
Transit Reduction (10% of Phase 1 Trips)			2	4	6	4	3	7
Phase 1 + Phase 2 Net Trips			**23**	**39**	**62**	**40**	**33**	**73**

Adjusted Trips

With consideration for the transit reduction, Phase 1 of the proposed development is expected to generate 55 trips during the AM peak hour and 64 trips during the PM peak hour. Upon completion of the Phase 2, the proposed commercial space is expected to generate 7 additional trips during the AM peak hour and 9 additional trips during the PM peak hour.

4.6.3 Trip Distribution

The distribution of the new trips generated by the site has been developed based on the location of the site in relation to the built-up area, access to Highway 407, existing travel patterns and a review of the 2016 TTS for GTA Zone 3620 (data summary is provided in Appendix I). The assumed distribution for both commercial and residential are presented in Table 10.

Table 10: Trip Distribution – 376 & 390 Derry Road West

DIRECTION (TO/FROM)	VIA	RESIDENTIAL		COMMERCIAL	
		Inbound	Outbound	Inbound	Outbound
North	St. Barbara Boulevards towards McLaughlin Road	5%	0%	0%	0%
North	McLaughlin Road	0%	5%	0%	8%
South	McLaughlin Road	30%	30%	30%	30%
West	Derry Road West	65%	20%	70%	16%
East	Derry Road West	0%	45%	0%	46%

4.6.4 Trip Assignment

The assignment of the site trips generated by the development to the adjacent road network is based on the trip distribution noted above and expected travel routes, with consideration for the proposed right-in/right-out access configuration (thus vehicles must approach from the west and exit to the east). It was assumed that the majority of drivers arriving from the east would use the Highway 407 Mavis Road exit or take alternative routes, thereby entering the site from the south of McLaughlin Road. As for drivers exiting the site to proceed northbound or westbound directions, it was presumed they would turn left onto St. Barbara Boulevard. For drivers exiting the site to proceed southbound, it was assumed 50% would turn left onto St. Barbara Boulevard to access McLaughlin Road, while the other 50% would turn right onto Martiz Drive.

The site-generated traffic for both phases are illustrated in Figure 12 and Figure 13 respectively.

5 Future Total Conditions

This chapter will address the resulting impacts of the proposed development on the adjacent road system. The following areas are to be addressed:

- intersection operations, including the site access operations.
- turning lane requirements; and
- potential improvements to the study area road network, if necessary.

5.1 TRAFFIC VOLUMES

To assess the impacts of the increased traffic volumes resulting from the proposed development, the site generated traffic was combined with the 2026, 2031 and 2036 background traffic volumes. The resulting total traffic volumes are presented in Figure 14 through Figure 16.

5.2 TRAFFIC OPERATIONS

The operations of the subject intersections were again investigated as were those of the proposed site access considering the total traffic volumes for each horizon year. The existing intersection configurations and control have been maintained through all horizon years. For all study signalized intersections, the signal timings have been optimized to ensure efficient operations. With respect to the RIRO site access, single lane approaches have been considered with stop control on exit from the site. The resulting operations area summarized in Table 11 through Table 13, with corresponding worksheets provided in Appendix J. As indicated, the study area intersections will provide acceptable overall operations through the 2036 horizon under total conditions. Similarly, the site access will also provide acceptable operations.

Due to the similar operating capacities between the future background and future total conditions, the subject site is not expected to create any significant traffic impacts on the study area roadways. As such, no intersection operational improvements are required to support the proposed development.

Table 11: Intersection Operations – 2026 Total

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & McLaughlin Road	EB L	Signal	26	C	0.40	78	E	0.95
	EB T	Signal	49	D	0.89	32	C	0.45
	EB R	Yield	0	A	0.18	0	A	0.06
	WB L	Signal	72	E	0.92	27	C	0.61
	WB T	Signal	34	C	0.40	41	D	0.81
	WB R	Yield	0	A	0.06	0	A	0.25
	NB L	Signal	68	E	0.70	**86**	**F**	0.89
	NB T	Signal	34	C	0.51	51	D	0.93
	NB R	Signal	29	C	0.10	28	C	0.06
	SB L	Signal	59	E	0.65	**97**	**F**	0.90
	SB T	Signal	57	E	0.98	36	D	0.61
	SB R	Signal	25	C	0.05	30	C	0.09
	Overall	**Signal**	**44**	**D**	**0.94**	**42**	**D**	**0.96**
Derry Road West & S. Barbara Boulevard/ Longview Place	EB L	Signal	15	B	0.20	16	B	0.53
	EB T	Signal	21	C	0.69	11	B	0.31
	EB R	Signal	12	B	0.00	9	A	0.00
	WB L	Signal	16	B	0.17	9	A	0.09
	WB T	Signal	11	B	0.29	17	B	0.63
	WB R	Signal	9	A	0.04	13	B	0.30
	NB L	Signal	58	E	0.06	69	E	0.07
	NB TR	Signal	58	E	0.04	69	E	0.03
	SB L	Signal	75	E	0.95	65	E	0.62
	SB TR	Signal	35	D	0.08	48	D	0.03
	Overall	**Signal**	**25**	**C**	**0.79**	**18**	**B**	**0.59**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	28	C	0.40	19	B	0.30
	EB T	Signal	44	D	0.84	18	B	0.35
	EB R	Signal	44	D	0.72	16	B	0.18
	WB L	Signal	45	D	0.73	33	C	0.65
	WB T	Signal	7	A	0.23	27	C	0.66
	WB R	Signal	7	A	0.09	19	B	0.01
	NB L	Signal	72	E	0.66	67	E	0.97
	NB TR	Signal	62	E	0.40	31	C	0.47
	SB L	Signal	61	E	0.33	59	E	0.03
	SB T	Signal	59	E	0.23	61	E	0.25
	SB R	Signal	58	E	0.04	58	E	0.01
	Overall	**Signal**	**37**	**D**	**0.77**	**31**	**C**	**0.80**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	77	E	0.56	80	F	0.54
	EB T R	Signal	74	E	0.50	73	E	0.17
	WB L	Signal	**165**	**F**	0.89	75	E	0.31
	WB TR	Signal	70	E	0.21	72	E	0.07
	NB L	Signal	14	B	0.37	2	A	0.15
	NB TR	Signal	3	A	0.29	3	A	0.48
	SB L	Signal	5	A	0.04	4	A	0.09
	SB TR	Signal	12	B	0.70	5	A	0.38
	Overall	**Signal**	**17**	**B**	**0.69**	**8**	**A**	**0.50**
Derry Road West & Site RIRO Access	NB R	Stop	10	A	0.05	9	A	0.03

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR – left-right

Table 12: Intersection Operations – 2031 Total

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & McLaughlin Road	EB L	Signal	28	C	0.43	70	E	0.92
	EB T	Signal	58	E	0.96	33	C	0.47
	EB R	Yield	0	A	0.19	0	A	0.06
	WB L	Signal	71	E	0.91	28	C	0.63
	WB T	Signal	36	D	0.44	44	D	0.85
	WB R	Yield	0	A	0.06	0	A	0.25
	NB L	Signal	70	E	0.71	**91**	**F**	0.91
	NB T	Signal	33	C	0.50	54	D	0.94
	NB R	Signal	28	C	0.11	28	C	0.06
	SB L	Signal	58	E	0.64	**103**	**F**	0.93
	SB T	Signal	53	D	0.96	37	D	0.62
	SB R	Signal	24	C	0.05	29	C	0.09
	Overall	**Signal**	**46**	**D**	**0.95**	**43**	**D**	**0.96**
Derry Road West & S. Barbara Boulevard/ Longview Place	EB L	Signal	15	B	0.21	24	C	0.55
	EB T	Signal	21	C	0.71	11	B	0.32
	EB R	Signal	12	B	0.00	9	A	0.00
	WB L	Signal	16	B	0.17	9	A	0.09
	WB T	Signal	11	B	0.29	18	B	0.65
	WB R	Signal	9	A	0.04	13	B	0.30
	NB L	Signal	58	E	0.06	70	E	0.07
	NB TR	Signal	58	E	0.04	69	E	0.03
	SB L	Signal	81	F	0.97	72	E	0.63
	SB TR	Signal	35	D	0.09	48	D	0.03
	Overall	**Signal**	**26**	**C**	**0.81**	**18**	**B**	**0.61**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	29	C	0.41	20	B	0.31
	EB T	Signal	46	D	0.87	18	B	0.37
	EB R	Signal	45	D	0.74	16	B	0.18
	WB L	Signal	45	D	0.73	35	D	0.68
	WB T	Signal	7	A	0.23	28	C	0.68
	WB R	Signal	7	A	0.10	19	B	0.01
	NB L	Signal	72	E	0.66	71	E	0.99
	NB TR	Signal	62	E	0.42	31	C	0.48
	SB L	Signal	61	E	0.33	58	E	0.03
	SB T	Signal	59	E	0.23	61	E	0.26
	SB R	Signal	57	E	0.04	58	E	0.01
	Overall	**Signal**	**38**	**D**	**0.78**	**32**	**C**	**0.82**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	77	E	0.56	81	F	0.54
	EB T R	Signal	75	E	0.53	73	E	0.18
	WB L	Signal	**172**	**F**	0.91	75	E	0.32
	WB TR	Signal	70	E	0.21	72	E	0.07
	NB L	Signal	16	B	0.40	3	A	0.16
	NB TR	Signal	3	A	0.27	3	A	0.49
	SB L	Signal	5	A	0.04	5	A	0.09
	SB TR	Signal	13	B	0.71	6	A	0.39
	Overall	**Signal**	**18**	**B**	**0.71**	**8**	**A**	**0.51**
Derry Road West & Site RIRO Access	NB R	Stop	10	A	0.05	9	A	0.03

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR – left-right

Table 13: Intersection Operations – 2036 Total

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & McLaughlin Road	EB L	Signal	28	C	0.45	**84**	**F**	0.97
	EB T	Signal	63	E	0.98	34	C	0.49
	EB R	Yield	0	A	0.19	0	A	0.06
	WB L	Signal	**86**	**F**	0.96	29	C	0.66
	WB T	Signal	36	D	0.45	45	D	0.87
	WB R	Yield	0	A	0.06	0	A	0.26
	NB L	Signal	71	E	0.73	**95**	**F**	0.93
	NB T	Signal	33	C	0.51	57	E	0.96
	NB R	Signal	28	C	0.12	28	C	0.06
	SB L	Signal	58	E	0.65	109	F	0.95
	SB T	Signal	58	E	0.99	37	D	0.63
	SB R	Signal	24	C	0.06	29	C	0.09
	Overall	**Signal**	**49**	**D**	**0.97**	**45**	**D**	**0.98**
Derry Road West & S. Barbara Boulevard/ Longview Place	EB L	Signal	15	B	0.22	30	C	0.58
	EB T	Signal	22	C	0.72	11	B	0.32
	EB R	Signal	12	B	0.00	9	A	0.00
	WB L	Signal	17	B	0.17	9	A	0.09
	WB T	Signal	11	B	0.30	19	B	0.67
	WB R	Signal	9	A	0.05	14	B	0.31
	NB L	Signal	58	E	0.06	70	E	0.07
	NB TR	Signal	58	E	0.04	69	E	0.03
	SB L	Signal	88	F	1.00	73	E	0.64
	SB TR	Signal	35	D	0.11	48	D	0.03
	Overall	**Signal**	**27**	**C**	**0.83**	**19**	**B**	**0.63**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	30	C	0.43	22	C	0.33
	EB T	Signal	49	D	0.90	19	B	0.39
	EB R	Signal	47	D	0.76	17	B	0.19
	WB L	Signal	44	D	0.73	41	D	0.73
	WB T	Signal	7	A	0.24	30	C	0.72
	WB R	Signal	7	A	0.10	20	C	0.01
	NB L	Signal	72	E	0.66	64	E	0.97
	NB TR	Signal	62	E	0.43	30	C	0.48
	SB L	Signal	61	E	0.34	58	E	0.03
	SB T	Signal	59	E	0.24	61	E	0.26
	SB R	Signal	57	E	0.04	58	E	0.01
	Overall	**Signal**	**39**	**D**	**0.80**	**33**	**C**	**0.84**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	77	E	0.56	76	E	0.48
	EB T R	Signal	75	E	0.55	71	E	0.16
	WB L	Signal	**180**	**F**	0.93	73	E	0.28
	WB TR	Signal	69	E	0.21	70	E	0.06
	NB L	Signal	19	B	0.43	3	A	0.17
	NB TR	Signal	3	A	0.31	4	A	0.51
	SB L	Signal	6	A	0.04	5	A	0.10
	SB TR	Signal	13	B	0.74	6	A	0.40
	Overall	**Signal**	**18**	**B**	**0.73**	**8**	**A**	**0.53**
Derry Road West & Site RIRO Access	NB R	Stop	10	A	0.05	9	A	0.03

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR – left-right

5.3 TURN LANE REQUIREMENTS

Notwithstanding the otherwise acceptable operations at the site access on Derry Road West, the need for an exclusive right turn lane at the site access has been reviewed based on the following:

- MTO and RCS warrants/guidelines for auxiliary turn lanes at unsignalized intersections;
- a design speed of 80km/h (posted speed of 70 km/h + 10 km/h); and
- the future total traffic volumes.

Right Turn Lanes

MTO guidelines and RCS suggest that an exclusive right-turn lane be considered where right-turn volumes exceed 60 vehicles per hour and impede the operations of through traffic. As illustrated in Figure 13, upon completion, the projected right turn volumes from Derry Road West into the site are in the order of 28 to 38 vehicles during both the weekday AM and PM peak hours. In this regard, the peak hour right turning volumes do not exceed the threshold of 60 vehicles and thus a right turn lane is not warranted.

5.4 SENSITIVITY ANALYSES

5.4.1 Longview Road Connector

As previously discussed in Chapter 4, if both 346/358 Derry Road West and 320 Derry Road West properties are developed, the subject project would potentially have access at the signalized intersection of Derry Road West with St. Barbara Boulevard. As per the City of Mississauga's request, a sensitivity analysis has been undertaken for the 2036 horizon year condition to evaluate the potential impact in the study area should the new Longview Place connector be built, and an easement is obtained.

D'Iorio Property – Proposed Residential Development

Currently, there are no prospects for this project. However, if the development were to move forward, it is anticipated to accommodate 19 single-family housing units. Traffic volumes associated with this development were obtained from ITE trip generation rates for the following land use:

- single family detached (ITE code 210).

Upon completion, this proposed development is expected to generate a total of 13 new trips during the weekday AM peak hour and 18 new trips during the PM peak hour. The resulting trips have been assigned to the road network based on the trip distribution noted in Section

4.6.3. For the purpose of this study, it is assumed that the property will be fully constructed and occupied by 2036.

5.4.2 Traffic Volumes

The allocation of the site trips associated with 376 and 390 Derry Road West to the road network has been revised in consideration of the noted future access, and maintaining the trip distribution outlined in Section 4.6.3. Despite the additional access to/from the east, the RIRO access on Derry Road West is intended to remain. The revised site traffic volumes are illustrated in Figure 17, with the resulting total traffic volumes presented in Figure 18 for the 2036 horizon.

5.4.3 Intersection Operations

The intersection operations are summarized in Table 14, with corresponding worksheets in Appendix K. As with the previous analyses, the signal timings have been optimized to ensure efficient operations.

As can be seen, with the new access, the overall levels of service for all study intersections will remain comparable to those of the total conditions (i.e. without consideration for the Longview Place access). For the intersection of Derry Road West with St. Barbara Boulevard/Longview Place, it is expected that there will be a slight increase in overall delays of 1 second during both peak hours. In this regard, the use of the new Longview Place access will not have any detrimental impacts to the overall intersection operations within the study area.

Table 14: Intersection Operations – 2036 Total (Longview Place Access)

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & McLaughlin Road	EB L	Signal	28	C	0.46	**84**	**F**	0.97
	EB T	Signal	61	E	0.97	34	C	0.48
	EB R	Yield	0	A	0.19	0	A	0.06
	WB L	Signal	**99**	**F**	1.01	31	C	0.69
	WB T	Signal	36	D	0.45	46	D	0.88
	WB R	Yield	0	A	0.07	0	A	0.26
	NB L	Signal	71	E	0.73	**96**	**F**	0.93
	NB T	Signal	33	C	0.51	57	E	0.96
	NB R	Signal	28	C	0.12	28	C	0.07
	SB L	Signal	58	E	0.65	**110**	**F**	0.95
	SB T	Signal	57	E	0.98	37	D	0.62
	SB R	Signal	24	C	0.06	29	C	0.09
	Overall	**Signal**	**48**	**D**	**0.99**	**45**	**D**	**0.98**
Derry Road West & S. Barbara Boulevard/ Longview Place	EB L	Signal	15	B	0.17	25	C	0.55
	EB T	Signal	24	C	0.74	13	B	0.33
	EB R	Signal	13	B	0.00	10	A	0.01
	WB L	Signal	18	B	0.25	10	A	0.16
	WB T	Signal	12	B	0.30	20	B	0.68
	WB R	Signal	10	A	0.05	14	B	0.32
	NB L	Signal	61	E	0.40	71	E	0.37
	NB TR	Signal	57	E	0.05	67	E	0.03
	SB L	Signal	**83**	**F**	0.98	73	E	0.64
	SB TR	Signal	35	C	0.11	46	D	0.03
	Overall	**Signal**	**28**	**C**	**0.83**	**20**	**C**	**0.64**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	30	C	0.44	21	C	0.34
	EB T	Signal	49	D	0.90	18	B	0.38
	EB R	Signal	46	D	0.75	16	B	0.18
	WB L	Signal	44	D	0.73	38	D	0.70
	WB T	Signal	7	A	0.24	29	C	0.71
	WB R	Signal	7	A	0.10	19	B	0.01
	NB L	Signal	72	E	0.66	77	E	1.01
	NB TR	Signal	62	E	0.43	31	C	0.49
	SB L	Signal	61	E	0.34	58	E	0.03
	SB T	Signal	59	E	0.24	61	E	0.26
	SB R	Signal	57	E	0.04	58	E	0.01
	Overall	**Signal**	**39**	**D**	**0.80**	**33**	**C**	**0.84**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	77	E	0.56	76	E	0.48
	EB T R	Signal	75	E	0.55	71	E	0.16
	WB L	Signal	**180**	**F**	0.93	73	E	0.28
	WB TR	Signal	69	E	0.21	70	E	0.06
	NB L	Signal	19	B	0.43	3	A	0.17
	NB TR	Signal	3	A	0.31	4	A	0.51
	SB L	Signal	6	A	0.04	5	A	0.11
	SB TR	Signal	13	B	0.74	6	A	0.40
	Overall	**Signal**	**18**	**B**	**0.74**	**8**	**A**	**0.53**
Derry Road West & Site RIRO Access	Stop	NB R	10	A	0.05	9	A	0.03

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR – left-right

5.4.4 Pre-Pandemic Level of Traffic

The operations of the subject intersections were again investigated as were those of the proposed site access considering the pre-pandemic total traffic volumes for the 2036 horizon year (refer to in Figure 19). The resulting operations are summarized in Table 15, with corresponding worksheets provided in Appendix K. The signal timings have been optimized to ensure efficient operations.

As indicated, with the exception of intersection of Derry Road West with McLaughlin Road, all study intersections are expected to continue to provide acceptable operation (LOS D or better) with minimal delays. The Derry Road West with McLaughlin Road intersection is expected to operate at overall LOS E under both peak periods. Similarly, the site access will also provide acceptable operations.

Due to the similar operating capacities between the pre pandemic future background and total conditions, the subject site is not expected to create any significant traffic impacts on the study area roadways.

Table 15: Intersection Operations – 2036 Total (Pre-Pandemic)

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Derry Road West & McLaughlin Road	EB L	Signal	29	C	0.53	**148**	**F**	1.18
	EB T	Signal	**133**	**F**	1.18	34	C	0.60
	EB R	Yield	0	A	0.21	0	A	0.07
	WB L	Signal	**114**	**F**	1.06	79	E	0.97
	WB T	Signal	38	D	0.55	**115**	**F**	1.15
	WB R	Yield	0	A	0.06	0	A	0.26
	NB L	Signal	71	E	0.73	**90**	**F**	0.94
	NB T	Signal	35	C	0.58	75	E	1.04
	NB R	Signal	29	C	0.15	25	C	0.07
	SB L	Signal	63	E	0.76	**83**	**F**	0.87
	SB T	Signal	**88**	**F**	1.08	33	C	0.62
	SB R	Signal	24	C	0.07	27	C	0.14
	Overall	**Signal**	**78**	**E**	**1.11**	**71**	**E**	**1.15**
Derry Road West & S. Barbara Boulevard/ Longview Place	EB L	Signal	17	B	0.27	42	D	0.59
	EB T	Signal	28	C	0.88	12	B	0.39
	EB R	Signal	12	B	0.00	9	A	0.00
	WB L	Signal	24	C	0.17	9	A	0.11
	WB T	Signal	12	B	0.37	24	C	0.83
	WB R	Signal	9	A	0.05	15	B	0.40
	NB L	Signal	58	E	0.06	70	E	0.07
	NB TR	Signal	58	E	0.04	69	E	0.03
	SB L	Signal	**170**	**F**	1.23	73	E	0.64
	SB TR	Signal	37	D	0.24	48	D	0.03
	Overall	**Signal**	**40**	**D**	**1.01**	**22**	**C**	**0.75**

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Derry Road West & Maritz Drive/ Derrycrest Drive	EB L	Signal	30	C	0.55	36	D	0.41
	EB T	Signal	57	E	0.99	29	C	0.50
	EB R	Signal	43	D	0.78	24	C	0.21
	WB L	Signal	63	E	0.88	**152**	**F**	1.10
	WB T	Signal	8	A	0.30	51	D	0.92
	WB R	Signal	7	A	0.10	27	C	0.01
	NB L	Signal	72	E	0.66	**84**	**F**	1.03
	NB TR	Signal	62	E	0.43	35	C	0.53
	SB L	Signal	61	E	0.34	75	E	0.06
	SB T	Signal	59	E	0.24	77	E	0.29
	SB R	Signal	57	E	0.04	74	E	0.01
	Overall	**Signal**	**44**	**D**	**0.91**	**51**	**D**	**1.06**
McLaughlin Road & Novo Star Drive/ Arrowsmith Drive	EB L	Signal	76	E	0.55	76	E	0.48
	EB T R	Signal	76	E	0.58	71	E	0.16
	WB L	Signal	**180**	**F**	0.93	73	E	0.28
	WB TR	Signal	69	E	0.21	70	E	0.06
	NB L	Signal	34	C	0.53	3	A	0.17
	NB TR	Signal	3	A	0.31	4	A	0.56
	SB L	Signal	5	A	0.04	6	A	0.13
	SB TR	Signal	16	B	0.80	6	A	0.40
	Overall	**Signal**	**20**	**B**	**0.80**	**8**	**A**	**0.57**
Derry Road West & Site RIRO Access	NB R	Stop	10	A	0.05	9	A	0.03

L-left T-through R-right LT-left-through TR-through-right LTR-left-through-right LR – left-right

6 Transportation Demand Management

Transportation Demand Management (TDM) is the use of policies, infrastructure, services and marketing and education programs to influence or encourage a behavioural shift in people with respect to how they travel. More specifically, TDM aims to reduce single occupancy vehicle trips and ultimately, the reliance on the private automobile by promoting alternative travel options.

In accordance with the City of Mississauga's guidelines, a TDM program or plan should be developed and implemented in support of the noted development. Upon completion of both phases of this project, the site is expected to generate a total of 62 and 73 new trips during the AM and PM peak periods, respectively. Development with this projected level of traffic (less than 100 new peak hour trips) triggers a TDM Statement plan.

This TDM Statement plan will outline TDM measures that be developed and implemented in support of the noted development. The opportunities and recommended measures are discussed below.

6.1 OPPORTUNITIES

6.1.1 Public Transit

As outlined in Chapter 2, 4 active bus routes currently operate within the project area, with available bus stops located within close proximity to the development site. These routes are:

- Brampton Transit 6 – James Potter;
- miWAY Route 18 - McLaughlin-Derry;
- miWAY Route 42 – Derry; and
- miWAY Route 66 – McLaughlin.

The subject site is well served by public transportation, with an all-day service along Derry Road West with peak headways of 20 minutes. All bus stops within close proximity of the site provide shelters and are well-connected with existing pedestrian sidewalks. The Hurontario LRT project will also further improve transit infrastructure in this area.

Increasing public transit use has many benefits such as protecting the environment, reducing traffic congestion on area roads, providing convenience, saving energy, strengthening communities, and improving livability. To encourage travel by transit, transit information packages containing route maps, schedules and other useful information should be readily available for tenants within an accessible location.

Encouraging the use of the available transit services serving the site is crucial to the overall success of the TDM program. It is recommended that a clause be included as a condition of the subdivision/site plan approval, stipulating that public transit information should be provided to purchasers in an information package.

6.1.2 Pedestrian & Cycling Infrastructure

Pedestrian sidewalks are present in the surrounding areas. The sidewalks are accessible and provide a safe and convenient means of pedestrian travel. Additionally, key intersections within the area have crosswalks, allowing pedestrians to safely cross. While no dedicated bicycle facilities are present in the immediate vicinity, the existing pedestrian infrastructure and crosswalks provide a foundation for safe and efficient non-motorized transportation within the project area.

As mentioned in Chapter 2, the City has a long-standing commitment to an off-road trail system, having built pathways and trails in parks and greenspaces across the city. Overall, pathways in the project neighbourhood provide cycling and walking-friendly connections to schools, community centers and libraries. In addition, cycling safety programs were offered such as CAN-BIKE courses and community safety workshops. The existing sidewalk infrastructure and on-site proposed pedestrian circulation are graphically depicted in Figure 20.

Encouraging more people to cycle, especially for utilitarian purposes, would result in taking more cars off the road during peak hours, helping to reduce traffic congestion, and is more environmentally friendly.

6.1.3 Car Share Service

The developer is committed to providing an information package to the purchasers, which will include comprehensive details about local car-sharing options.

6.2 PROGRAMMING

6.2.1 TDM Coordinator

The TDM Coordinator will be required to implement and manage the TDM program on an ongoing basis. The responsibilities of the TDM Coordinator include the following:

- champion of the TDM program;
- liaise with the Region and City to tailor and deliver a TDM program that meets the needs of the site;

- liaise with local transit providers in order to gather and disseminate transit service information (i.e. fare structures, schedules and maps) to future residents to ensure that commuters are educated regarding transit options; and
- act as the TDM point of contact for residents.

The TDM Coordinator is the promoter, educator and facilitator of the TDM program. The Board of Directors (BOD) of the Condo Corporation for the site will be responsible for managing the TDM program.

6.2.2 Marketing & Education

A site-specific TDM marketing and education package should be prepared and distributed to all new residents of the development. The TDM package should include the following information:

- introduction to TDM objectives, goals and benefits;
- maps of cycling routes in Peel Region and the City of Mississauga;
- bicycle safety information;
- school travel planning initiatives;
- transit schedules for local services (i.e. miWAY);
- available car-share service; and
- information on Smart Commute programs serving the area.

The marketing and education package will be organized in conjunction with Region and city staff to ensure consistency with the TDM programs being delivered to other residential developments of similar size. The designated TDM Coordinator will coordinate with the City o Mississauga (and the Peel Region, as required) in preparing and distributing the transportation information packages to all new residents. It is recommended that a clause be included as a condition of the subdivision/site plan approval.

6.3 APPROXIMATE COSTS

A summary of approximate costs for the noted TDM elements is provided in Table 16.

Table 16: TDM Cost Summary Table

TDM PROGRAM MEASURE	QUANTITY	UNIT COST	ESTIMATED COST
Marketing & Education Package	42	$10/package	$420

7 Summary

Proposed Development

This study has addressed the transportation impacts associated with the proposed mixed-use development to be located at 376 and 390 Derry Road West in the City of Mississauga. Upon completion of Phase 1 of this project, the site is expected to generate a total of 55 trips during the AM peak hour and 64 trips during the PM peak hour (a total of inbound and outbound trips). Upon completion of Phase 2, the proposed commercial space is expected to generate 7 additional trips during the AM peak hour and 9 additional trips during the PM peak hour.

Intersection Operations

In addressing the study area operations, the key intersections were analyzed under existing (2023), 2026, 2031 and 2036 horizon periods. The results of the operational analysis indicate that all study signalized intersections and the site access will provide acceptable operations through the 2036 horizon under future total conditions.

Turn Lane Requirements

The need for exclusive right turn lanes at the site access was reviewed in consideration of MTO guidelines for auxiliary turn lanes at unsignalized intersections. Based on this review, no turn lanes are considered necessary.

Sight Lines

Sight lines were reviewed at the proposed site access to ensure that adequate sight distances were provided with respect to TAC design requirements. In consideration of the road layout and anticipated operating speed, the sight lines at the site access are considered appropriate.

Site Access & Circulation

The internal site layout and access points were reviewed. The internal layout, access point configuration and design are considered appropriate as presented in this report. A turning analysis was completed, which indicates that the site can readily accommodate the turning requirements of a garbage truck and other large service vehicles.

Overall Impact

Overall, the subject site is not expected to have any material impact on the operations of the existing road network. The study area intersections will provide acceptable operations through 2036 horizon under total conditions. Similarly, the site access will also provide acceptable

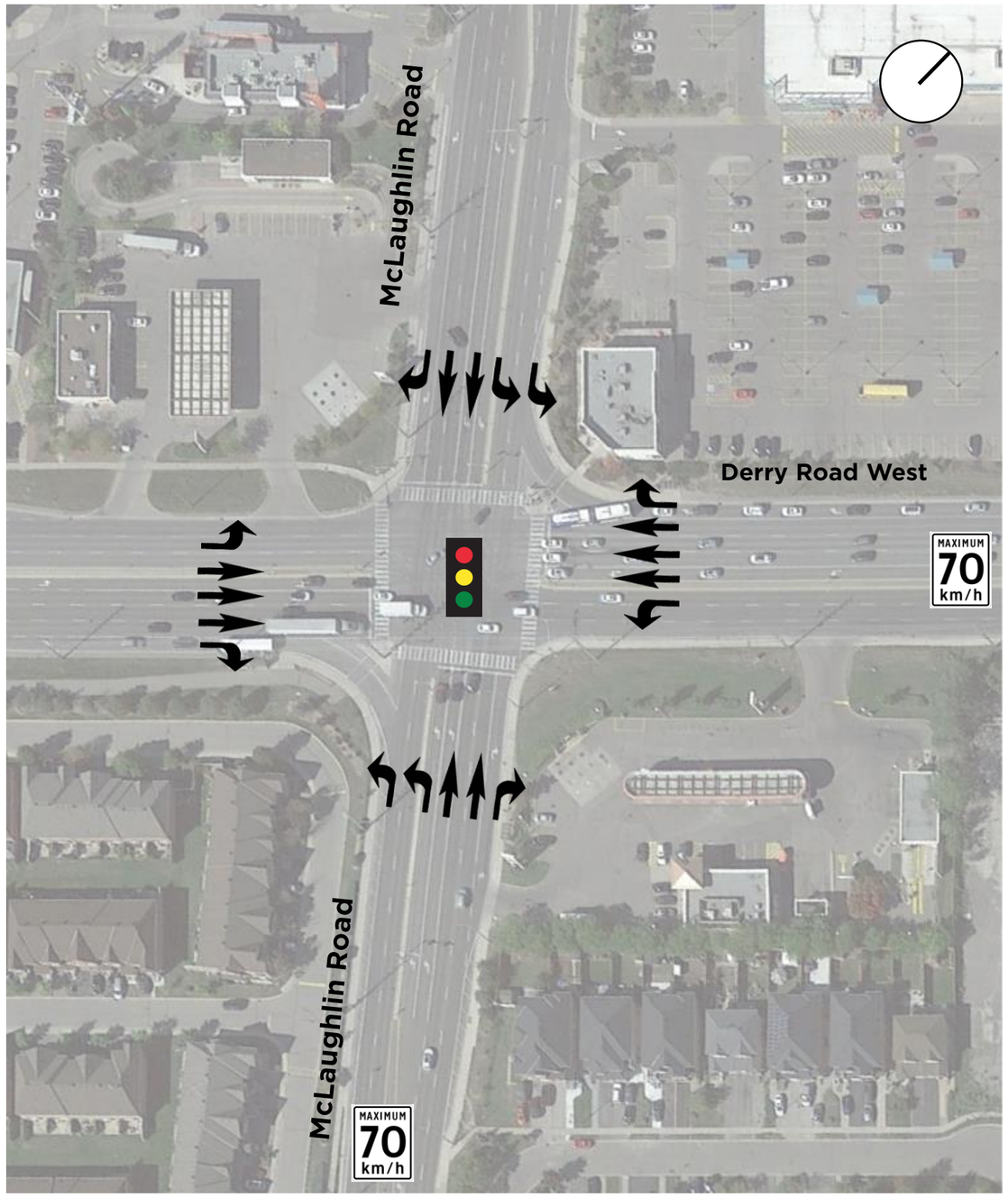
operations. Due to the similar operating capacities between the future background and future total conditions, the subject site is not expected to create any significant traffic impacts on the study area roadways. As such, no intersection operational improvements are required to support the proposed development under the 2026, 2031 and 2036 horizons.

TDM Program

Transportation demand management initiatives for the site were reviewed and an appropriate TDM plan was recommended. The TDM plan should focus on educating the residents of the development as to the various travel options available to them when making travel plans (e.g. walking, cycling and transit). The condo corporation for the site will manage the TDM program.

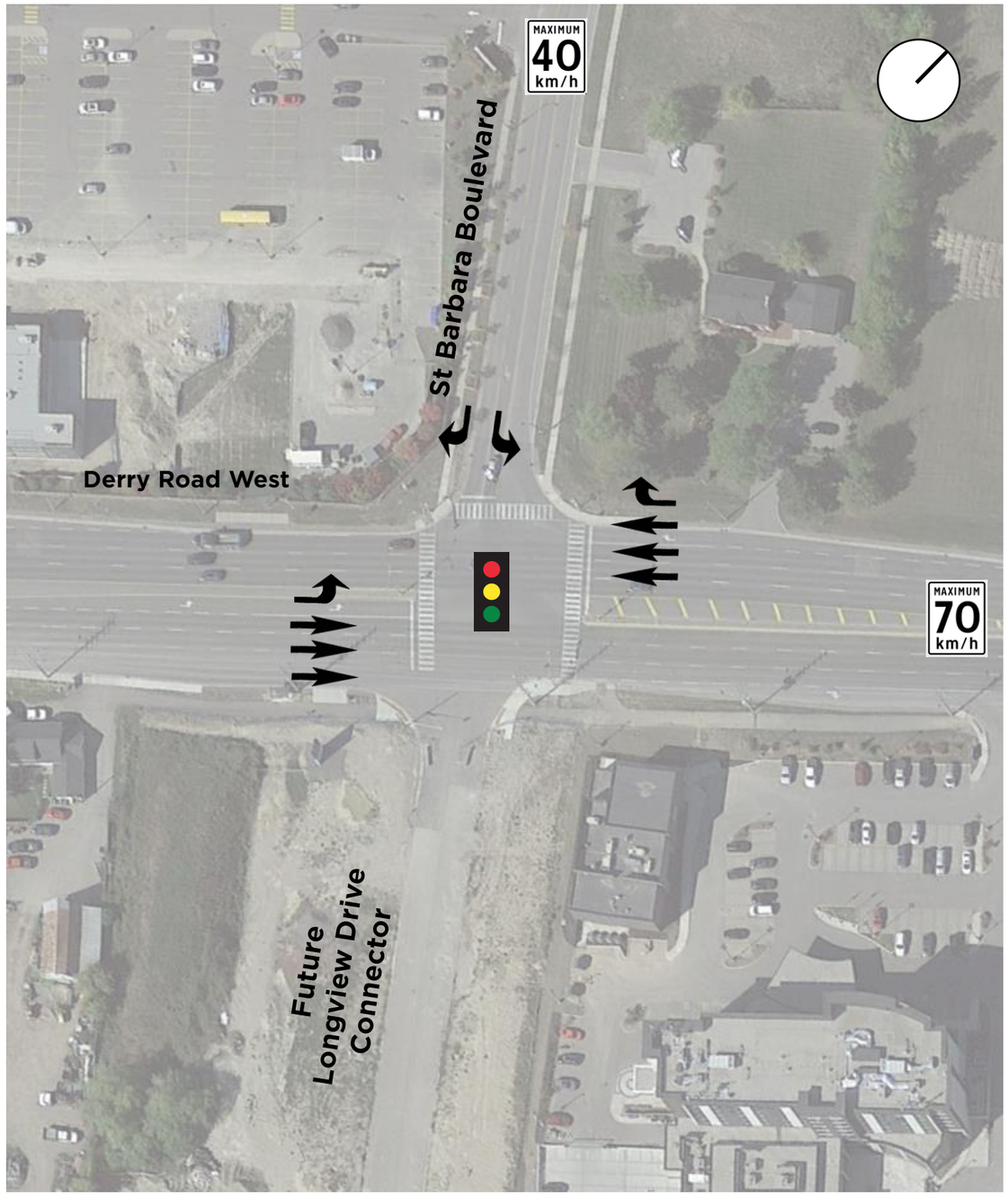
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

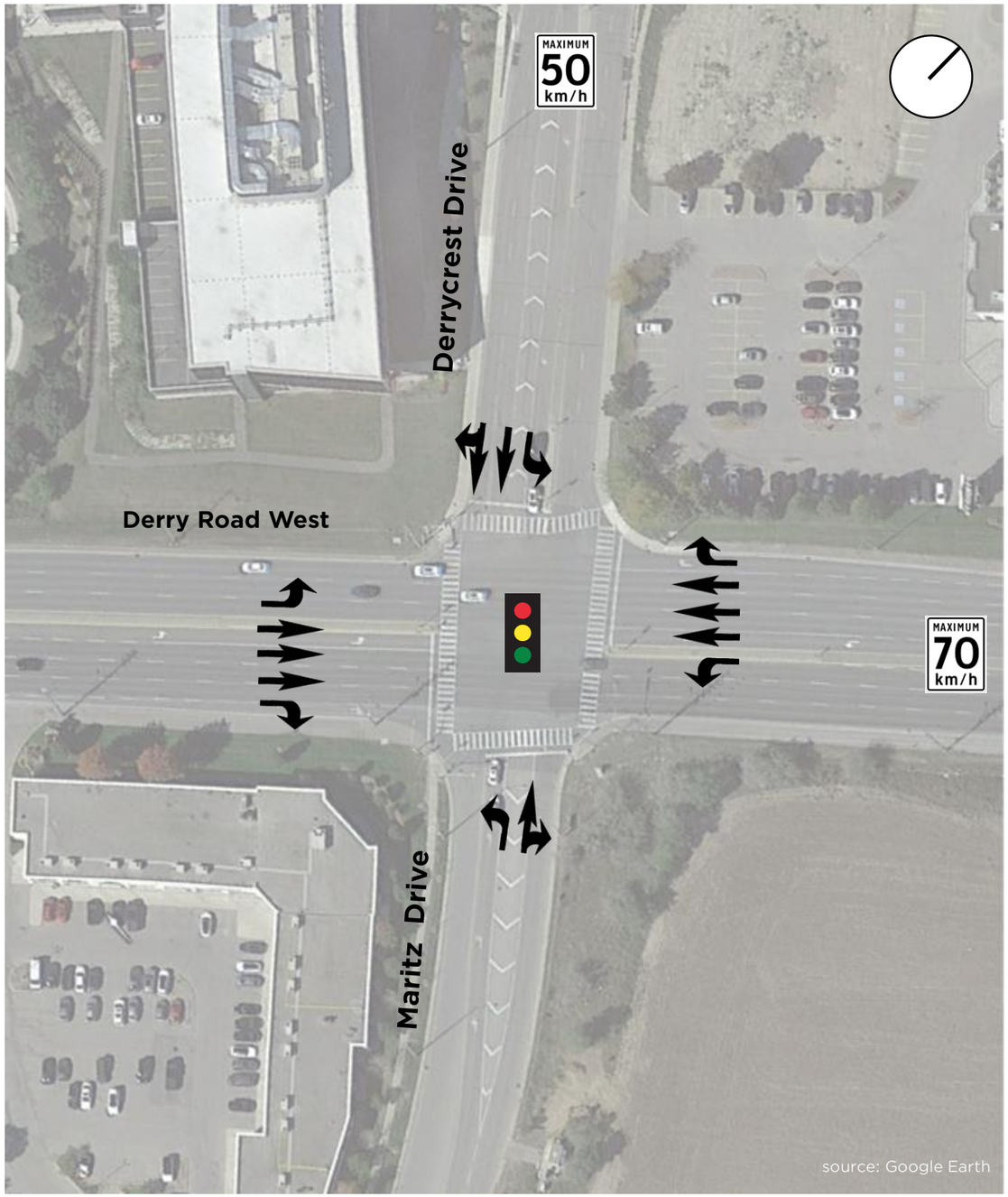
Figure 1: Site Location Map



376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

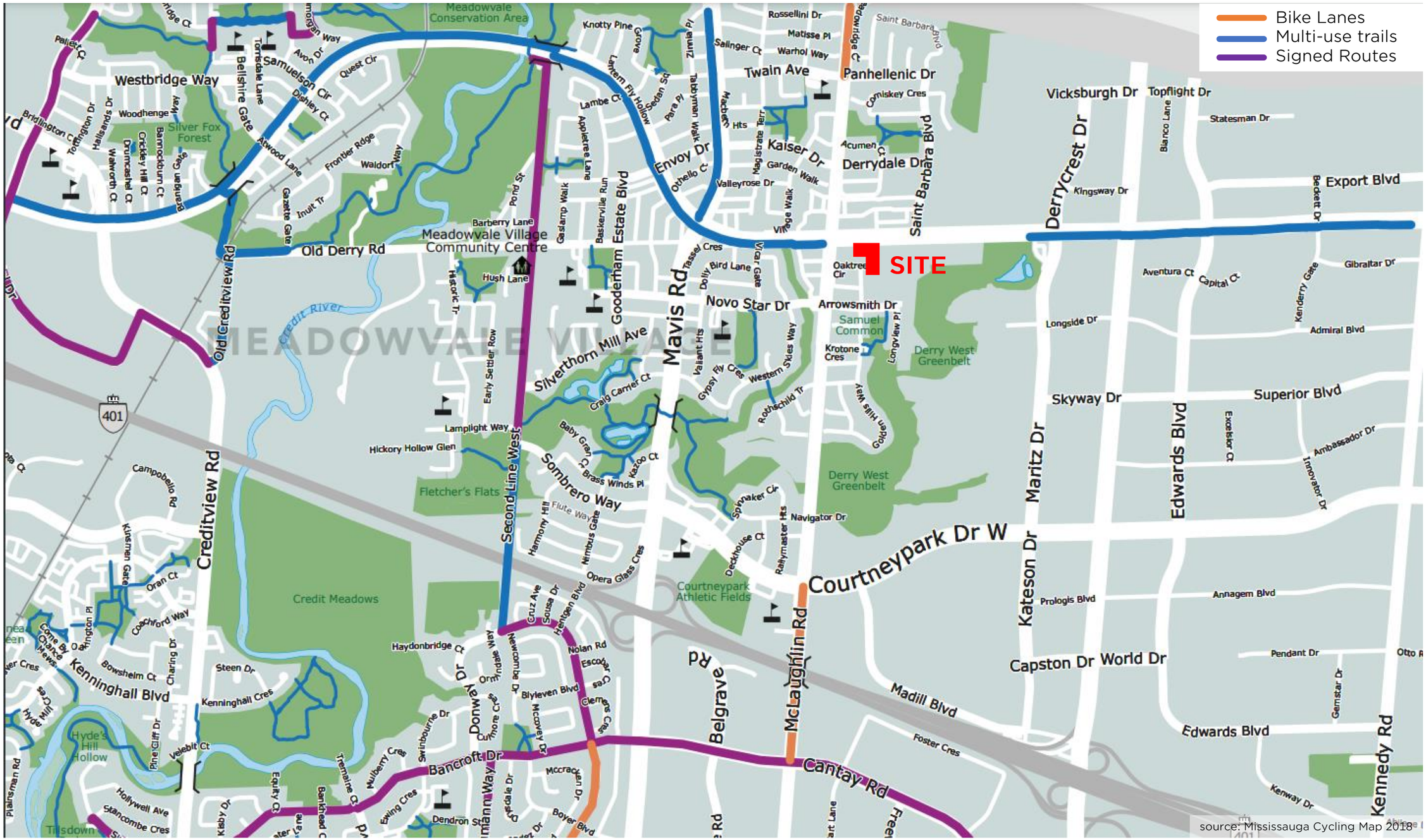
Figure 2A: Area Road Network





376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 2B: Area Road Network



source: Mississauga Cycling Map 2018

376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 3: Area Cycling Network

Weekday Service Map

Effective: April 24, 2023

MiWay Route Service Types

- Regular Route
- Monday to Friday Route
- Rush Hour (Peak) Route
- Non-Rush Hour (Off Peak) Route
- MiExpress Route All Day Service
- MiExpress Route AM/PM Rush Hour Service
- Route Number

Connecting Transit Services

- Oakville Transit Route
- Brampton Transit Route
- TTC Bus Route
- TTC Subway & Station
- GO Train & Station

Map Symbols

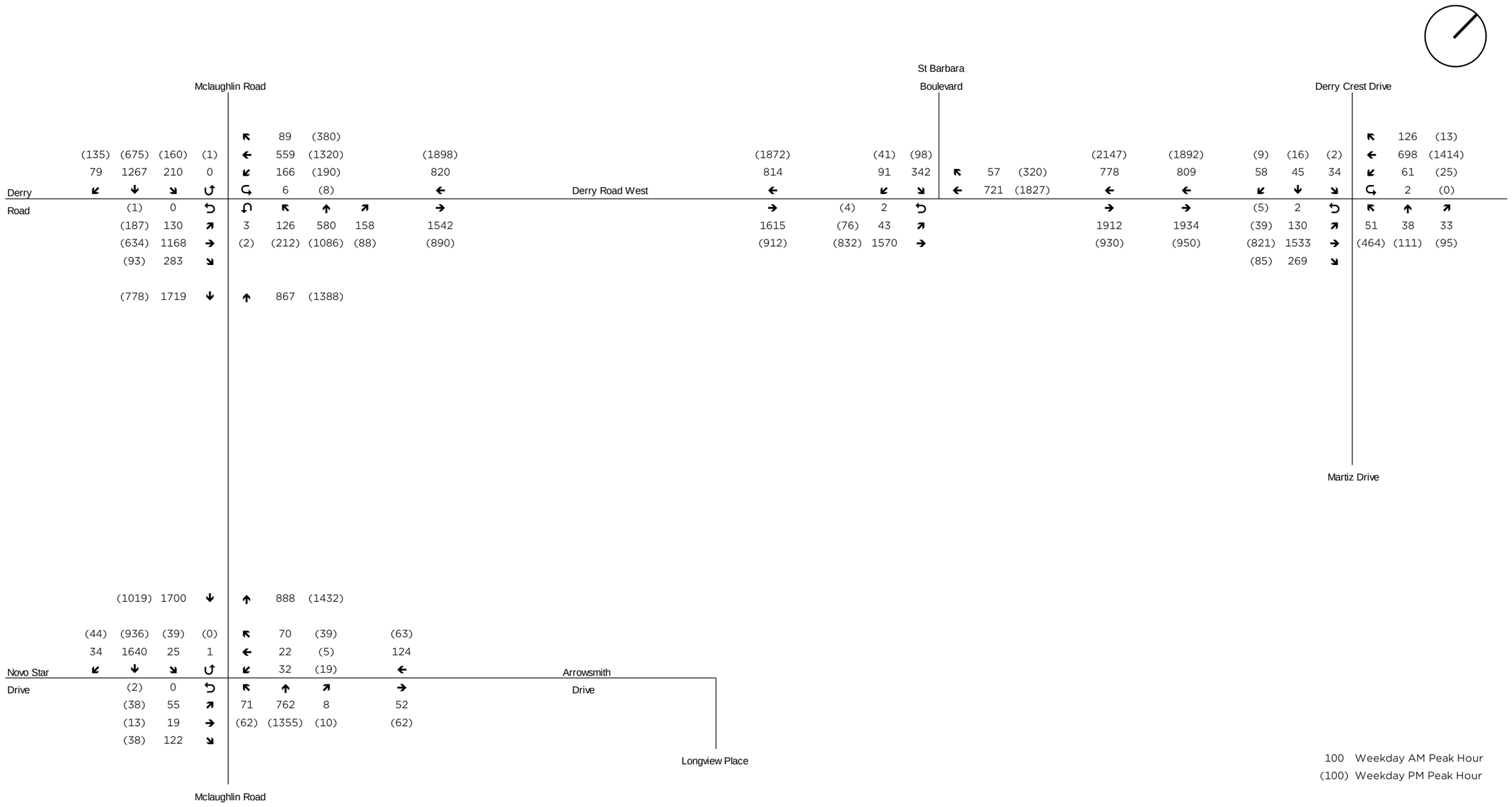
- Major Transit Terminal
- Transitway Station
- Mississauga Transitway
- Key Transit Stops
- Hospital
- Shopping Centre
- High School, University or College
- Recreation or Community Centre
- Ice Rink
- Public Library
- Living Arts Centre
- Civic Centre (City Hall)
- Court House

All MiWay routes are fully accessible with low floor, wheelchair accessible buses

source: MiWay Transit services Map - Weekdays

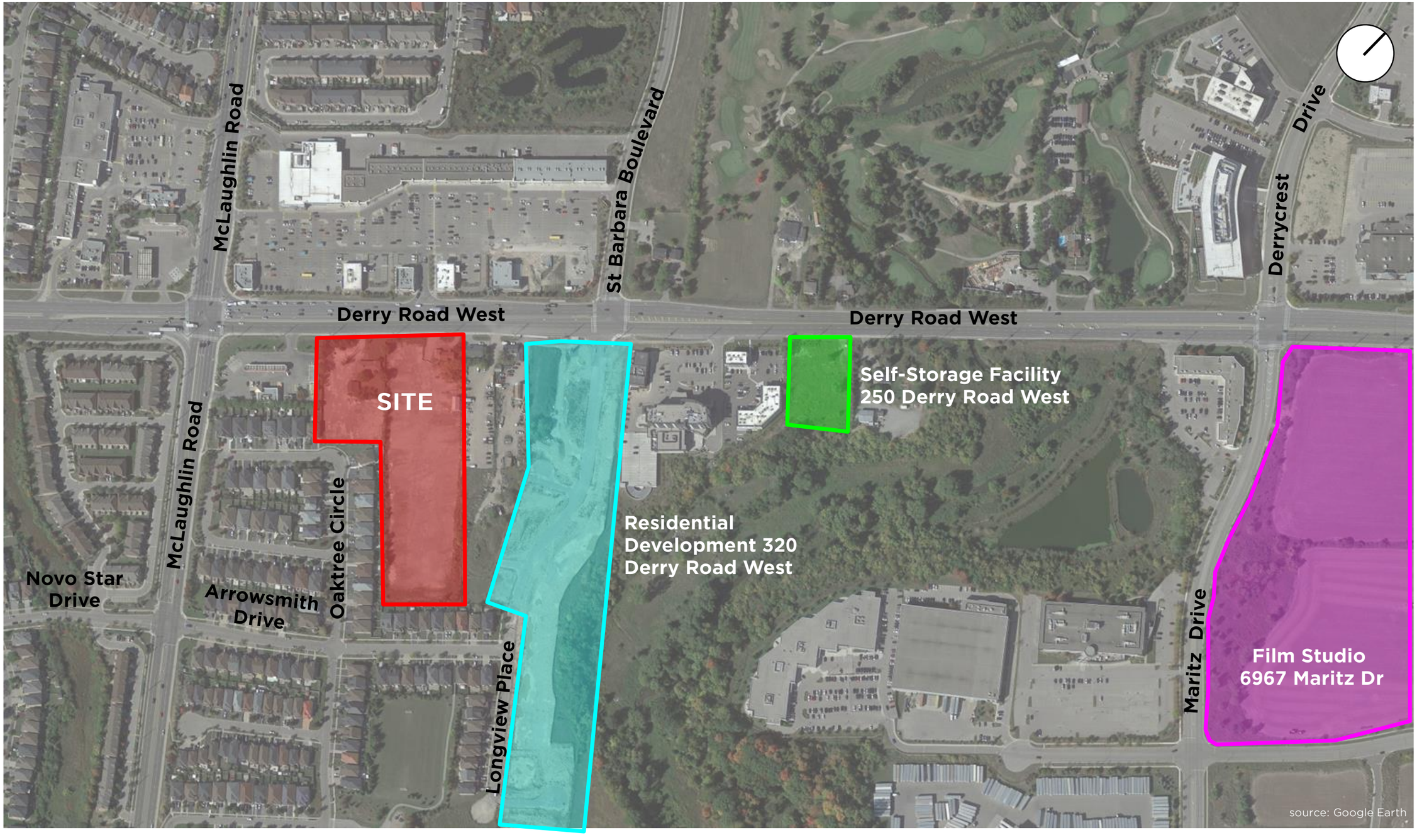
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 4: Area Transit Network



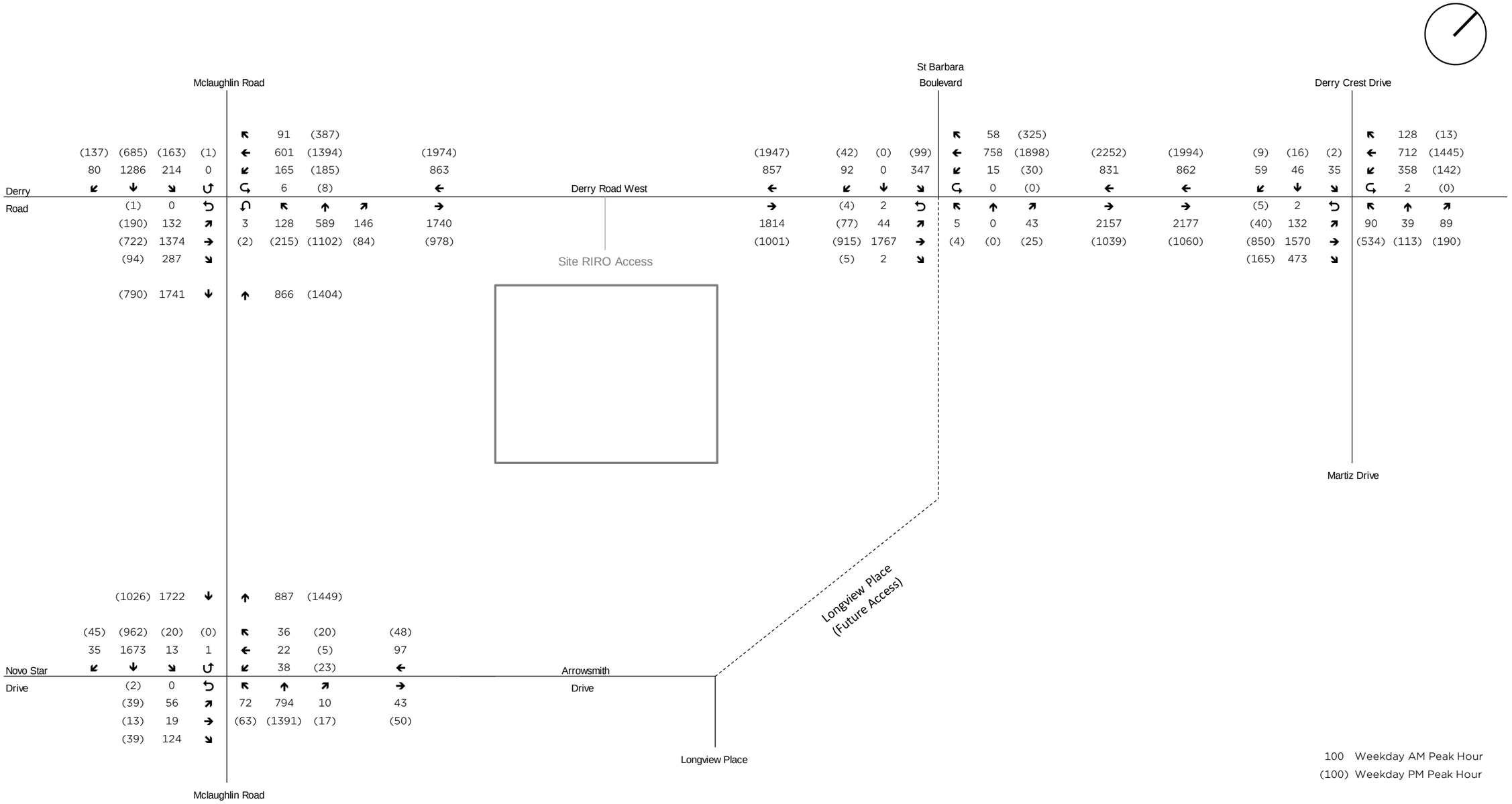
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 5: Traffic Volumes – 2023 Counts



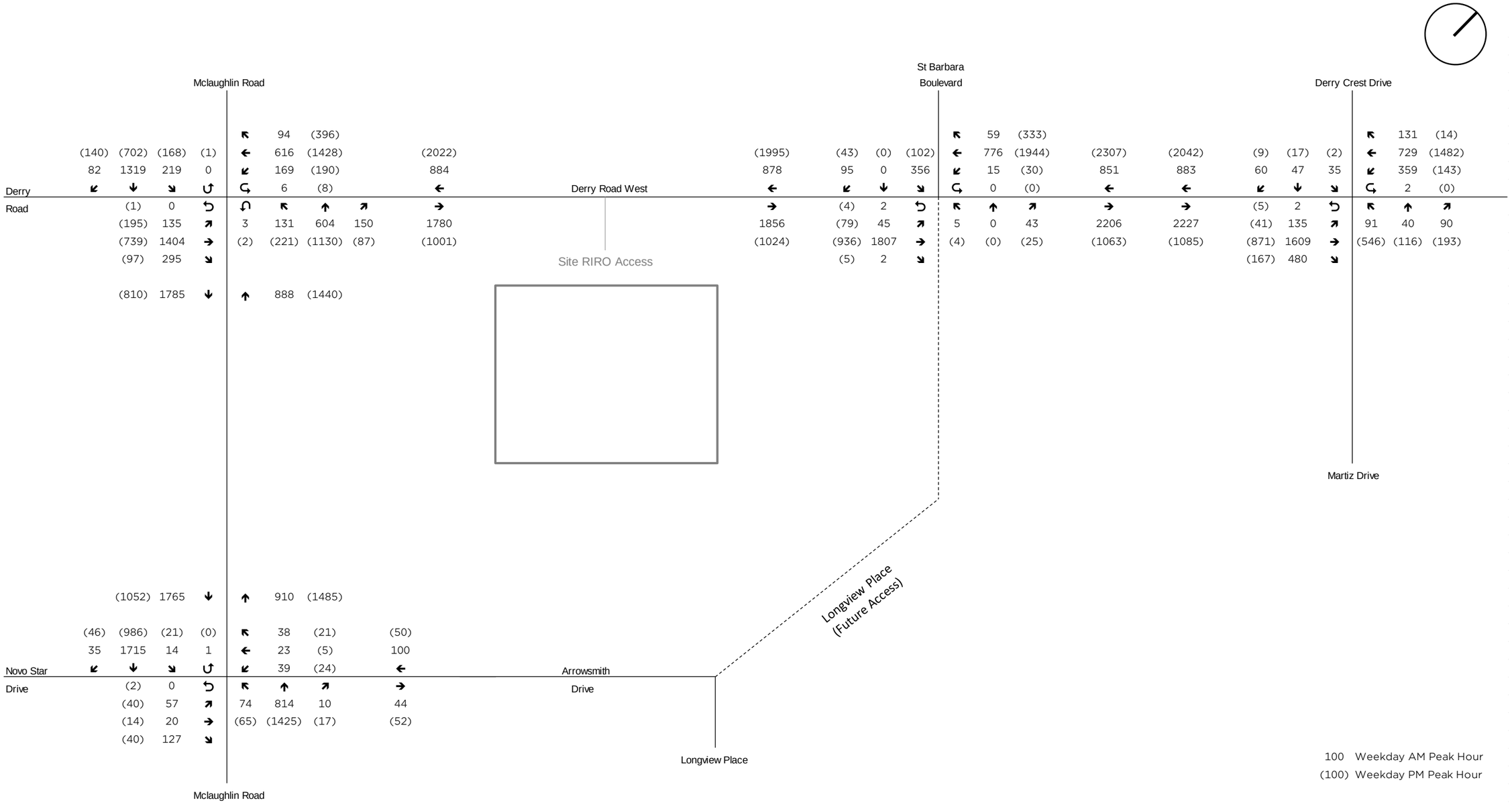
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 6: Area Developments



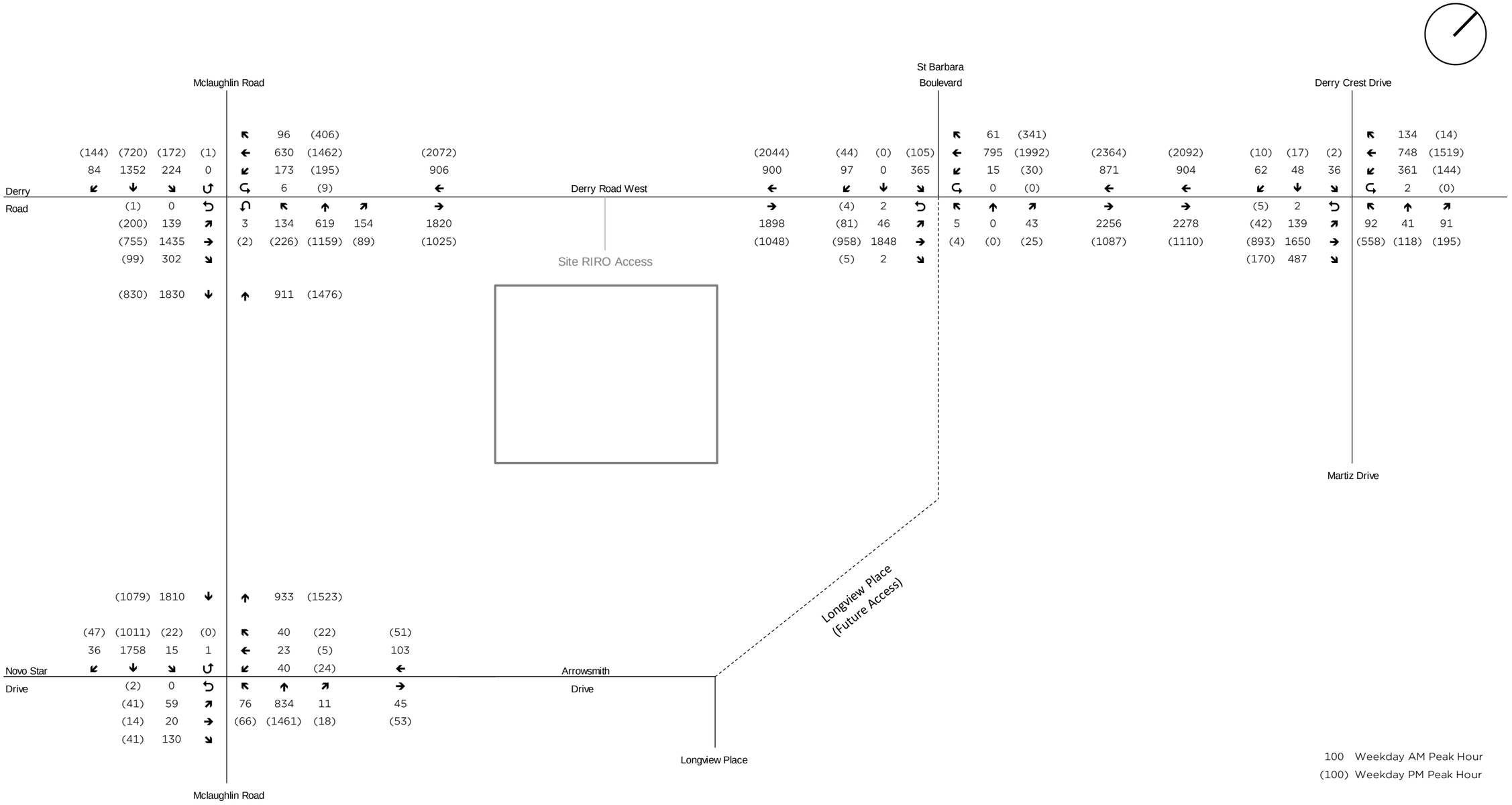
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 7: Traffic Volumes – 2026 Background



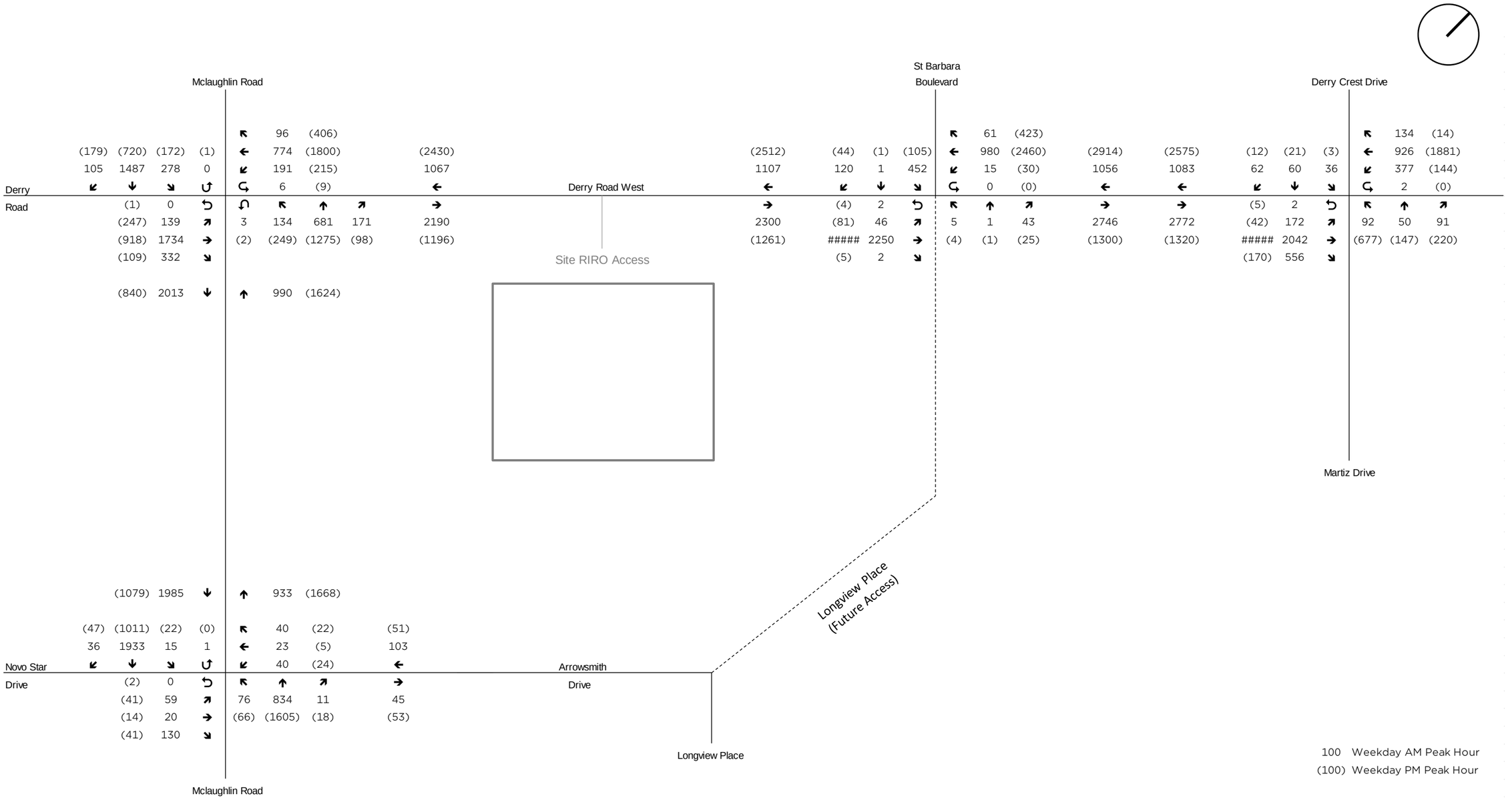
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 8: Traffic Volumes – 2031 Background



376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 9: Traffic Volumes – 2036 Background



376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 10: Traffic Volumes – 2036 Background (Pre-Pandemic)

376 & 390 DERRY ROAD WEST
PART OF LOT 10, CONCESSION 1, W.H.S.
CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

DEVELOPMENT STATISTICS - 376 & 390 DERRY ROAD W.

SITE AREAS

TOTAL SITE AREA:	2.59ha (6.40ac)
APPROXIMATE ROAD WIDENING:	0.09ha (0.22ac)
TOTAL CONDOMINIUM BLOCK AREA:	2.39ha (5.91ac)
TOTAL FREEHOLD LOT AREA:	0.11ha (0.27ac)

RESIDENTIAL CONDOMINIUM STATISTICS

AMENITY AREA REQ. (5% B2B AREA):	358m²
AMENITY AREA PROVIDED:	470m²

CONDOMINIUM UNIT TOTALS

5.5m DUAL FRONTAGE TOWNHOUSES:	13 UNITS
5.5m STREET TOWNHOUSES:	35 UNITS
6.1m BACK-TO-BACK TOWNHOUSES:	72 UNITS
TOTAL:	120 UNITS

RESIDENTIAL CONDOMINIUM PARKING STATISTICS

REQUIRED RESIDENTIAL VISITOR:	0.25 / UNIT x 120 = 30 SPACES
PROVIDED RESIDENTIAL VISITOR:	30 SPACES

COMMERCIAL STATISTICS

APPROXIMATE GFA:	374m² (4,026ft²)
REQ. PARKING (4.3-5.0 SPACES / 100m²):	16-19 SPACES
PROVIDED PARKING:	17 SPACES

RESIDENTIAL FREEHOLD STATISTICS

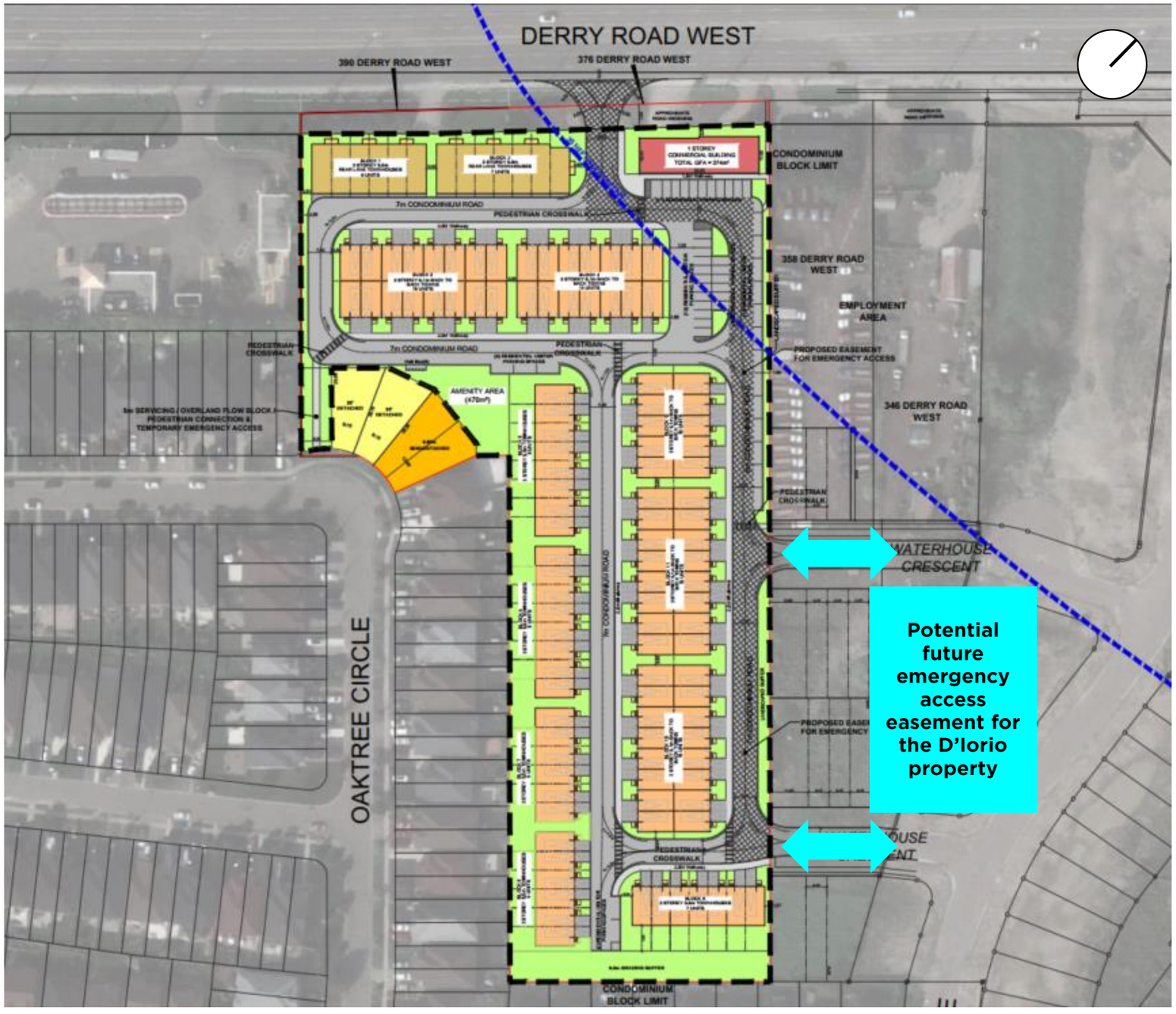
TOTAL FREEHOLD DETACHED:	2 UNIT
TOTAL FREEHOLD SEMI-DETACHED:	2 UNITS
TOTAL FREEHOLD UNITS:	**4 UNITS**

LEGEND

PROPOSED EASEMENT FOR EMERGENCY ACCESS

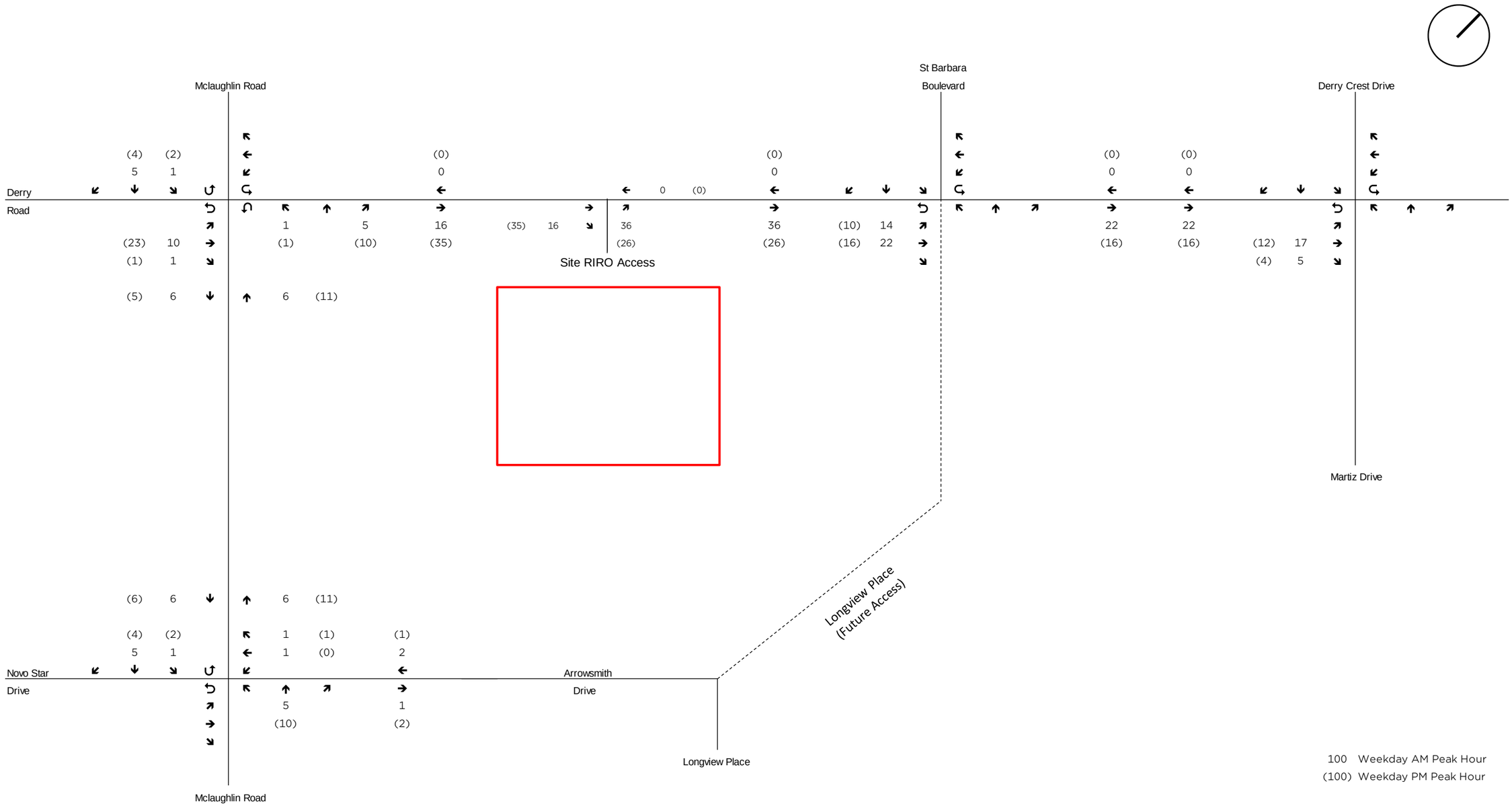
CONDOMINIUM BLOCK LIMIT

PROPERTY LIMIT



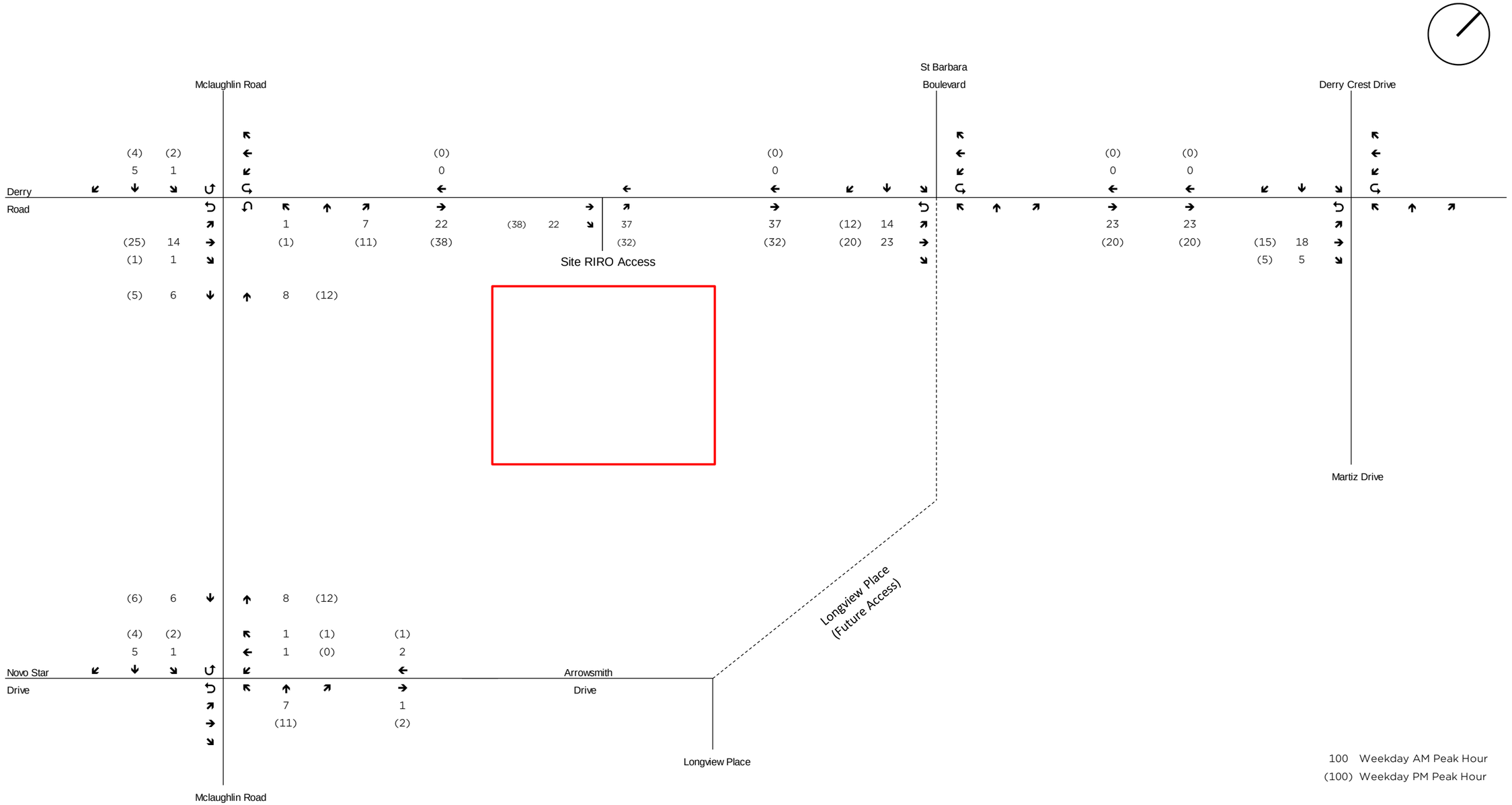
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 11: Site plan



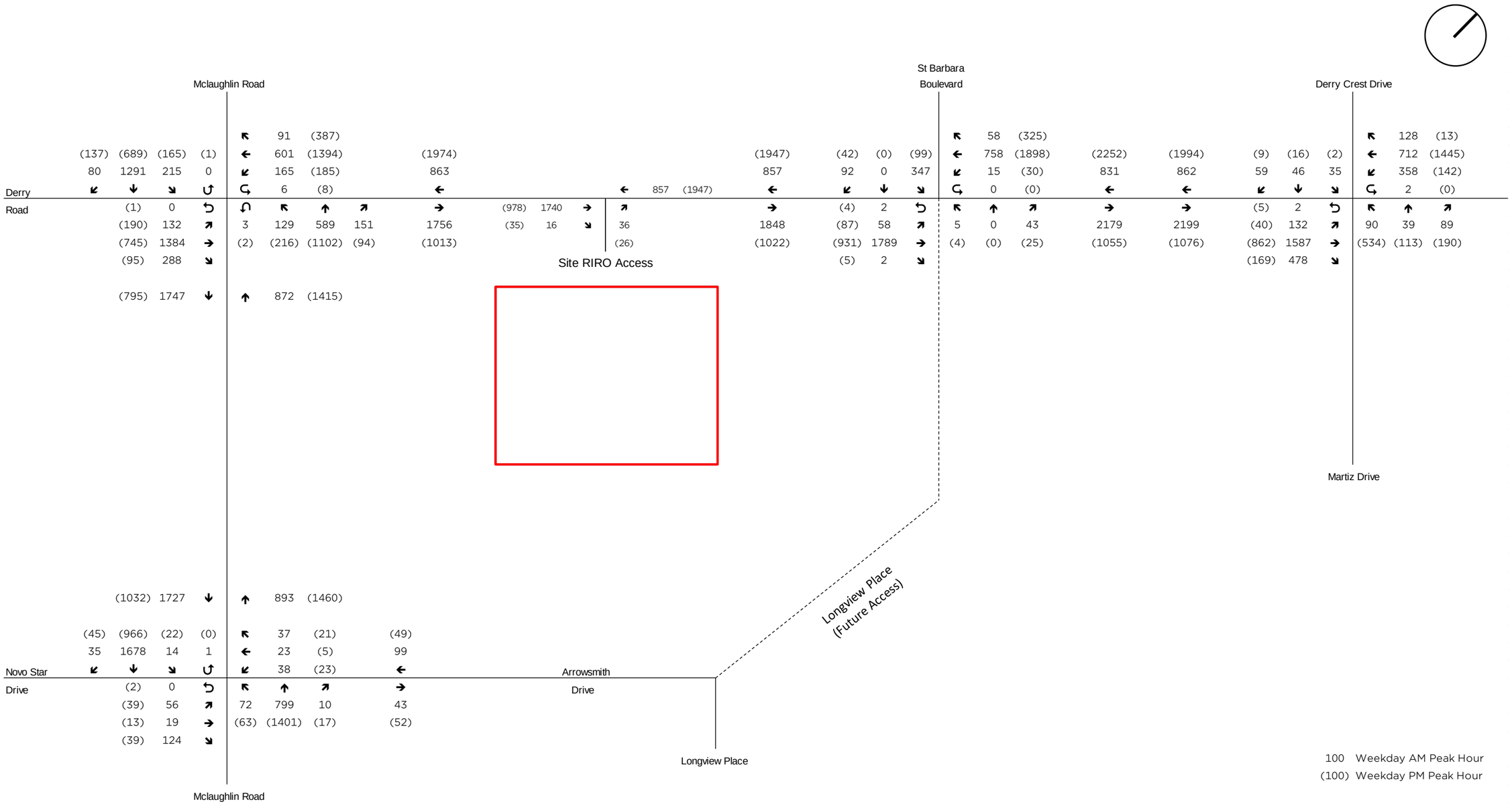
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 12: Site Traffic Volumes – Phase 1



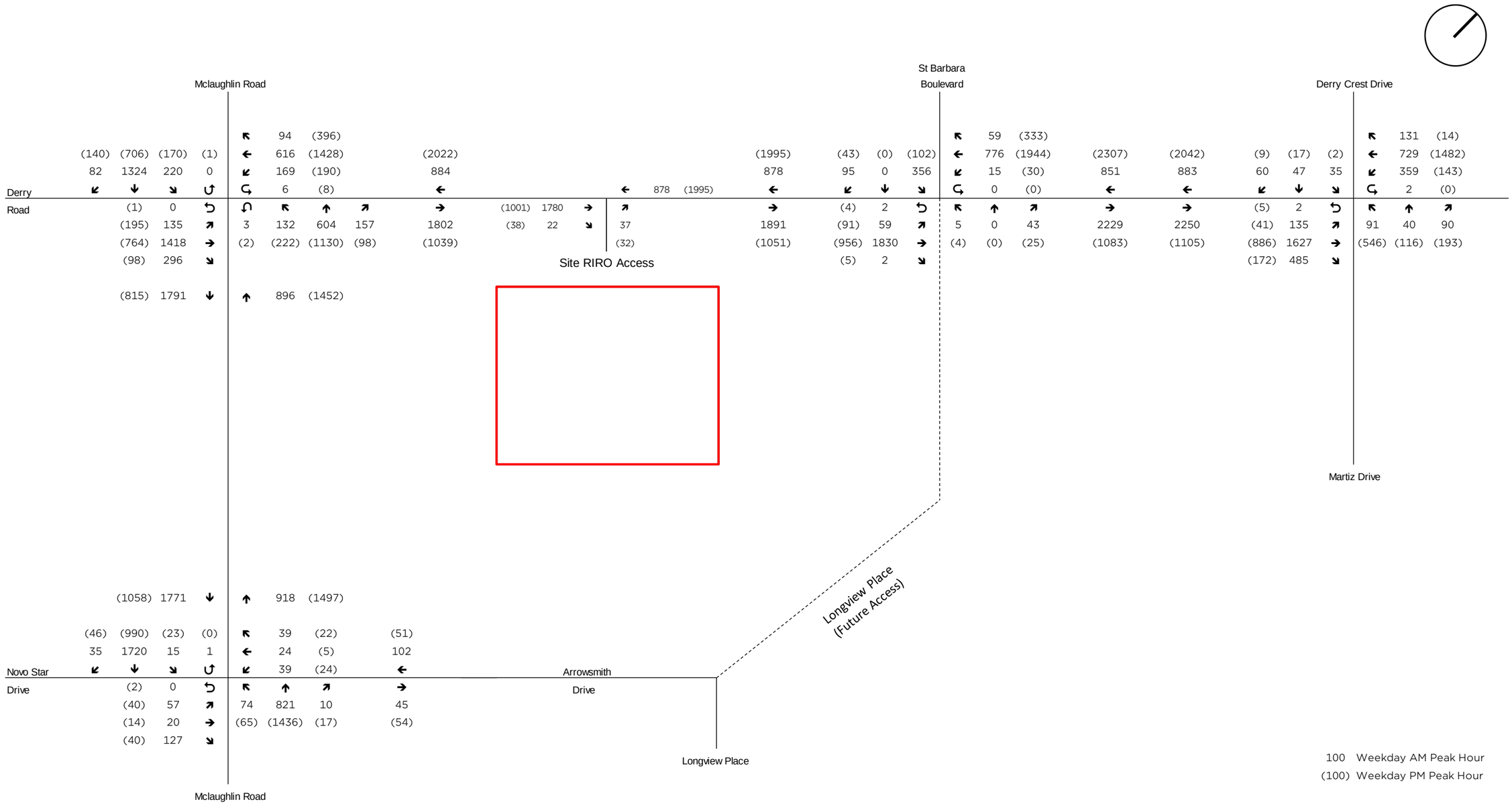
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 13: Site Traffic Volumes – Phase 2



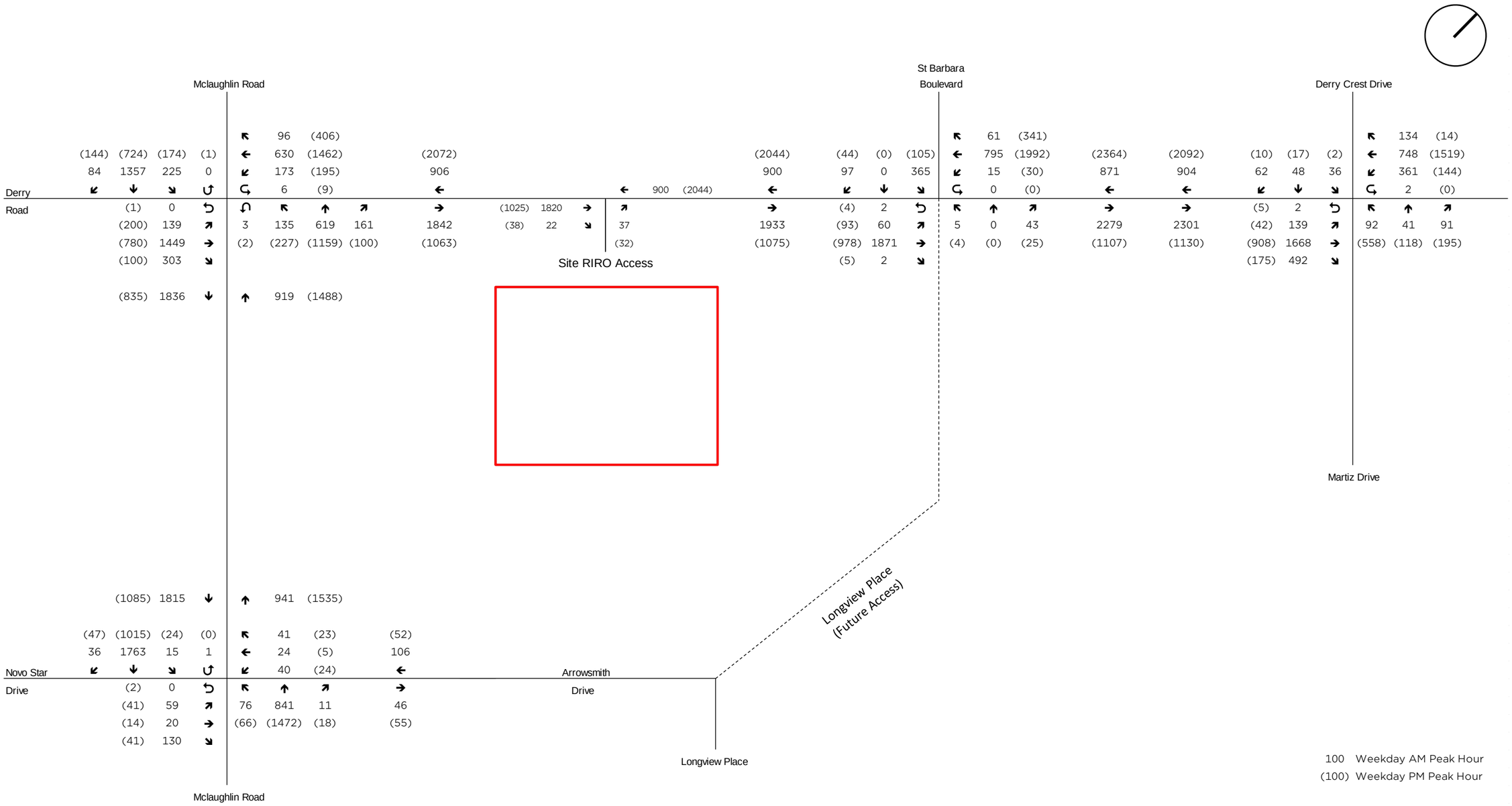
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 14: Traffic Volumes – 2026 Total



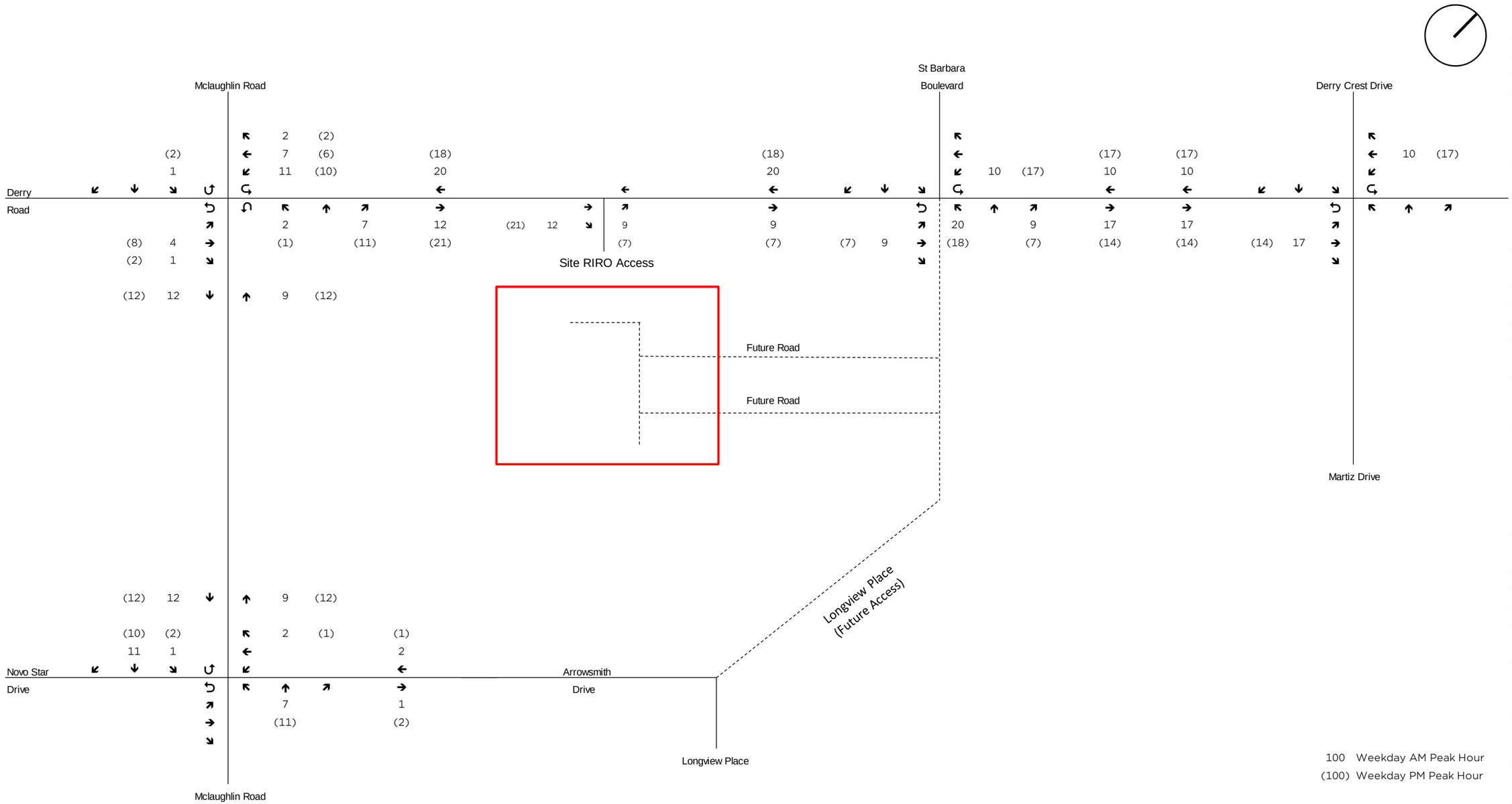
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 15: Traffic Volumes – 2031 Total



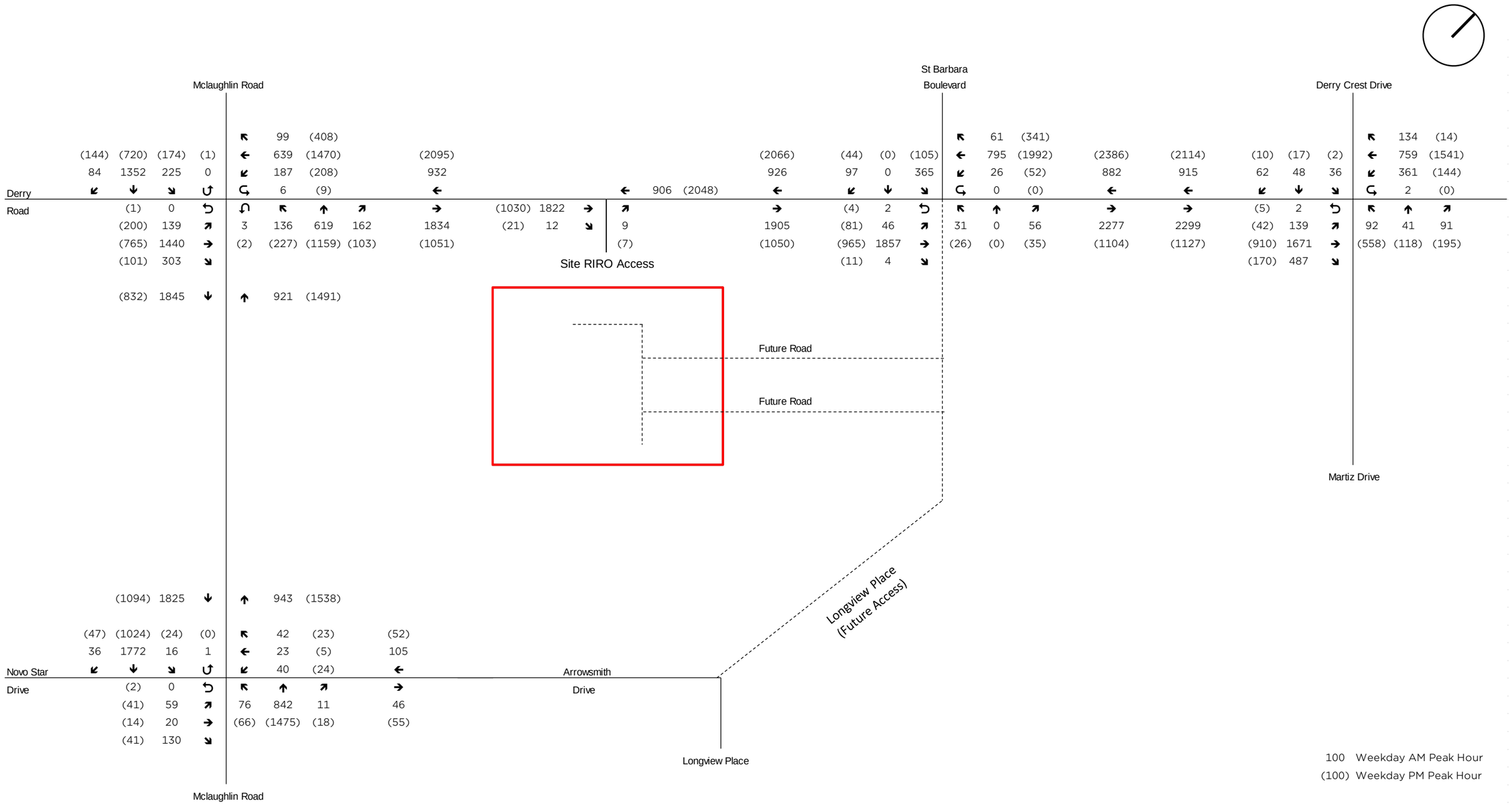
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 16: Traffic Volumes – 2036 Total



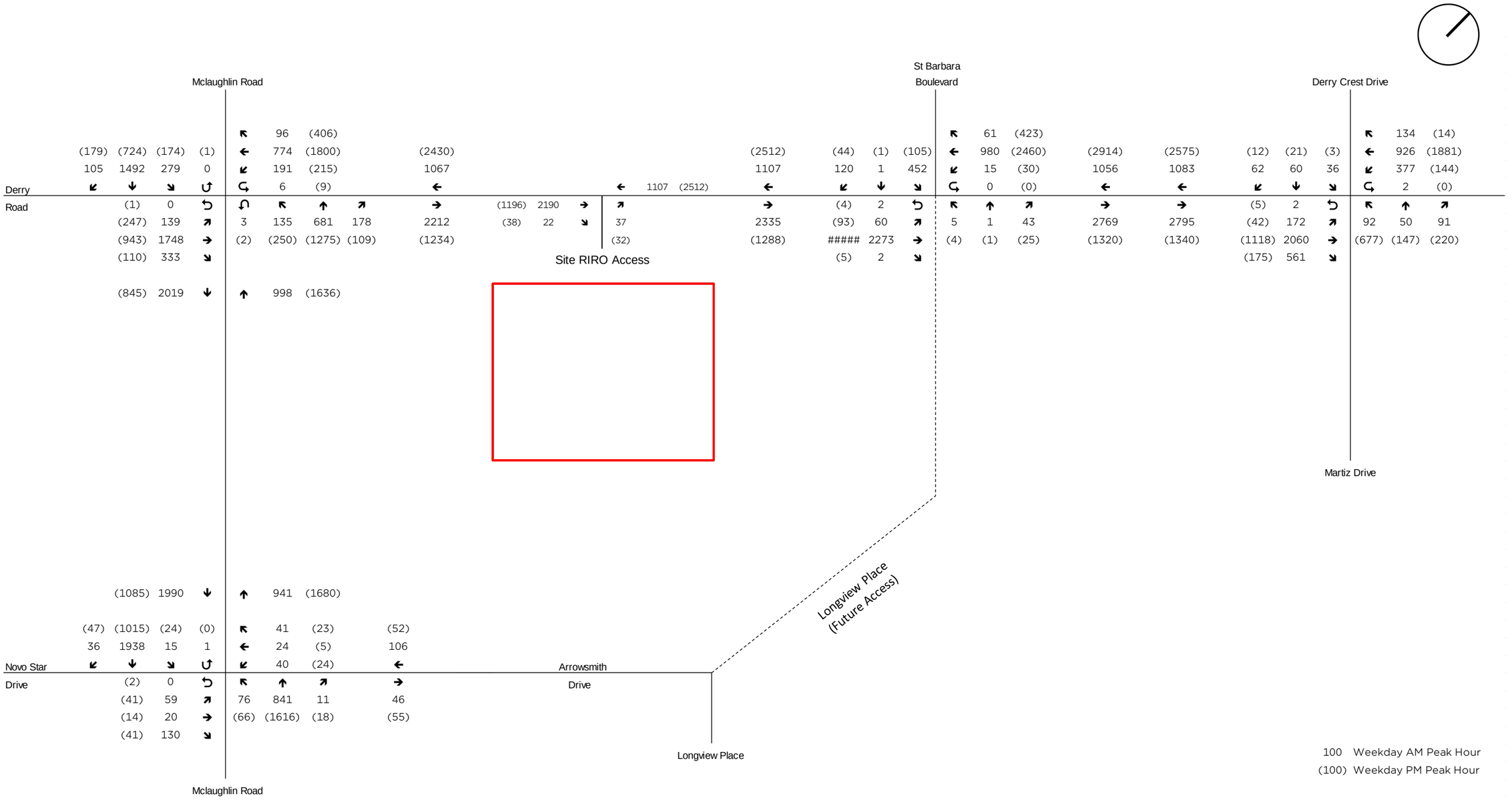
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 17: Site Traffic Volumes – Longview Place Access Sensitivity Analysis



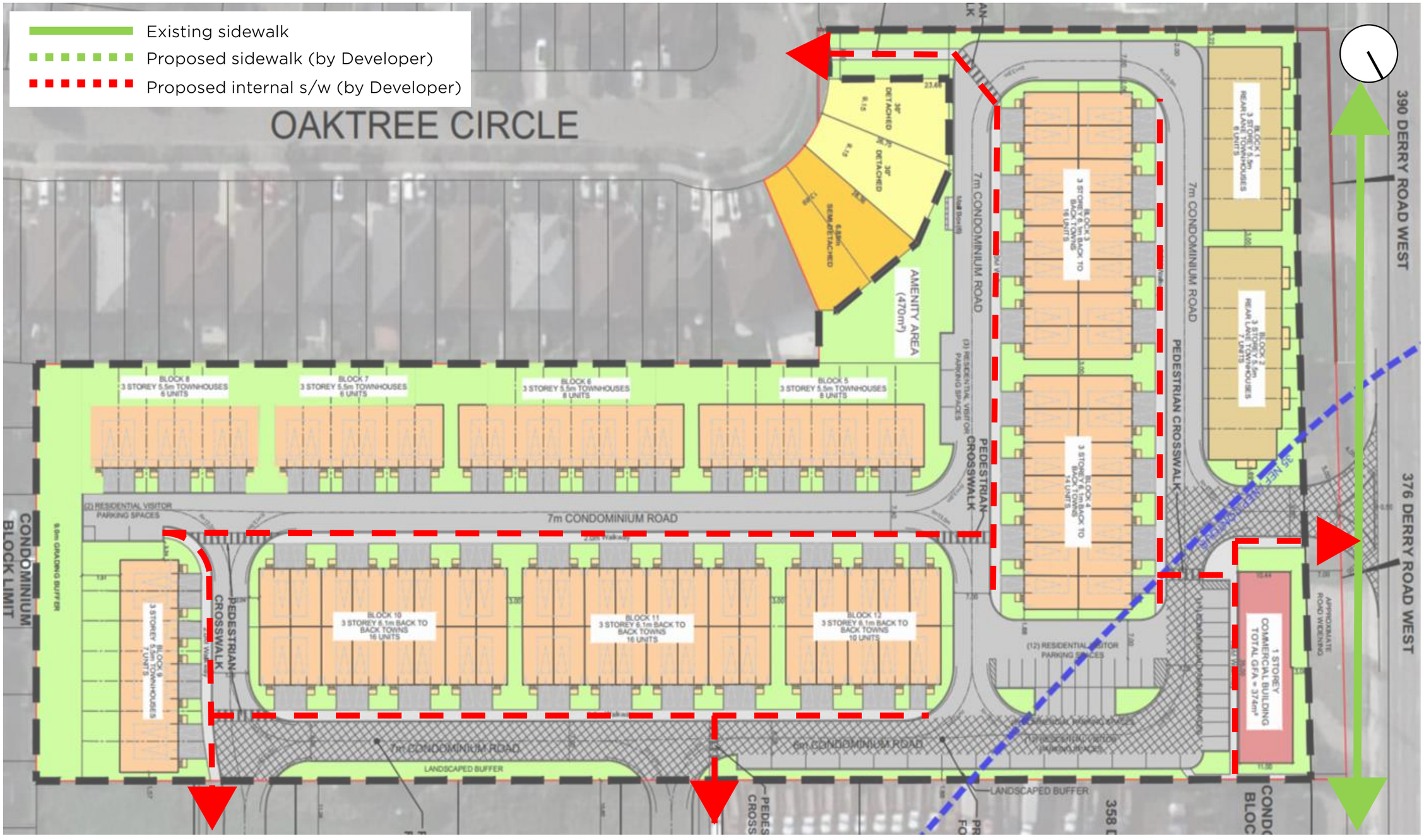
376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 18: Traffic Volumes – 2036 Total (Longview Place Access Sensitivity Analysis)



376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 19: Traffic Volumes – 2036 Total (Pre-Pandemic)



376, 390 DERRY ROAD WEST & 0 OAKTREE CIRCLE

Figure 20: Sidewalk Network

Appendix A:
Terms of Reference

Appendix B

APPROVED

Pre-Study Consultation Checklist

Description	Information	Section Reference
Development Information		
Development Description (land use, size, and number of phases of development)	• Phase 1: 120 Residential Units 115 single family attached 5 single family detached • Phase 2: Two-story Office Building (886 m2 (9,537 ft2). • Phase 3:	2.3.6
Transportation Impact Assessment		
Step 1 – Screening		
Type of Application (attach a drawing)	☒ Official Plan Amendment ☒ Zoning Amendment ☐ Site Plan Control Application ☒ Plan of Subdivision ☒ Other Plan of Condominium and Site Plan Approval	2.3.5
Screening Criteria	☒ Trip Generation Trigger Satisfied ☐ Location Trigger Satisfied ☐ Operational/Safety Trigger Satisfied	2.2.1
Type of Study	☒ Transportation Impact Study ☐ Access Review ☐ No Additional Study Required	2.2.1
Step 2 – Scoping		
Study Area (intersections to be analyzed) Note: The Transportation Consultant is responsible to identify any further intersections impacted as the study progresses.	• Derry Road / McLaughlin Road (Signalized) - Region / MTO; • Derry Road / St. Barbara Boulevard (Signalized) - Region / MTO; • Derry Road / Derry crest Drive – Martiz Drive (Signalized) - Region / MTO; and, • McLaughlin Road / Novo Star Drive – Arrowsmith Drive (Signalized) – Township. • • • • •	2.3.8

Description	Information	Section Reference
Horizon Years	☐ 5 years from date of TIS ☑ Interim years 2026,2031 and 2036 ☐ Other _____	2.3.9
Analysis Periods	☑ AM weekday peak hour of adjacent roadway ☑ PM weekday peak hour of adjacent roadway ☐ Saturday peak hour of adjacent roadway ☐ AM weekday peak hour of development ☐ PM weekday peak hour of development ☐ Saturday peak hour of development ☐ Other _____	2.3.10
Input Parameters and Assumptions (potential deviations)	• • • •	2.3.13
Existing Transportation Conditions	☑ City data sources ☑ New data collection If necessary ☐ Other _____	2.3.14
Planned Network Improvements (with timing)	• Hurontario Light Rail Transit (LRT) - Fall 2024 • McLaughlin Road corridor project - Environmental assessment •	2.3.16
Other Planned Developments (per City's Website)	• Proposed Supermarket - 7010 Saint Barbara Boulevard - New freestanding LCBO store. • ~~Residential Development - 268 & 280 Derry Road West - Registration of 28 commercial units~~ • Proposed Storage Facility - 250 Derry Road West - 6-storey self-storage facility. • • •	2.3.17
Identification of Mitigation Improvement Measures	☐ Neighbourhood Traffic Management Plan ☐ Other _____	2.3.23
Safety Analysis (any special issues)	• • • •	2.3.25
Site Access and Circulation (design vehicles)	☑ Passenger Car (P) ☑ Light Single Unit Truck (LSU) ☑ Medium Single Unit Truck (MSU) ☑ Heavy Single Unit Truck (HSU) ☑ Pumper Fire Truck ☐ WB-20 Tractor Semi-Trailer Truck ☐ Other Trash Truck	2.3.26
Impacts During Construction (any special issues)	• • • •	2.3.27

Description	Information	Section Reference
Step 3 – Forecasting		
Growth Rate	☑ Obtained from City ☑ Historical traffic counts ☐ Travel demand forecasts ☐ Proposed Growth Rate: 0.5% annual growth rate per Peel Region	2.3.15
Site Trip Generation	☑ ITE Trip Generation Manual ☐ "First Principles" ☐ Observed rates for similar developments in area ☐ Other _____	2.3.19
Trip Reductions	☐ Internal capture reductions for mixed-use developments ☐ Pass-by reductions ☐ Other _____	2.3.19
Trip Distribution	☑ Local traffic patterns ☑ TTS ☐ Travel demand model ☑ Population and employment distribution ☐ Market analysis of catchment area ☐ Other _____	2.3.20
Trip Assignment	☑ Local traffic patterns ☑ Shortest distance ☑ Site layout, access design and logical routing ☐ Existing turning movements ☐ Other _____	2.3.21
Transportation Demand Management Plan		
Format	☑ Within a TIA Report ☐ Standalone	3.2.1
Type of Transportation Demand Management Plan	☑ TDM Statement ☐ TDM Scheme	3.2.2
Pedestrian Circulation Plan		
Format	☑ Within a TIA Report ☐ Standalone	4.2.1

Additional Comments

(i) Background Developments add: 6967 Maritz Dr - Film Studio

(ii) Please include Certification Form found in Transportation Impact Study Guidelines, Appendix A: https://www.mississauga.ca/wp-content/uploads/2023/04/Mississauga-Transportation-Impact-Study-Guidelines-Version-5.1-Dec-2022.pdf

(iii) Include a section for Community Impacts. Any traffic related impacts on the existing community and comments from the public through the planning approvals process shall be addressed in this section.

(iv) Include sensitivity analysis for Longview Place road connection.

Jennifer Conners

From: Zare, Mina <mina.zare@peelregion.ca>
Sent: Tuesday, April 11, 2023 9:48 AM
To: Jennifer Conners
Cc: Hamdani, Hashim; Public Info; transprojects@mississauga.ca; ZZG-PlanningInfo; ZZG-PublicWorksCustomerService; David Perks
Subject: RE: HSR #4477229 - RE: 423394 - 376 & 390 Derry Road West - Mississauga ON - Proposed Residential/Office development - Terms of Reference

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Hi Jennifer,

The Traffic Development would like to offer the below comments with regards to the proposed Terms of Reference:

- We are satisfied with the study area scope;
- We would prefer if the traffic volume data was used from 2019 if available, to provide us with the most accurate representation for the analysis;
- We would like the analysis to include 10-year post build-out as well;
- Please ensure that any proposed access(es) must be in accordance with the Region's Road Characterization Study (RCS) and as per the Region's Controlled Access By-law 62-2013;
- A functional design(s) must also be included for our review for any recommended access configuration as well as their associated geometrics in terms of auxiliary turn lanes, etc. clearly outlined;

To obtain the required data:

- Please contact transportationplanningdata@peelregion.ca to confirm growth rates along the subject Regional road(s).
- Please contact Damian Jamroz (damian.jamroz@peelregion.ca), Supervisor of Traffic Operations to obtain the most recent TMCs and/or average annual daily traffic (AADT).
- Please contact Rebecca Caughey (rebecca.caughey@peelregion.ca), Supervisor of Traffic Signals and Streetlighting, to obtain traffic signal timing parameters and ensure that the information includes the appropriate walk/don't walk splits, recall modes and offsets.
- Please contact Development Services Planning staff to obtain details on surrounding developments in the area that would affect traffic capacity in the planning horizon year(s)

Please see the following link for further details on our **website** for the preparation of the TIS - https://www.peelregion.ca/pw/transportation/business/traffic-impact-study.asp.

A traffic impact study may be required to review a proposed access to a Regional road or anticipated traffic impact on the Regional road network. The traffic impact study shall be completed in accordance with the Region's Traffic Impact Study Guidelines (available for distribution upon request).
The following is a general terms of reference for all traffic impact studies. Not all elements listed below are required, and will be evaluated on a case-by-case basis. Formal terms of reference must be submitted to the Traffic Development Group prior to submitting a report.

Full description

The study must provide a full description of the proposed development. This includes, but is not limited to:

- Municipal address.
- Existing land uses that are permitted and use provisions in an Official Plan Amendment, Zoning By-law, etc.
- Proposed land uses.
- Floor space, including a summary of each type of use and/or number of residential units (where applicable).
- Anticipated date of occupancy.
- Approximate hour of operation.
- Planned phasing of the development.
- Nearby Regional intersections and access to adjacent developments, including type of control (signalized or unsignalized).
- Number of lanes, width and configuration:
    - The requirements for auxiliary turn lanes shall be reviewed. Adequate spacing must be provided between access points in accordance with the Region of Peel's current Controlled Access By-law, as amended. All design standards must be in accordance with those outlined in the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads and the Ministry of Transportation, Ontario (MTO) Geometric Design Standards for Ontario Highways.
- Proposed access points and type of access:
  -When determining the location of an access, consideration should be given to how the access will affect the surrounding road network, area residents and area businesses. All proposed site access points on Regional roads should be evaluated for capacity, safety and adequacy of queue storage capacity. Approval of the proposed access will be evaluated using the Region of Peel's current Controlled Access By-law, as amended and sound engineering judgement.
- Nearby transit facilities/stops.
- Bike paths.
- A combination of maps and other documentation, which will identify all relevant information.

Traffic volume analysis

A traffic volume analysis must include:

- Horizon years of 5 and 10 and 20 depending on full build-out, or as advised by Regional staff.
- AM and PM peak periods at a minimum. Commercial development requires Saturday analysis – note that the analysis of turning movement counts (TMCs) for a Saturday of a holiday weekend will not be accepted except when directed by Regional staff.
- Background, site-generated and total traffic volumes.
- "Worst case" combination of site-related and background traffic.
    - Please contact Transportation to confirm growth rates along the subject Regional road(s).
    - Please contact Traffic Operations staff to obtain the most recent TMCs and/or average annual daily traffic (AADT).
    - Please contact Traffic Signals and Systems staff to obtain traffic signal timing parameters and ensure that the information includes the appropriate walk/don't walk splits, recall modes and offsets.
    - Please contact Development Services Planning staff to obtain details on surrounding developments in the area that would affect traffic capacity in the planning horizon year(s).

Trip generation and distribution

A trip distribution and trip generation analysis must include:

- Trip generation surveys from similar developments in the Region which have similar operating characteristics as the proposed development.
- Latest edition of the Institute of Transportation Engineers (ITE) trip generation rates are acceptable (use the greater of the average rate method or the fitted line equation).
- A table summarizing your findings.
- Trip distribution assumptions must be supported by one or more of the following:
    - Transportation Tomorrow Survey
    - Origin-destination surveys
    - Comprehensive travel surveys
    - Existing/anticipated travel patterns
    - Output from the Region of Peel Travel Demand Forecasting Model

- Market studies

Capacity analysis

The report must include capacity analysis completed in Synchro (version 7.0 preferred, but version 11.0 will be accepted as per the Highway Capacity Manual (HCM) 2000 standards and not the new HCM 2010 module). Unsignalized analysis can be completed in either Synchro or CCG Intercalc (2008 version at a minimum).
The following parameters must be used in either software:

- Saturation flow rate of 1,900 vehicles per hour
- 7 metre lane width on Regional roads; and
- 5 metre lane width on the intersecting street(s) and/or access(es)

For Synchro analysis, see Regional Guidelines for Using Synchro 7.0 (PDF) for other individual parameters. For CCG Intercalc analysis, saturation adjustments should include a complete breakdown of vehicle types by percentage (based on available data) and is to be documented in a table in the report.
The analysis must also include the identification of signalized intersections, unsignalized intersections and unsignalized accesses where:

- Volume/capacity (V/C) ratios for overall intersection operations, through movements or shared through/turning movements increased to 0.90 or above.
- V/C ratios for exclusive movements that will exceed 1.00.
- 95th percentile queue lengths for individual movements and do they exceed available lane storage.

All intersections that are modelled as signalized intersections (other than existing signalized intersections) must be supported by an Ontario Traffic Manual (OTM) Book 12 traffic control signals warrant, each one required to be included in the appendix of the TIS.
If traffic control signals are found to be warranted at a particular intersection in an earlier horizon year (e.g. 5 year horizon), a warrant is not required for the subsequent horizon year (e.g. 10 year horizon). The horizon year in which a particular intersection is warranted for traffic control signals must be documented in the text of the TIS. A roundabout feasibility analysis may also be required at the direction of Regional staff.
In Synchro unsignalized intersection analysis, if an unacceptable LOS ("E" or higher) and v/c ratio results on the minor approach in existing conditions analysis, the consultant shall conduct a gap study to establish an average value for gaps accepted (in seconds) and override the resultant value for the HCM-calculated critical gap in the Signing window.
For horizon year analysis with an existing two- lane road, if the road is forecasted to be widened to four lanes by the respective horizon year, the consultant shall override the resultant value for the HCM-calculated critical gap in the Signing window by inputting recommended values for critical gap of left-turning and right-turning movements onto a four-lane road as identified in the Ministry of Transportation, Ontario (MTO) Geometric Design Standards for Ontario Highways.

Sight Distance Evaluation

A review and analysis of the sight distance availability for all proposed accesses or roads is required. The sight distance requirements must be determined based on the most current standards and guidelines used by the Region of Peel. Available sight distance should be taken from actual field measurements to ensure accurate conditions.
Assess the sightlines based on the Region of Peel's standard practice, eye height and object height of 1.05 metres and 0.38 metres above road surface, respectively. The Region requires the access to meet the following sightline requirements:

- Stopping sight distance; and
- Turning sight distance.

Sight distances must be in accordance with the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads methodology. Folded full size and to scale drawings of the sightline analysis are required for our review and comment.

Safety

Identification of potential safety or operational issues must be reviewed that are associated with:

- weaving
- merging
- corner clearances
- sight distances
- vehicle/pedestrian conflicts
- traffic infiltration
- access conflicts
- cyclist movements
- heavy truck movement conflicts

In addition, should the development be determined by Regional staff to be adjacent to a Regional intersection or road segment with significant collision history, most recent five-year collision data for the intersection(s) and/or road segment (s) must be reviewed and an assessment of the impact of the proposed development provided. Such information may be helpful to minimize any additional problems through the design or location of access points along the subject Regional road(s).

Please contact Traffic Safety staff for collision information.

Functional Design

A functional design detailing a recommended access configuration and/or proposed intersection geometrics may be required at the discretion of Regional staff.

Final Report

The following study structure is suggested:

- Site/development description
- Study area, including map
- Existing conditions – exhibit required
- Analysis periods
- Background, existing, future background and future total traffic demand – exhibit required
- Site generated traffic – exhibit required
- Improvement alternatives
- Traffic impacts for future background and total traffic with and without mitigation (tabular summaries)
- Access considerations
- Recommendations

The TIS should consist of a main document, supplemented by technical appendices containing detailed analyses as required.

The Region of Peel will require 1 copy to be in electronic format and 1 hard copy complete with the appropriate supporting documentation. This shall be submitted to the Traffic Engineering section of Public Works for our review, comment and approval.

All information submitted to Regional staff in connection with any Traffic Impact Study will be considered to be in the public domain.

Appendix

The appendix must include:

- Turning movement counts (include date counted) with breakdown of heavy vehicle counts;
- Signal timing plan(s) for signalized intersections; and
- For submissions using Synchro, generated Synchro reports showing HCM 2000 results and queuing, as well as electronic Synchro files (CD copy or sent concurrently with the TIS via email); or
- For submissions using CCG Intercalc, a CCG Intercalc summary report.

Study Updates

From the date of submission, the Traffic Impact Study will have a "shelf life" of 5 years.
Where timing of subsequent development approvals exceeds 5 years, a new study will be required at the discretion of the Region of Peel.

From <https://www.peelregion.ca/pw/transportation/business/traffic-impact-study.asp>

Warm regards,

Mina Zare, **MA, PMP**
Technical Analyst
Traffic Development & Permits , Traffic Engineering
Region of Peel
10 Peel Centre Drive Suite B, 4th Floor
Brampton, ON L6T 4B9
During this Health Emergency please contact me via email as I am out of the office working remotely.

Region of Peel
working with you

From: Jennifer Conners <jconners@tathameng.com>
Sent: April 10, 2023 3:20 PM
To: Hamdani, Hashim <hashimali.hamdani@peelregion.ca>; Public Info <Public.Info@mississauga.ca>; transprojects@mississauga.ca
Cc: ZZG-PlanningInfo <zzg-planninginfo@peelregion.ca>; ZZG-PublicWorksCustomerService <publicworkscustserv@peelregion.ca>; David Perks <dperks@tathameng.com>
Subject: RE: HSR #4477229 - RE: 423394 - 376 & 390 Derry Road West - Mississauga ON - Proposed Residential/Office development - Terms of Reference

Hello, Engineering Staff at City of Mississauga and Peel Region,

Tatham is pleased to present thisTerms of Reference for a Traffic Impact Study (TIS) in support of a proposed Residential/Office development to be located at 376 & 390 Derry Road West in the City of Mississauga, ON.
The subject site is situated in the southeast quadrant of the Derry Road and McLaughlin Road intersection in the City of Mississauga (the “City”), within the Peel Region (the “Region”).
As per the conceptual site plan (attached), the proposal includes the development of 120 residential units (115 townhouse units and 5 single residential units) and a two-story office building with a ground floor area of 886 m2 (9,537 ft2).
The development is set to be executed in two stages: Phase One will concentrate on constructing the residential units, targeted for completion by 2026, while Phase Two will prioritize the office building, with an anticipated completion date of 2031.
For parking provisions, the development is expected to offer 2 parking spaces per residential unit, 34 visitor parking spaces, and 15 parking spaces allocated for the office use.
Access and egress to this project will be provided through a right-in/right-out access to Derry Road West and individual driveways onto Oaktree Circle for 4 single residential units.

Based on review of the proposed conceptual plan, Tatham have prepared the following Term of Reference for your comment and endorsement:

PEAK HOURS AND KEY STUDY INTERSECTIONS

- Study Intersections :
    - Derry Road / McLaughlin Road (Signalized) -**Region / MTO**;
    - Derry Road / St. Barbara Boulevard (Signalized) -**Region / MTO**;
    - Derry Road / Derry crest Drive – Martiz Drive (Signalized) -**Region / MTO**; and,
    - McLaughlin Road / Novo Star Drive – Arrowsmith Drive (Signalized) –**Township.**

- Obtain / undertake weekday morning (7:00 AM – 9:00 AM) and afternoon (4:00PM – 6:00 PM) peak hours traffic turning movement counts at the above intersections.

We ask the Township/Region to kindly provide contact information of appropriate staff member for existing TMC and Signal Timing Plans (STP) data acquisition.

EXISTING CONDITION

- Assessment of existing road conditions
- Assess traffic operations and queuing analyses using Synchro 11.0 analysis package.
- Identify and document any additional deficiencies or operational problems.

FUTURE BACKGROUND VOLUME

- Develop future background traffic volumes for development site opening year (2026) , five (5)-year (2031) , and 10- year horizon (2036) using the traffic growth rate factors and additional traffic from the planned/approved developments in the proximity of the proposed development.
    - Calculate traffic growth rate from regression analysis of historic AADT / ATR / TMC counts, or calibrated travel demand forecasting, or other area transportation studies, whichever is available.
        - Based on the Peel Region's most recent Transportation Master Plan (TMP), the area is experiencing an annual growth rate of 2%.**(We ask the Township/Region to confirm this information)**
    - Traffic projections for the future extension of St Barbara Blvd at the intersection of Derry Road / St. Barbara Boulevard.
    - Assess traffic operations and queuing analyses using Synchro 11.0 analysis.
    - Identify and document any additional deficiencies or operational problems.

Future Roadway improvements and Background developments

According to the Mississauga website the following roadway improvements are located within study area:

- Hurontario Light Rail Transit (LRT) - Fall 2024
- McLaughlin Road corridor project - Environmental assessment

According to Mississauga website the following development are approved or registered and located within study area.

- Proposed Supermarket - 7010 Saint Barbara Boulevard - New freestanding LCBO store. (approved in the past 18 months)
- Residential Development - 268 & 280 Derry Road West - Registration of 28 commercial units to standard condo (registered)
- Proposed Storage Facility - 250 Derry Road West - 6-storey self-storage facility. (approved in the past 18 months)

We ask the Township/Region to confirm and provide the background development (Site Plans, Transportation Studies, Units, GFA/GLA, Planned Completion Year/Construction Phases etc.) and future roadway improvements information, that needs to be accounted for in our study.
Please advise if there is any additional project other than the listed above that should be include in our analysis.

PROPOSED DEVELOPMENT

Traffic projections and distribution

- We will forecast the trip generation characteristics of the development using the ITE Trip Generation Manual, 11th Edition.
    - A total of 66 total trips during Weekday AM and 79 total trips during Weekday PM (without transit adjustment)
- Adjusted (reduced) by a transit mode split factor determined from the TTS analyses. We will provide supporting documentation for the proposed modal split reductions for all horizon years.
- Due to the size of the proposed office building, no adjustments will be made to account for internal trips.
- The directional distribution of generated trips to and from the subject site will be determined based on 2021*Transportation Tomorrow Survey Data,* Canada census data *(Commuting Flow from Geography of Residence to Geography of Work),*TTS Dataand existing travel patterns.

Parking space review

- Check parking requirements of the proposed development using the Municipality's Zoning By-law

Design Vehicle Maneuverability

- Confirm that waste collection vehicle, emergency response vehicle, and delivery vehicle using AutoTURN can enter/exit the site, and that access to the loading areas is functional.
- Confirm that access to critical parking areas by passenger vehicles are functional.

Site access and Circulation

- Check right-turn lane warrant analysis, which will be conducted for the proposed site access onto Derry Road West, based on the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (June 2017) and the MTO Design Supplement document.
- TAC, City and Region guidelines will be reviewed to complete an access management review including reviews corner clearance, driveway spacing, auxiliary lanes, corner radii, and clear throat distance.
- Review sight lines at the main driveway in context of Region and TAC sight distance requirements.

FUTURE TOTAL VOLUME

- Develop and plot the future total traffic volumes for development site opening year, five (5)-year, and 10-year horizon; (2026, 2031 and 2036)
- Assess traffic operations and queuing analyses using Synchro 11.0 analysis package.
- Identify and document any additional deficiencies or operational problems.

Please note that an easement with the adjacent property (346&338 Derry Road W) is being planned, which aims to facilitate convenient access for residents of this project to Longview Place and at the intersection of Derry Road West and Longview Place/St. Barbara Boulevard.
The adjacent property has an intention to develop however timing of the development has yet to be confirmed. For the purpose of this study, a potential access scenario will be considered under 2036 total future condition.

TDM STATEMENT

- Review and inventory of existing transportation infrastructure/service.
- Discuss and identify potential site specific TDM opportunities.

PEDESTRIAN AND CYCLIST CIRCULATION PLAN

- Pedestrian and Cyclist Circulation Plan demonstrating how pedestrians/cyclists will travel through the site.

CONCLUSION

- Identify improvements to mitigate traffic impacts (if any).

It is important to note that this TIS will be prepared to comply with the City of Mississauga Traffic Impact Study Guidelines and will be signed and stamped by a Professional Engineer. All supporting documents will be included in the appendices of the study.
Following Mississauga guidelines, please find attached**Appendix B – Pre-study Consultation Checklist**.

Please let us know if you have any question and/or comments on the above scope and feel free to contact me to discuss any aspects of this email.
I will be pleased to provide any additional information you might require.

Regards
Jen

TATHAM ENGINEERING

Jennifer Conners
Engineering Intern

jconners@tathameng.com **T** 705-733-9037 x2078
41 King Street, Unit 4, Barrie, Ontario L4N 6B5

tathameng.com

From: ZZG-PublicWorksCustomerService <publicworkscustserv@peelregion.ca>
Sent: Thursday, April 6, 2023 12:42 PM
To: Hamdani, Hashim <hashimali.hamdani@peelregion.ca>; Public Info <Public.Info@mississauga.ca>; Jennifer Conners <jconners@tathameng.com>
Cc: ZZG-PublicWorksCustomerService <publicworkscustserv@peelregion.ca>; ZZG-PlanningInfo <zzg-planninginfo@peelregion.ca>
Subject: HSR #4477229 - RE: 423394 - 376& 390 Derry Road W in Mississauga - Proposed Mixed Use Development - Request for Traffic Impact Study Information

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Appendix B:
Turning Movement Counts

Spectrum

Turning Movement Count
Location Name: MCLAUGHLIN RD & NOVO STAR DR / ARROWSMITH DR
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Turning Movement Count (4 . MCLAUGHLIN RD & NOVO STAR DR / ARROWSMITH DR)

Start Time	N Approach MCLAUGHLIN RD						E Approach ARROWSMITH DR						S Approach MCLAUGHLIN RD						W Approach NOVO STAR DR						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	3	270	4	0	1	277	10	0	5	0	0	15	4	117	5	0	0	126	7	1	4	0	1	12	430	
07:15:00	3	273	4	0	4	280	6	3	4	0	1	13	1	119	4	0	0	124	10	1	6	0	1	17	434	
07:30:00	3	331	1	0	2	335	9	1	2	0	2	12	0	148	0	0	0	148	16	0	5	0	1	21	516	
07:45:00	6	423	6	0	3	435	29	7	5	0	3	41	1	203	16	0	0	220	26	0	13	0	1	39	735	2115
08:00:00	8	409	2	0	5	419	15	9	10	0	3	34	2	176	22	0	4	200	37	10	7	0	2	54	707	2392
08:15:00	14	447	10	1	4	472	16	6	8	0	2	30	1	204	22	0	4	227	36	6	10	0	3	52	781	2739
08:30:00	6	361	7	0	5	374	10	0	9	0	0	19	4	179	11	0	1	194	23	3	25	0	0	51	638	2861
08:45:00	7	390	7	0	2	404	6	1	7	0	0	14	1	123	6	0	1	130	18	1	8	0	3	27	575	2701
09:00:00	5	325	12	0	3	342	4	2	3	0	2	9	1	135	10	0	1	146	19	1	8	0	1	28	525	2519
09:15:00	3	239	8	0	0	250	7	0	5	0	1	12	0	136	2	0	2	138	16	0	7	0	1	23	423	2161
09:30:00	1	231	1	1	1	234	12	0	7	0	0	19	1	103	2	0	4	106	13	0	7	0	0	20	379	1902
09:45:00	4	219	5	0	0	228	8	1	2	0	0	11	4	110	2	0	2	116	10	1	3	0	2	14	369	1696
BREAK																										
16:00:00	12	187	8	0	2	207	9	1	3	0	3	13	2	291	18	0	3	311	14	3	15	0	5	32	563	
16:15:00	11	249	10	0	2	270	6	2	3	0	1	11	4	364	14	0	0	382	10	2	6	1	0	19	682	
16:30:00	10	223	7	0	0	240	10	0	5	0	3	15	3	314	13	0	1	330	12	3	14	0	2	29	614	
16:45:00	9	240	7	0	0	256	10	2	8	0	3	20	0	349	16	0	0	365	8	4	9	0	2	21	662	2521
17:00:00	14	224	15	0	2	253	13	1	3	0	2	17	3	328	19	0	3	350	8	4	9	1	3	22	642	2600
17:15:00	10	195	20	0	0	225	10	1	6	0	2	17	2	348	15	0	2	365	13	2	1	0	1	16	623	2541
17:30:00	11	191	20	0	0	222	14	1	5	0	2	20	4	346	13	1	3	364	9	1	11	0	2	21	627	2554
17:45:00	7	189	11	1	0	208	10	2	6	0	0	18	2	315	13	0	1	330	12	4	6	0	0	22	578	2470
18:00:00	12	168	10	1	4	191	10	2	10	0	3	22	3	289	20	0	1	312	13	4	6	0	1	23	548	2376
18:15:00	10	227	14	0	4	251	7	0	0	0	1	7	4	321	12	0	0	337	11	0	10	0	2	21	616	2369
18:30:00	6	183	9	0	3	198	8	0	7	0	3	15	1	274	7	0	1	282	14	3	10	0	1	27	522	2264
18:45:00	11	183	17	0	0	211	10	1	5	0	0	16	7	240	10	0	1	257	13	2	9	0	1	24	508	2194
Grand Total	186	6377	215	4	47	6782	249	43	128	0	37	420	55	5532	272	1	35	5860	368	56	209	2	36	635	**13697**	-
Approach%	2.7%	94%	3.2%	0.1%		-	59.3%	10.2%	30.5%	0%		-	0.9%	94.4%	4.6%	0%		-	58%	8.8%	32.9%	0.3%		-	**-**	-
Totals %	1.4%	46.6%	1.6%	0%		49.5%	1.8%	0.3%	0.9%	0%		3.1%	0.4%	40.4%	2%	0%		42.8%	2.7%	0.4%	1.5%	0%		4.6%	**-**	-
Heavy	8	117	6	0		-	1	2	2	0		-	1	92	7	0		-	8	3	3	0		-	**-**	-
Heavy %	4.3%	1.8%	2.8%	0%		-	0.4%	4.7%	1.6%	0%		-	1.8%	1.7%	2.6%	0%		-	2.2%	5.4%	1.4%	0%		-	**-**	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-

Spectrum

Turning Movement Count
Location Name: MCLAUGHLIN RD & NOVO STAR DR / ARROWSMITH DR
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 07:45 AM - 08:45 AM **Weather: Broken Clouds (2.32 °C)**

Start Time	N Approach MCLAUGHLIN RD						E Approach ARROWSMITH DR						S Approach MCLAUGHLIN RD						W Approach NOVO STAR DR						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	6	423	6	0	3	435	29	7	5	0	3	41	1	203	16	0	0	220	26	0	13	0	1	39	735
08:00:00	8	409	2	0	5	419	15	9	10	0	3	34	2	176	22	0	4	200	37	10	7	0	2	54	707
08:15:00	14	447	10	1	4	472	16	6	8	0	2	30	1	204	22	0	4	227	36	6	10	0	3	52	781
08:30:00	6	361	7	0	5	374	10	0	9	0	0	19	4	179	11	0	1	194	23	3	25	0	0	51	638
Grand Total	34	1640	25	1	17	1700	70	22	32	0	8	124	8	762	71	0	9	841	122	19	55	0	6	196	**2861**
Approach%	2%	96.5%	1.5%	0.1%		-	56.5%	17.7%	25.8%	0%		-	1%	90.6%	8.4%	0%		-	62.2%	9.7%	28.1%	0%		-	**-**
Totals %	1.2%	57.3%	0.9%	0%		59.4%	2.4%	0.8%	1.1%	0%		4.3%	0.3%	26.6%	2.5%	0%		29.4%	4.3%	0.7%	1.9%	0%		6.9%	**-**
PHF	0.61	0.92	0.63	0.25		0.9	0.6	0.61	0.8	0		0.76	0.5	0.93	0.81	0		0.93	0.82	0.48	0.55	0		0.91	**-**
Heavy	3	28	2	0		33	0	2	1	0		3	0	19	2	0		21	2	2	0	0		4	**-**
Heavy %	8.8%	1.7%	8%	0%		1.9%	0%	9.1%	3.1%	0%		2.4%	0%	2.5%	2.8%	0%		2.5%	1.6%	10.5%	0%	0%		2%	**-**
Lights	31	1612	23	1		1667	70	20	31	0		121	8	743	69	0		820	120	17	55	0		192	**-**
Lights %	91.2%	98.3%	92%	100%		98.1%	100%	90.9%	96.9%	0%		97.6%	100%	97.5%	97.2%	0%		97.5%	98.4%	89.5%	100%	0%		98%	**-**
Single-Unit Trucks	1	5	0	0		6	0	0	0	0		0	0	4	1	0		5	0	0	0	0		0	**-**
Single-Unit Trucks %	2.9%	0.3%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0.5%	1.4%	0%		0.6%	0%	0%	0%	0%		0%	**-**
Buses	2	21	2	0		25	0	2	1	0		3	0	15	1	0		16	2	2	0	0		4	**-**
Buses %	5.9%	1.3%	8%	0%		1.5%	0%	9.1%	3.1%	0%		2.4%	0%	2%	1.4%	0%		1.9%	1.6%	10.5%	0%	0%		2%	**-**
Articulated Trucks	0	2	0	0		2	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	**-**
Articulated Trucks %	0%	0.1%	0%	0%		0.1%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	17	-	-	-	-	-	7	-	-	-	-	-	9	-	-	-	-	-	5	-	**-**
Pedestrians%	-	-	-	-	42.5%		-	-	-	-	17.5%		-	-	-	-	22.5%		-	-	-	-	12.5%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	1	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	2.5%		-	-	-	-	0%		-	-	-	-	2.5%		**-**

Spectrum

Turning Movement Count
Location Name: MCLAUGHLIN RD & NOVO STAR DR / ARROWSMITH DR
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

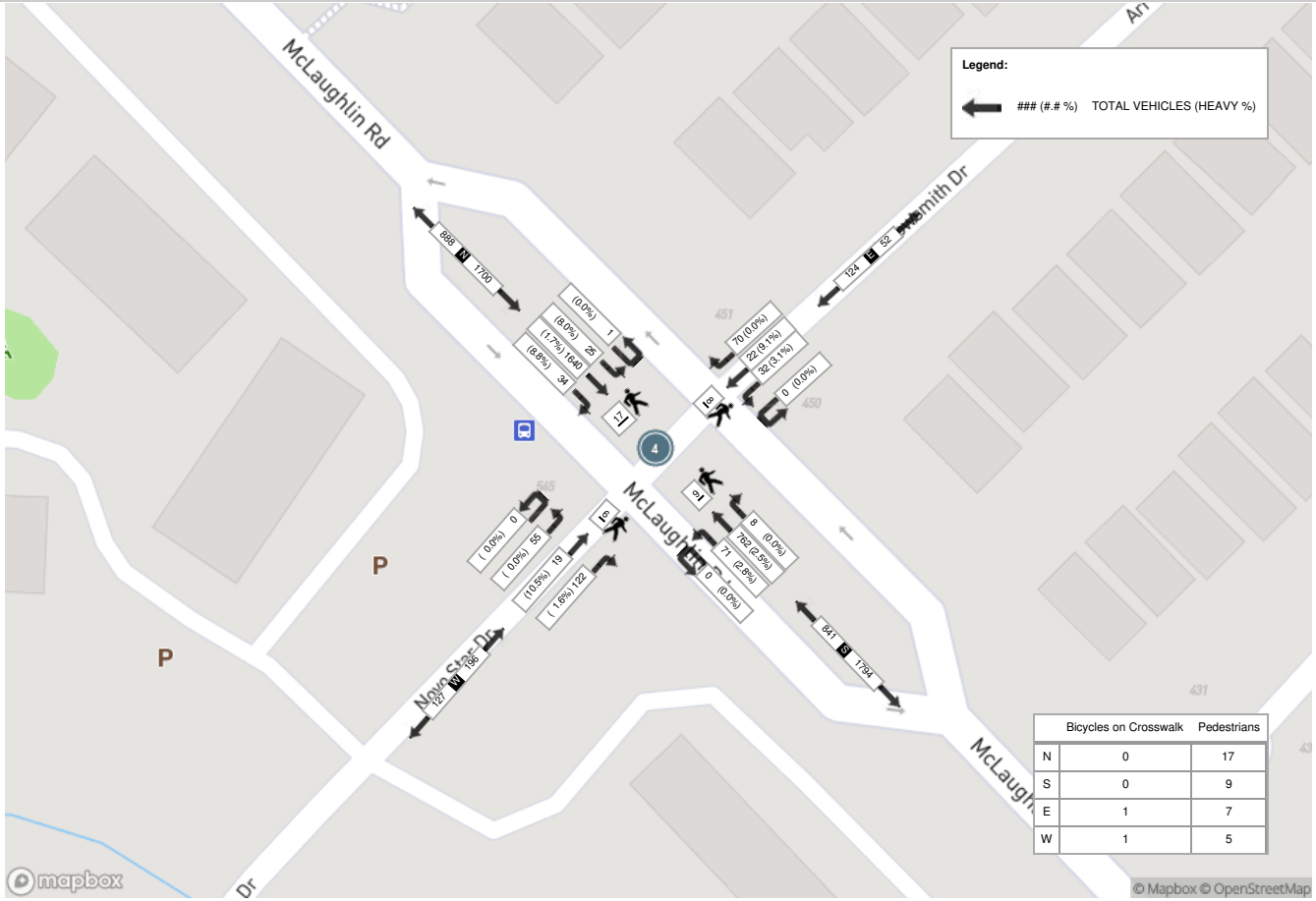
Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 04:15 PM - 05:15 PM **Weather: Light Shower Snow (3.13 °C)**

Start Time	N Approach MCLAUGHLIN RD						E Approach ARROWSMITH DR						S Approach MCLAUGHLIN RD						W Approach NOVO STAR DR						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:15:00	11	249	10	0	2	270	6	2	3	0	1	11	4	364	14	0	0	382	10	2	6	1	0	19	682
16:30:00	10	223	7	0	0	240	10	0	5	0	3	15	3	314	13	0	1	330	12	3	14	0	2	29	614
16:45:00	9	240	7	0	0	256	10	2	8	0	3	20	0	349	16	0	0	365	8	4	9	0	2	21	662
17:00:00	14	224	15	0	2	253	13	1	3	0	2	17	3	328	19	0	3	350	8	4	9	1	3	22	642
Grand Total	44	936	39	0	4	1019	39	5	19	0	9	63	10	1355	62	0	4	1427	38	13	38	2	7	91	**2600**
Approach%	4.3%	91.9%	3.8%	0%		-	61.9%	7.9%	30.2%	0%		-	0.7%	95%	4.3%	0%		-	41.8%	14.3%	41.8%	2.2%		-	**-**
Totals %	1.7%	36%	1.5%	0%		39.2%	1.5%	0.2%	0.7%	0%		2.4%	0.4%	52.1%	2.4%	0%		54.9%	1.5%	0.5%	1.5%	0.1%		3.5%	**-**
PHF	0.79	0.94	0.65	0		0.94	0.75	0.63	0.59	0		0.79	0.63	0.93	0.82	0		0.93	0.79	0.81	0.68	0.5		0.78	**-**
Heavy	0	14	0	0		14	0	0	0	0		0	0	19	1	0		20	1	0	0	0		1	**-**
Heavy %	0%	1.5%	0%	0%		1.4%	0%	0%	0%	0%		0%	0%	1.4%	1.6%	0%		1.4%	2.6%	0%	0%	0%		1.1%	**-**
Lights	44	922	39	0		1005	39	5	19	0		63	10	1336	61	0		1407	37	13	38	2		90	**-**
Lights %	100%	98.5%	100%	0%		98.6%	100%	100%	100%	0%		100%	100%	98.6%	98.4%	0%		98.6%	97.4%	100%	100%	100%		98.9%	**-**
Single-Unit Trucks	0	3	0	0		3	0	0	0	0		0	0	3	0	0		3	0	0	0	0		0	**-**
Single-Unit Trucks %	0%	0.3%	0%	0%		0.3%	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.2%	0%	0%	0%	0%		0%	**-**
Buses	0	11	0	0		11	0	0	0	0		0	0	15	1	0		16	1	0	0	0		1	**-**
Buses %	0%	1.2%	0%	0%		1.1%	0%	0%	0%	0%		0%	0%	1.1%	1.6%	0%		1.1%	2.6%	0%	0%	0%		1.1%	**-**
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.1%	0%	0%		0.1%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	4	-	-	-	-	-	9	-	-	-	-	-	4	-	-	-	-	-	7	-	**-**
Pedestrians%	-	-	-	-	16.7%		-	-	-	-	37.5%		-	-	-	-	16.7%		-	-	-	-	29.2%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 07:45 AM - 08:45 AM **Weather: Broken Clouds (2.32 °C)**



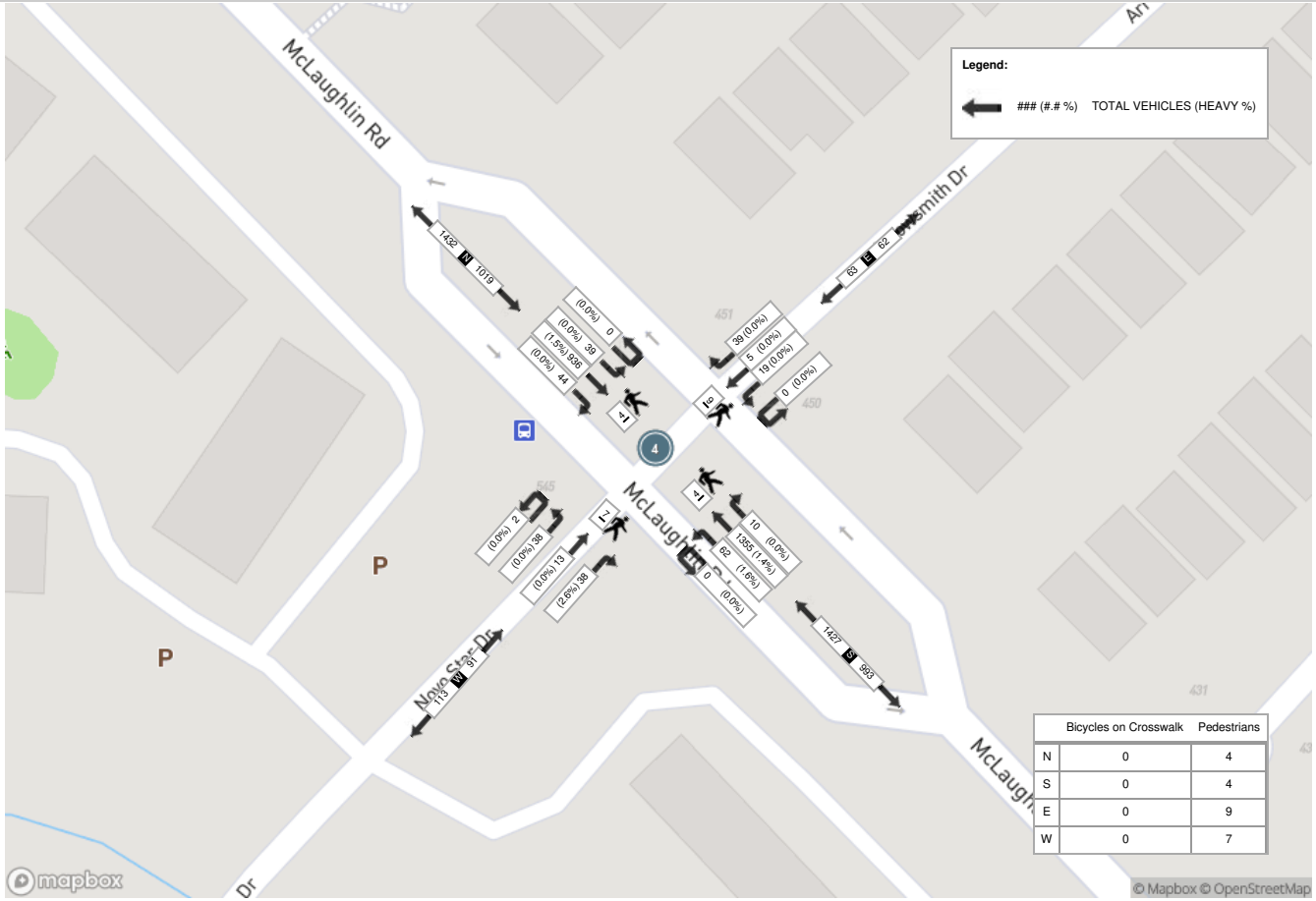
	Bicycles on Crosswalk	Pedestrians
N	0	17
S	0	9
E	1	7
W	1	5

Spectrum

Turning Movement Count
Location Name: MCLAUGHLIN RD & NOVO STAR DR / ARROWSMITH DR
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 04:15 PM - 05:15 PM **Weather: Light Shower Snow (3.13 °C)**



Spectrum

Turning Movement Count
Location Name: DERRY RD & DERRY CREST DR / MARTIZ DR
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Turning Movement Count (3 . DERRY RD & DERRY CREST DR / MARTIZ DR) CustID: 00511162 MioID:

Start Time	N Approach DERRYCREST DR						E Approach DERRY RD						S Approach MARITZ DR						W Approach DERRY RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	7	1	3	0	0	11	9	132	9	1	0	151	15	2	17	0	1	34	35	290	6	0	0	331	527	
07:15:00	5	3	5	0	0	13	13	125	15	0	0	153	7	2	10	0	0	19	39	354	16	1	2	410	595	
07:30:00	10	3	8	0	2	21	16	142	16	0	0	174	7	6	8	0	0	21	58	383	14	0	1	455	671	
07:45:00	16	9	3	0	0	28	25	174	20	0	0	219	8	8	11	0	1	27	82	417	24	2	0	525	799	2592
08:00:00	12	15	14	0	2	41	21	173	13	1	1	208	4	10	11	0	0	25	63	351	28	0	2	442	716	2781
08:15:00	15	12	10	0	0	37	39	167	11	1	4	218	12	13	16	0	3	41	65	340	40	0	1	445	741	2927
08:30:00	15	9	7	0	3	31	41	184	17	0	0	242	9	7	13	0	1	29	59	425	38	0	2	522	824	3080
08:45:00	13	10	7	0	2	30	43	165	24	0	1	232	3	20	23	0	0	46	58	325	37	1	3	421	729	3010
09:00:00	7	6	8	0	1	21	28	146	23	3	4	200	7	8	17	0	4	32	50	302	34	1	2	387	640	2934
09:15:00	8	3	0	0	1	11	21	141	23	0	0	185	10	3	17	0	0	30	34	268	9	0	1	311	537	2730
09:30:00	11	0	6	0	1	17	6	112	12	0	0	130	8	1	17	0	0	26	32	206	8	2	1	248	421	2327
09:45:00	4	3	7	0	3	14	15	148	14	1	1	178	11	7	9	0	1	27	27	232	7	0	0	266	485	2083
BREAK																										
16:00:00	49	12	13	0	4	74	2	329	10	0	0	341	37	21	105	0	0	163	25	165	2	0	1	192	770	
16:15:00	39	3	9	0	2	51	4	344	9	0	1	357	40	16	110	0	1	166	24	174	9	2	0	209	783	
16:30:00	51	11	9	0	1	71	5	347	7	0	3	359	32	14	94	0	4	140	18	197	12	0	1	227	797	
16:45:00	64	20	11	0	2	95	4	352	9	0	1	365	29	35	118	0	3	182	25	194	15	1	0	235	877	3227
17:00:00	76	16	35	0	2	127	6	368	7	0	0	381	25	36	106	0	1	167	21	211	5	0	1	237	912	3369
17:15:00	41	8	19	0	2	68	0	311	2	0	0	313	20	18	125	0	1	163	16	189	13	3	1	221	765	3351
17:30:00	37	7	6	0	0	50	3	383	7	0	0	393	21	22	115	0	4	158	23	227	6	1	0	257	858	3412
17:45:00	31	11	7	0	2	49	5	365	9	0	0	379	25	5	92	0	0	122	22	201	9	0	1	232	782	3317
18:00:00	17	4	7	0	3	28	5	313	1	0	0	319	22	2	92	0	1	116	14	191	9	2	3	216	679	3084
18:15:00	23	3	8	0	7	34	2	406	5	0	4	413	16	5	61	0	1	82	24	210	4	1	6	239	768	3087
18:30:00	12	3	5	0	0	20	1	353	6	0	1	360	11	4	41	0	0	56	8	187	4	1	0	200	636	2865
18:45:00	8	1	4	0	0	13	0	244	3	2	3	249	10	1	44	0	0	55	16	176	5	1	0	198	515	2598
Grand Total	571	173	211	0	40	955	314	5924	272	9	24	6519	389	266	1272	0	27	1927	838	6215	354	19	29	7426	**16827**	-
Approach%	59.8%	18.1%	22.1%	0%		-	4.8%	90.9%	4.2%	0.1%		-	20.2%	13.8%	66%	0%		-	11.3%	83.7%	4.8%	0.3%		-	-	-
Totals %	3.4%	1%	1.3%	0%		5.7%	1.9%	35.2%	1.6%	0.1%		38.7%	2.3%	1.6%	7.6%	0%		11.5%	5%	36.9%	2.1%	0.1%		44.1%	-	-
Heavy	6	2	4	0		-	8	313	55	0		-	64	3	40	0		-	26	326	1	0		-	-	-
Heavy %	1.1%	1.2%	1.9%	0%		-	2.5%	5.3%	20.2%	0%		-	16.5%	1.1%	3.1%	0%		-	3.1%	5.2%	0.3%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: DERRY RD & DERRY CREST DR / MARTIZ DR
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 07:45 AM - 08:45 AM Weather: Broken Clouds (2.32 °C)

Start Time	N Approach DERRYCREST DR						E Approach DERRY RD						S Approach MARITZ DR						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	16	9	3	0	0	28	25	174	20	0	0	219	8	8	11	0	1	27	82	417	24	2	0	525	799
08:00:00	12	15	14	0	2	41	21	173	13	1	1	208	4	10	11	0	0	25	63	351	28	0	2	442	716
08:15:00	15	12	10	0	0	37	39	167	11	1	4	218	12	13	16	0	3	41	65	340	40	0	1	445	741
08:30:00	15	9	7	0	3	31	41	184	17	0	0	242	9	7	13	0	1	29	59	425	38	0	2	522	824
Grand Total	58	45	34	0	5	137	126	698	61	2	5	887	33	38	51	0	5	122	269	1533	130	2	5	1934	**3080**
Approach%	42.3%	32.8%	24.8%	0%		-	14.2%	78.7%	6.9%	0.2%		-	27%	31.1%	41.8%	0%		-	13.9%	79.3%	6.7%	0.1%		-	**-**
Totals %	1.9%	1.5%	1.1%	0%		4.4%	4.1%	22.7%	2%	0.1%		28.8%	1.1%	1.2%	1.7%	0%		4%	8.7%	49.8%	4.2%	0.1%		62.8%	**-**
PHF	0.91	0.75	0.61	0		0.84	0.77	0.95	0.76	0.5		0.92	0.69	0.73	0.8	0		0.74	0.82	0.9	0.81	0.25		0.92	**-**
Heavy	1	0	1	0		2	2	68	17	0		87	12	1	3	0		16	5	47	1	0		53	**-**
Heavy %	1.7%	0%	2.9%	0%		1.5%	1.6%	9.7%	27.9%	0%		9.8%	36.4%	2.6%	5.9%	0%		13.1%	1.9%	3.1%	0.8%	0%		2.7%	**-**
Lights	57	45	33	0		135	124	630	44	2		800	21	37	48	0		106	264	1486	129	2		1881	**-**
Lights %	98.3%	100%	97.1%	0%		98.5%	98.4%	90.3%	72.1%	100%		90.2%	63.6%	97.4%	94.1%	0%		86.9%	98.1%	96.9%	99.2%	100%		97.3%	**-**
Single-Unit Trucks	1	0	1	0		2	2	30	11	0		43	4	1	2	0		7	5	11	1	0		17	**-**
Single-Unit Trucks %	1.7%	0%	2.9%	0%		1.5%	1.6%	4.3%	18%	0%		4.8%	12.1%	2.6%	3.9%	0%		5.7%	1.9%	0.7%	0.8%	0%		0.9%	**-**
Buses	0	0	0	0		0	0	16	0	0		16	0	0	0	0		0	0	22	0	0		22	**-**
Buses %	0%	0%	0%	0%		0%	0%	2.3%	0%	0%		1.8%	0%	0%	0%	0%		0%	0%	1.4%	0%	0%		1.1%	**-**
Articulated Trucks	0	0	0	0		0	0	22	6	0		28	8	0	1	0		9	0	14	0	0		14	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	3.2%	9.8%	0%		3.2%	24.2%	0%	2%	0%		7.4%	0%	0.9%	0%	0%		0.7%	**-**
Pedestrians	-	-	-	-	5	-	-	-	-	-	5	-	-	-	-	-	5	-	-	-	-	-	5	-	**-**
Pedestrians%	-	-	-	-	25%		-	-	-	-	25%		-	-	-	-	25%		-	-	-	-	25%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

Spectrum

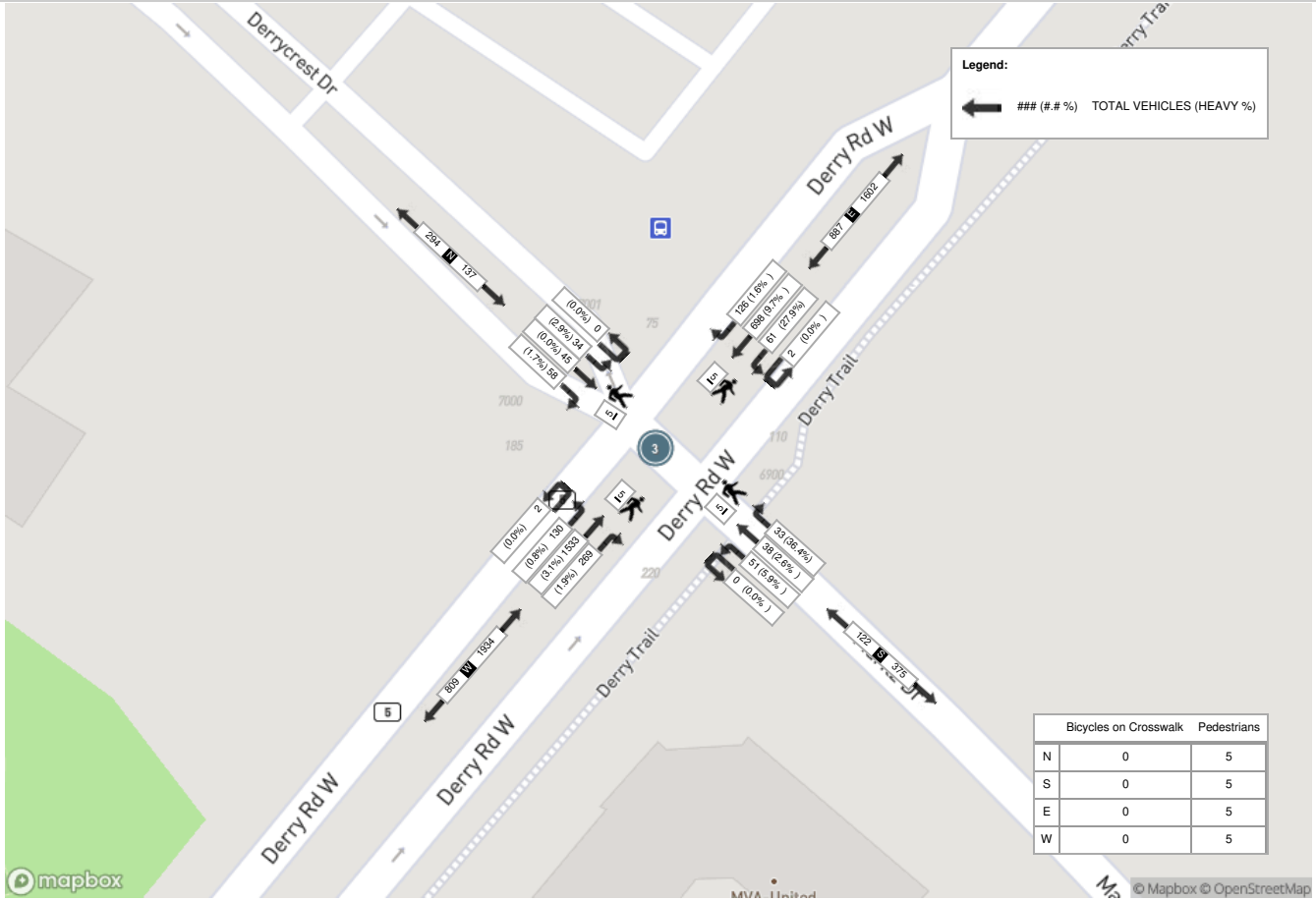
Turning Movement Count
Location Name: DERRY RD & DERRY CREST DR / MARTIZ DR
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 04:45 PM - 05:45 PM Weather: Light Shower Snow (3.13 °C)

Start Time	N Approach DERRYCREST DR						E Approach DERRY RD						S Approach MARITZ DR						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	64	20	11	0	2	95	4	352	9	0	1	365	29	35	118	0	3	182	25	194	15	1	0	235	877
17:00:00	76	16	35	0	2	127	6	368	7	0	0	381	25	36	106	0	1	167	21	211	5	0	1	237	912
17:15:00	41	8	19	0	2	68	0	311	2	0	0	313	20	18	125	0	1	163	16	189	13	3	1	221	765
17:30:00	37	7	6	0	0	50	3	383	7	0	0	393	21	22	115	0	4	158	23	227	6	1	0	257	858
Grand Total	218	51	71	0	6	340	13	1414	25	0	1	1452	95	111	464	0	9	670	85	821	39	5	2	950	**3412**
Approach%	64.1%	15%	20.9%	0%		-	0.9%	97.4%	1.7%	0%		-	14.2%	16.6%	69.3%	0%		-	8.9%	86.4%	4.1%	0.5%		-	**-**
Totals %	6.4%	1.5%	2.1%	0%		10%	0.4%	41.4%	0.7%	0%		42.6%	2.8%	3.3%	13.6%	0%		19.6%	2.5%	24.1%	1.1%	0.1%		27.8%	**-**
PHF	0.72	0.64	0.51	0		0.67	0.54	0.92	0.69	0		0.92	0.82	0.77	0.93	0		0.92	0.85	0.9	0.65	0.42		0.92	**-**
Heavy	2	0	0	0		2	1	33	3	0		37	7	0	12	0		19	7	54	0	0		61	**-**
Heavy %	0.9%	0%	0%	0%		0.6%	7.7%	2.3%	12%	0%		2.5%	7.4%	0%	2.6%	0%		2.8%	8.2%	6.6%	0%	0%		6.4%	**-**
Lights	216	51	71	0		338	12	1381	22	0		1415	88	111	452	0		651	78	767	39	5		889	**-**
Lights %	99.1%	100%	100%	0%		99.4%	92.3%	97.7%	88%	0%		97.5%	92.6%	100%	97.4%	0%		97.2%	91.8%	93.4%	100%	100%		93.6%	**-**
Single-Unit Trucks	2	0	0	0		2	0	9	2	0		11	3	0	10	0		13	3	19	0	0		22	**-**
Single-Unit Trucks %	0.9%	0%	0%	0%		0.6%	0%	0.6%	8%	0%		0.8%	3.2%	0%	2.2%	0%		1.9%	3.5%	2.3%	0%	0%		2.3%	**-**
Buses	0	0	0	0		0	0	9	0	0		9	0	0	0	0		0	0	14	0	0		14	**-**
Buses %	0%	0%	0%	0%		0%	0%	0.6%	0%	0%		0.6%	0%	0%	0%	0%		0%	0%	1.7%	0%	0%		1.5%	**-**
Articulated Trucks	0	0	0	0		0	1	15	1	0		17	4	0	2	0		6	4	21	0	0		25	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	7.7%	1.1%	4%	0%		1.2%	4.2%	0%	0.4%	0%		0.9%	4.7%	2.6%	0%	0%		2.6%	**-**
Pedestrians	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	9	-	-	-	-	-	2	-	**-**
Pedestrians%	-	-	-	-	22.2%		-	-	-	-	5.6%		-	-	-	-	50%		-	-	-	-	11.1%		**-**
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	11.1%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

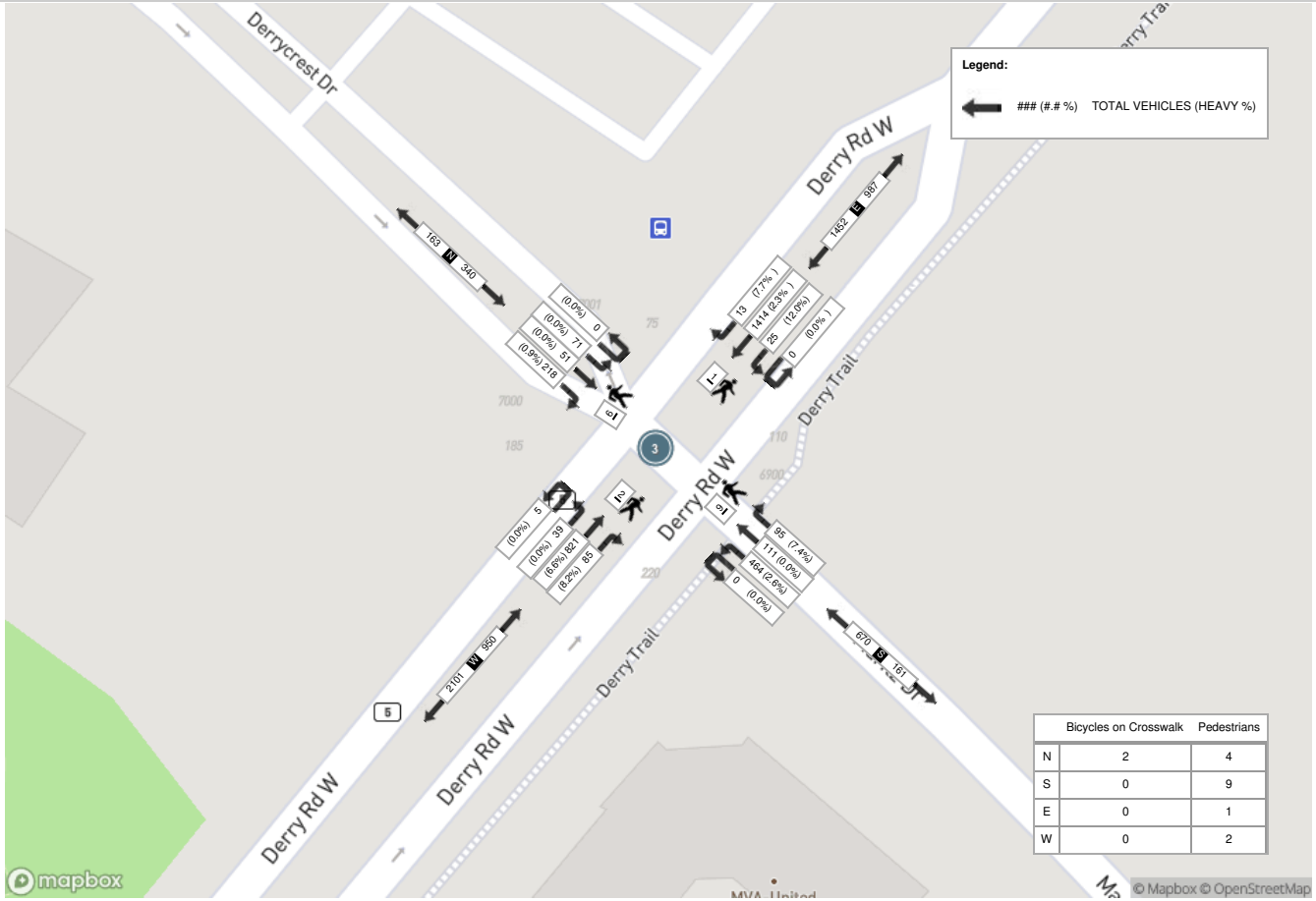
Peak Hour: 07:45 AM - 08:45 AM **Weather: Broken Clouds (2.32 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	5
S	0	5
E	0	5
W	0	5

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 04:45 PM - 05:45 PM **Weather: Light Shower Snow (3.13 °C)**



	Bicycles on Crosswalk	Pedestrians
N	2	4
S	0	9
E	0	1
W	0	2

Spectrum

Turning Movement Count
Location Name: DERRY RD & MCLAUGHLIN RD
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Turning Movement Count (1 . DERRY RD & MCLAUGHLIN RD) CustID: 00512198 MioID:

Start Time	N Approach MCLAUGHLIN RD						E Approach DERRY RD						S Approach MCLAUGHLIN RD						W Approach DERRY RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	25	225	63	0	3	313	23	105	14	0	6	142	29	86	15	0	6	130	36	222	22	0	9	280	865	
07:15:00	20	243	64	0	10	327	16	111	21	1	2	149	18	95	21	0	6	134	37	245	27	0	7	309	919	
07:30:00	30	253	72	0	16	355	19	131	18	0	6	168	30	94	16	1	6	141	45	359	35	1	11	440	1104	
07:45:00	16	345	45	0	8	406	18	139	47	2	6	206	49	157	27	1	4	234	64	261	32	0	10	357	1203	4091
08:00:00	21	289	53	0	18	363	16	129	47	0	2	192	29	120	33	1	4	183	78	324	40	0	8	442	1180	4406
08:15:00	19	333	44	0	13	396	34	133	38	1	5	206	32	163	30	1	9	226	80	297	30	0	3	407	1235	4722
08:30:00	23	300	68	0	7	391	21	158	34	3	3	216	48	140	36	0	4	224	61	286	28	0	12	375	1206	4824
08:45:00	31	281	53	0	6	365	22	149	46	1	1	218	35	82	15	0	4	132	64	306	33	0	11	403	1118	4739
09:00:00	26	242	87	0	7	355	19	106	38	0	4	163	16	106	16	0	3	138	57	216	37	2	12	312	968	4527
09:15:00	28	199	52	0	10	279	24	87	33	2	6	146	23	117	17	1	5	158	42	187	33	1	16	263	846	4138
09:30:00	15	159	48	0	9	222	25	97	22	4	3	148	28	70	17	1	5	116	34	165	33	0	15	232	718	3650
09:45:00	24	176	55	0	13	255	28	103	17	2	6	150	21	92	14	3	7	130	32	155	37	0	13	224	759	3291
BREAK																										
16:00:00	42	144	36	1	18	223	76	328	53	2	6	459	26	232	46	0	7	304	13	131	46	0	13	190	1176	
16:15:00	34	196	31	0	7	261	72	315	55	0	13	442	24	306	50	0	19	380	22	139	36	0	7	197	1280	
16:30:00	28	198	36	0	13	262	86	324	35	0	18	445	21	265	54	0	16	340	19	133	38	0	13	190	1237	
16:45:00	21	172	37	0	6	230	89	387	50	3	6	529	21	263	44	2	6	330	26	167	50	1	9	244	1333	5026
17:00:00	47	195	31	1	18	274	88	287	48	2	17	425	25	275	62	0	15	362	20	136	40	0	11	196	1257	5107
17:15:00	35	166	50	0	12	251	95	334	51	1	14	481	16	283	59	0	24	358	23	174	43	0	8	240	1330	5157
17:30:00	32	142	42	0	11	216	108	312	41	2	12	463	26	265	47	0	10	338	24	157	54	0	7	235	1252	5172
17:45:00	44	155	46	1	14	246	88	245	37	3	16	373	16	275	64	0	12	355	19	137	58	1	15	215	1189	5028
18:00:00	28	118	39	3	9	188	97	283	39	5	9	424	27	204	53	0	5	284	28	162	51	0	7	241	1137	4908
18:15:00	35	182	42	1	19	260	69	296	49	2	11	416	23	289	55	0	8	367	23	137	46	0	9	206	1249	4827
18:30:00	27	152	44	3	11	226	61	261	27	4	5	353	30	219	53	1	5	303	21	111	47	1	10	180	1062	4637
18:45:00	36	122	36	0	10	194	75	215	38	5	14	333	26	170	29	1	8	226	26	135	50	0	7	211	964	4412
Grand Total	687	4987	1174	10	268	6858	1269	5035	898	45	191	7247	639	4368	873	13	198	5893	894	4742	946	7	243	6589	**26587**	-
Approach%	10%	72.7%	17.1%	0.1%		-	17.5%	69.5%	12.4%	0.6%		-	10.8%	74.1%	14.8%	0.2%		-	13.6%	72%	14.4%	0.1%		-	-	-
Totals %	2.6%	18.8%	4.4%	0%		25.8%	4.8%	18.9%	3.4%	0.2%		27.3%	2.4%	16.4%	3.3%	0%		22.2%	3.4%	17.8%	3.6%	0%		24.8%	-	-
Heavy	11	93	40	0		-	38	285	31	0		-	17	76	6	0		-	8	302	19	0		-	-	-
Heavy %	1.6%	1.9%	3.4%	0%		-	3%	5.7%	3.5%	0%		-	2.7%	1.7%	0.7%	0%		-	0.9%	6.4%	2%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-

Spectrum

Turning Movement Count
Location Name: DERRY RD & MCLAUGHLIN RD
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 07:45 AM - 08:45 AM Weather: Broken Clouds (2.32 °C)

Start Time	N Approach MCLAUGHLIN RD						E Approach DERRY RD						S Approach MCLAUGHLIN RD						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	16	345	45	0	8	406	18	139	47	2	6	206	49	157	27	1	4	234	64	261	32	0	10	357	1203
08:00:00	21	289	53	0	18	363	16	129	47	0	2	192	29	120	33	1	4	183	78	324	40	0	8	442	1180
08:15:00	19	333	44	0	13	396	34	133	38	1	5	206	32	163	30	1	9	226	80	297	30	0	3	407	1235
08:30:00	23	300	68	0	7	391	21	158	34	3	3	216	48	140	36	0	4	224	61	286	28	0	12	375	1206
Grand Total	79	1267	210	0	46	1556	89	559	166	6	16	820	158	580	126	3	21	867	283	1168	130	0	33	1581	**4824**
Approach%	5.1%	81.4%	13.5%	0%		-	10.9%	68.2%	20.2%	0.7%		-	18.2%	66.9%	14.5%	0.3%		-	17.9%	73.9%	8.2%	0%		-	**-**
Totals %	1.6%	26.3%	4.4%	0%		32.3%	1.8%	11.6%	3.4%	0.1%		17%	3.3%	12%	2.6%	0.1%		18%	5.9%	24.2%	2.7%	0%		32.8%	**-**
PHF	0.86	0.92	0.77	0		0.96	0.65	0.88	0.88	0.5		0.95	0.81	0.89	0.88	0.75		0.93	0.88	0.9	0.81	0		0.89	**-**
Heavy	4	20	5	0		29	6	57	9	0		72	4	17	2	0		23	3	42	4	0		49	**-**
Heavy %	5.1%	1.6%	2.4%	0%		1.9%	6.7%	10.2%	5.4%	0%		8.8%	2.5%	2.9%	1.6%	0%		2.7%	1.1%	3.6%	3.1%	0%		3.1%	**-**
Lights	75	1247	205	0		1527	83	502	157	6		748	154	563	124	3		844	280	1126	126	0		1532	**-**
Lights %	94.9%	98.4%	97.6%	0%		98.1%	93.3%	89.8%	94.6%	100%		91.2%	97.5%	97.1%	98.4%	100%		97.3%	98.9%	96.4%	96.9%	0%		96.9%	**-**
Single-Unit Trucks	2	1	0	0		3	0	26	5	0		31	3	2	0	0		5	0	11	1	0		12	**-**
Single-Unit Trucks %	2.5%	0.1%	0%	0%		0.2%	0%	4.7%	3%	0%		3.8%	1.9%	0.3%	0%	0%		0.6%	0%	0.9%	0.8%	0%		0.8%	**-**
Buses	2	19	5	0		26	6	11	2	0		19	1	15	2	0		18	3	17	2	0		22	**-**
Buses %	2.5%	1.5%	2.4%	0%		1.7%	6.7%	2%	1.2%	0%		2.3%	0.6%	2.6%	1.6%	0%		2.1%	1.1%	1.5%	1.5%	0%		1.4%	**-**
Articulated Trucks	0	0	0	0		0	0	20	2	0		22	0	0	0	0		0	0	14	1	0		15	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	3.6%	1.2%	0%		2.7%	0%	0%	0%	0%		0%	0%	1.2%	0.8%	0%		0.9%	**-**
Pedestrians	-	-	-	-	46	-	-	-	-	-	16	-	-	-	-	-	21	-	-	-	-	-	31	-	**-**
Pedestrians%	-	-	-	-	39.7%		-	-	-	-	13.8%		-	-	-	-	18.1%		-	-	-	-	26.7%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	1.7%		**-**

Spectrum

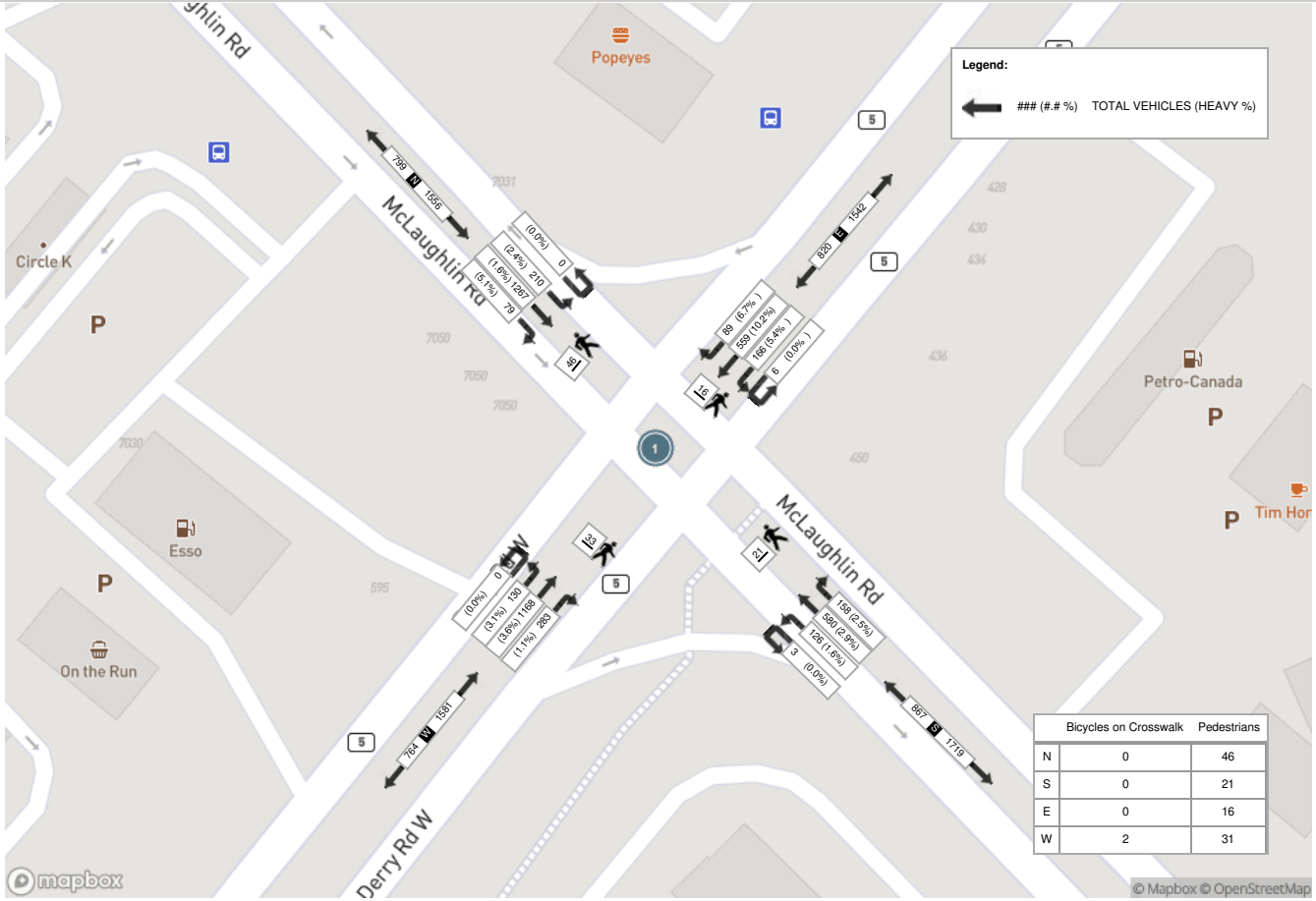
Turning Movement Count
Location Name: DERRY RD & MCLAUGHLIN RD
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 04:45 PM - 05:45 PM **Weather: Light Shower Snow (3.13 °C)**

Start Time	N Approach MCLAUGHLIN RD						E Approach DERRY RD						S Approach MCLAUGHLIN RD						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	21	172	37	0	6	230	89	387	50	3	6	529	21	263	44	2	6	330	26	167	50	1	9	244	1333
17:00:00	47	195	31	1	18	274	88	287	48	2	17	425	25	275	62	0	15	362	20	136	40	0	11	196	1257
17:15:00	35	166	50	0	12	251	95	334	51	1	14	481	16	283	59	0	24	358	23	174	43	0	8	240	1330
17:30:00	32	142	42	0	11	216	108	312	41	2	12	463	26	265	47	0	10	338	24	157	54	0	7	235	1252
Grand Total	135	675	160	1	47	971	380	1320	190	8	49	1898	88	1086	212	2	55	1388	93	634	187	1	35	915	**5172**
Approach%	13.9%	69.5%	16.5%	0.1%		-	20%	69.5%	10%	0.4%		-	6.3%	78.2%	15.3%	0.1%		-	10.2%	69.3%	20.4%	0.1%		-	**-**
Totals %	2.6%	13.1%	3.1%	0%		18.8%	7.3%	25.5%	3.7%	0.2%		36.7%	1.7%	21%	4.1%	0%		26.8%	1.8%	12.3%	3.6%	0%		17.7%	**-**
PHF	0.72	0.87	0.8	0.25		0.89	0.88	0.85	0.93	0.67		0.9	0.85	0.96	0.85	0.25		0.96	0.89	0.91	0.87	0.25		0.94	**-**
Heavy	0	9	7	0		16	5	38	2	0		45	1	12	1	0		14	0	50	1	0		51	**-**
Heavy %	0%	1.3%	4.4%	0%		1.6%	1.3%	2.9%	1.1%	0%		2.4%	1.1%	1.1%	0.5%	0%		1%	0%	7.9%	0.5%	0%		5.6%	**-**
Lights	135	666	153	1		955	375	1282	188	8		1853	87	1074	211	2		1374	93	584	186	1		864	**-**
Lights %	100%	98.7%	95.6%	100%		98.4%	98.7%	97.1%	98.9%	100%		97.6%	98.9%	98.9%	99.5%	100%		99%	100%	92.1%	99.5%	100%		94.4%	**-**
Single-Unit Trucks	0	1	2	0		3	0	16	2	0		18	1	1	0	0		2	0	15	1	0		16	**-**
Single-Unit Trucks %	0%	0.1%	1.3%	0%		0.3%	0%	1.2%	1.1%	0%		0.9%	1.1%	0.1%	0%	0%		0.1%	0%	2.4%	0.5%	0%		1.7%	**-**
Buses	0	8	5	0		13	5	6	0	0		11	0	11	1	0		12	0	9	0	0		9	**-**
Buses %	0%	1.2%	3.1%	0%		1.3%	1.3%	0.5%	0%	0%		0.6%	0%	1%	0.5%	0%		0.9%	0%	1.4%	0%	0%		1%	**-**
Articulated Trucks	0	0	0	0		0	0	16	0	0		16	0	0	0	0		0	0	26	0	0		26	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	1.2%	0%	0%		0.8%	0%	0%	0%	0%		0%	0%	4.1%	0%	0%		2.8%	**-**
Pedestrians	-	-	-	-	46	-	-	-	-	-	49	-	-	-	-	-	54	-	-	-	-	-	31	-	**-**
Pedestrians%	-	-	-	-	24.7%		-	-	-	-	26.3%		-	-	-	-	29%		-	-	-	-	16.7%		**-**
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	4	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0.5%		-	-	-	-	0%		-	-	-	-	0.5%		-	-	-	-	2.2%		**-**

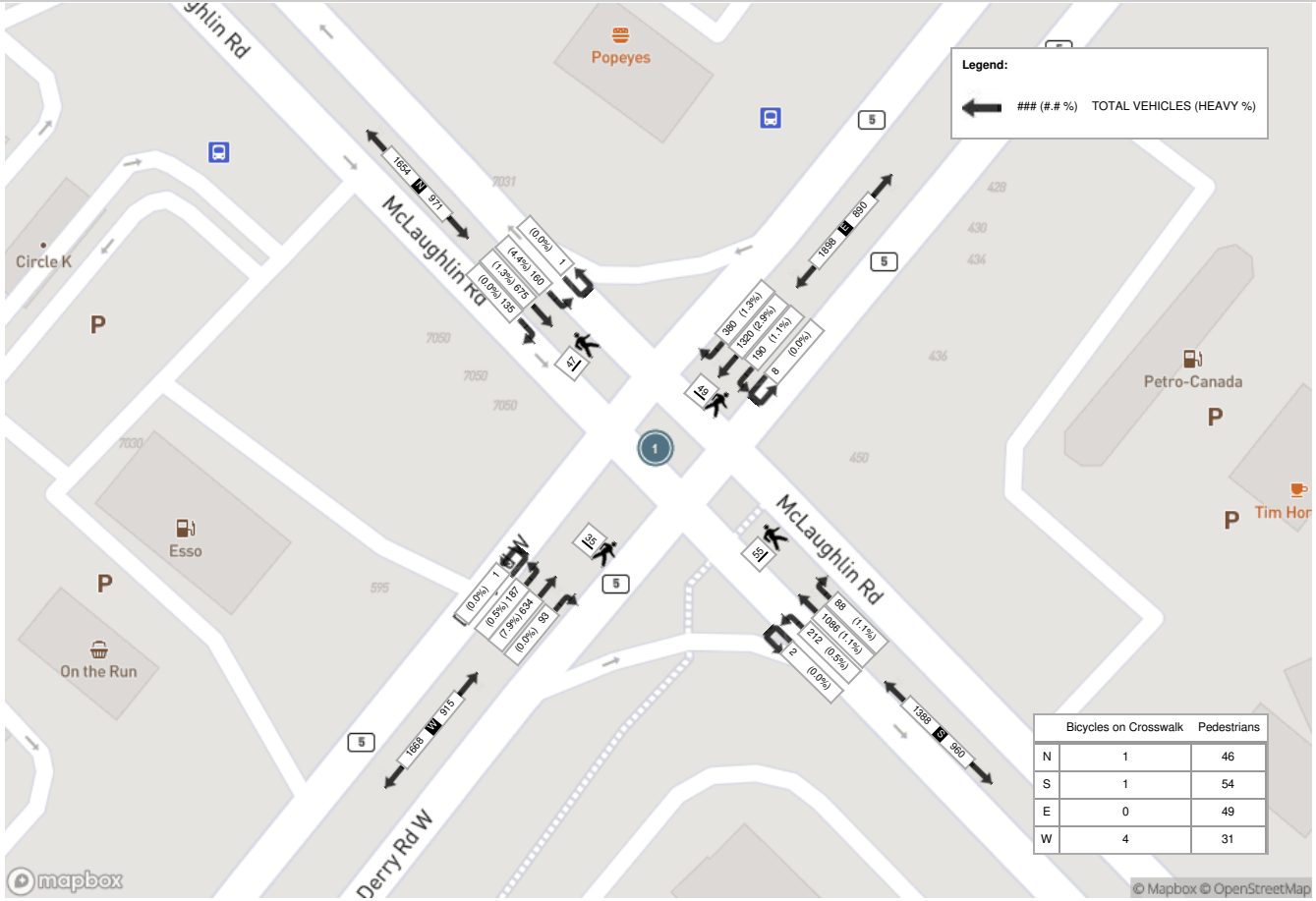
Peak Hour: 07:45 AM - 08:45 AM **Weather: Broken Clouds (2.32 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	46
S	0	21
E	0	16
W	2	31

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 04:45 PM - 05:45 PM **Weather: Light Shower Snow (3.13 °C)**



Spectrum

Turning Movement Count
Location Name: DERRY RD & ST. BARBARA BLVD
Date: Tue, Apr 18, 2023 Deployment Lead: Walter Fugaj

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Turning Movement Count (2 . DERRY RD & ST. BARBARA BLVD) CustID: 00511807 MioID:

Start Time	N Approach ST BARBARA BLVD						E Approach DERRY RD						S Approach ST BARBARA BLVD						W Approach DERRY RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	8	0	43	0	0	51	15	151	0	1	1	167	0	0	0	0	2	0	0	298	2	0	0	300	518	
07:15:00	15	0	51	0	0	66	16	115	0	2	0	133	0	0	0	0	0	0	0	337	2	0	1	339	538	
07:30:00	20	0	58	0	3	78	7	157	0	0	2	164	0	0	0	0	2	0	0	434	1	0	0	435	677	
07:45:00	27	0	105	0	0	132	10	186	0	1	2	197	0	0	0	0	3	0	0	400	6	1	1	407	736	2469
08:00:00	22	0	59	0	0	81	18	143	0	2	3	163	0	0	0	0	2	0	0	392	8	0	0	400	644	2595
08:15:00	30	0	99	0	0	129	7	210	0	2	6	219	0	0	0	0	3	0	0	370	10	0	0	380	728	2785
08:30:00	12	0	79	0	0	91	22	182	0	1	0	205	0	0	0	0	1	0	0	408	19	1	0	428	724	2832
08:45:00	10	0	69	0	1	79	18	183	0	3	2	204	0	0	0	0	5	0	0	372	8	1	2	381	664	2760
09:00:00	8	0	42	0	1	50	16	156	0	2	3	174	0	0	0	0	2	0	0	335	5	0	0	340	564	2680
09:15:00	4	0	27	0	0	31	22	135	0	2	0	159	0	0	0	0	3	0	0	282	5	0	0	287	477	2429
09:30:00	12	0	30	0	0	42	9	138	0	0	0	147	0	0	0	0	1	0	0	240	11	0	0	251	440	2145
09:45:00	6	0	31	0	0	37	14	159	0	3	1	176	0	0	0	0	2	0	0	217	2	0	0	219	432	1913
BREAK																										
16:00:00	11	0	18	0	1	29	59	399	0	1	2	459	0	0	0	0	0	0	0	181	18	0	0	199	687	
16:15:00	13	0	30	0	1	43	58	460	0	3	2	521	0	0	0	0	4	0	0	186	9	1	0	196	760	
16:30:00	7	0	26	0	3	33	45	405	0	3	4	453	0	0	0	0	10	0	0	190	9	0	2	199	685	
16:45:00	9	0	24	0	2	33	74	500	0	10	0	584	0	0	0	0	3	0	0	222	18	1	1	241	858	2990
17:00:00	7	0	28	0	4	35	89	475	0	2	2	566	0	0	0	0	5	0	0	179	17	0	0	196	797	3100
17:15:00	16	0	19	0	6	35	74	403	0	2	1	479	0	0	0	0	6	0	0	229	22	0	0	251	765	3105
17:30:00	9	0	27	0	9	36	83	449	0	4	10	536	0	0	0	0	12	0	0	202	19	3	1	224	796	3216
17:45:00	10	0	43	0	4	53	72	413	0	4	1	489	0	0	0	0	0	0	0	201	24	2	2	227	769	3127
18:00:00	11	0	21	0	3	32	89	362	0	2	1	453	0	0	0	0	3	0	0	202	23	1	0	226	711	3041
18:15:00	15	0	30	0	2	45	73	421	0	2	1	496	0	0	0	0	1	0	0	181	26	1	1	208	749	3025
18:30:00	12	0	28	0	3	40	65	292	0	3	3	360	0	0	0	0	0	0	0	172	21	2	1	195	595	2824
18:45:00	11	0	24	0	2	35	43	298	0	1	0	342	0	0	0	0	0	0	0	190	15	4	0	209	586	2641
Grand Total	305	0	1011	0	45	1316	998	6792	0	56	47	7846	0	0	0	0	70	0	0	6420	300	18	12	6738	**15900**	-
Approach%	23.2%	0%	76.8%	0%		-	12.7%	86.6%	0%	0.7%		-	0%	0%	0%	0%		-	0%	95.3%	4.5%	0.3%		-	**-**	-
Totals %	1.9%	0%	6.4%	0%		8.3%	6.3%	42.7%	0%	0.4%		49.3%	0%	0%	0%	0%		0%	0%	40.4%	1.9%	0.1%		42.4%	**-**	-
Heavy	11	0	15	0		-	9	354	0	0		-	0	0	0	0		-	0	347	9	0		-	**-**	-
Heavy %	3.6%	0%	1.5%	0%		-	0.9%	5.2%	0%	0%		-	0%	0%	0%	0%		-	0%	5.4%	3%	0%		-	**-**	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Broken Clouds (2.32 °C)

Start Time	N Approach ST BARBARA BLVD						E Approach DERRY RD						S Approach ST BARBARA BLVD						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	27	0	105	0	0	132	10	186	0	1	2	197	0	0	0	0	3	0	0	400	6	1	1	407	736
08:00:00	22	0	59	0	0	81	18	143	0	2	3	163	0	0	0	0	2	0	0	392	8	0	0	400	644
08:15:00	30	0	99	0	0	129	7	210	0	2	6	219	0	0	0	0	3	0	0	370	10	0	0	380	728
08:30:00	12	0	79	0	0	91	22	182	0	1	0	205	0	0	0	0	1	0	0	408	19	1	0	428	724
Grand Total	91	0	342	0	0	433	57	721	0	6	11	784	0	0	0	0	9	0	0	1570	43	2	1	1615	**2832**
Approach%	21%	0%	79%	0%		-	7.3%	92%	0%	0.8%		-	0%	0%	0%	0%		-	0%	97.2%	2.7%	0.1%		-	**-**
Totals %	3.2%	0%	12.1%	0%		15.3%	2%	25.5%	0%	0.2%		27.7%	0%	0%	0%	0%		0%	0%	55.4%	1.5%	0.1%		57%	**-**
PHF	0.76	0	0.81	0		0.82	0.65	0.86	0	0.75		0.89	0	0	0	0		0	0	0.96	0.57	0.5		0.94	**-**
Heavy	4	0	2	0		6	3	70	0	0		73	0	0	0	0		0	0	54	2	0		56	**-**
Heavy %	4.4%	0%	0.6%	0%		1.4%	5.3%	9.7%	0%	0%		9.3%	0%	0%	0%	0%		0%	0%	3.4%	4.7%	0%		3.5%	**-**
Lights	87	0	340	0		427	54	651	0	6		711	0	0	0	0		0	0	1516	41	2		1559	**-**
Lights %	95.6%	0%	99.4%	0%		98.6%	94.7%	90.3%	0%	100%		90.7%	0%	0%	0%	0%		0%	0%	96.6%	95.3%	100%		96.5%	**-**
Single-Unit Trucks	1	0	1	0		2	3	31	0	0		34	0	0	0	0		0	0	19	0	0		19	**-**
Single-Unit Trucks %	1.1%	0%	0.3%	0%		0.5%	5.3%	4.3%	0%	0%		4.3%	0%	0%	0%	0%		0%	0%	1.2%	0%	0%		1.2%	**-**
Buses	3	0	1	0		4	0	16	0	0		16	0	0	0	0		0	0	21	2	0		23	**-**
Buses %	3.3%	0%	0.3%	0%		0.9%	0%	2.2%	0%	0%		2%	0%	0%	0%	0%		0%	0%	1.3%	4.7%	0%		1.4%	**-**
Articulated Trucks	0	0	0	0		0	0	23	0	0		23	0	0	0	0		0	0	14	0	0		14	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	3.2%	0%	0%		2.9%	0%	0%	0%	0%		0%	0%	0.9%	0%	0%		0.9%	**-**
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	**-**
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	0	-	-	-	-	-	11	-	-	-	-	-	9	-	-	-	-	-	1	-	**-**
Pedestrians%	-	-	-	-	0%		-	-	-	-	52.4%		-	-	-	-	42.9%		-	-	-	-	4.8%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

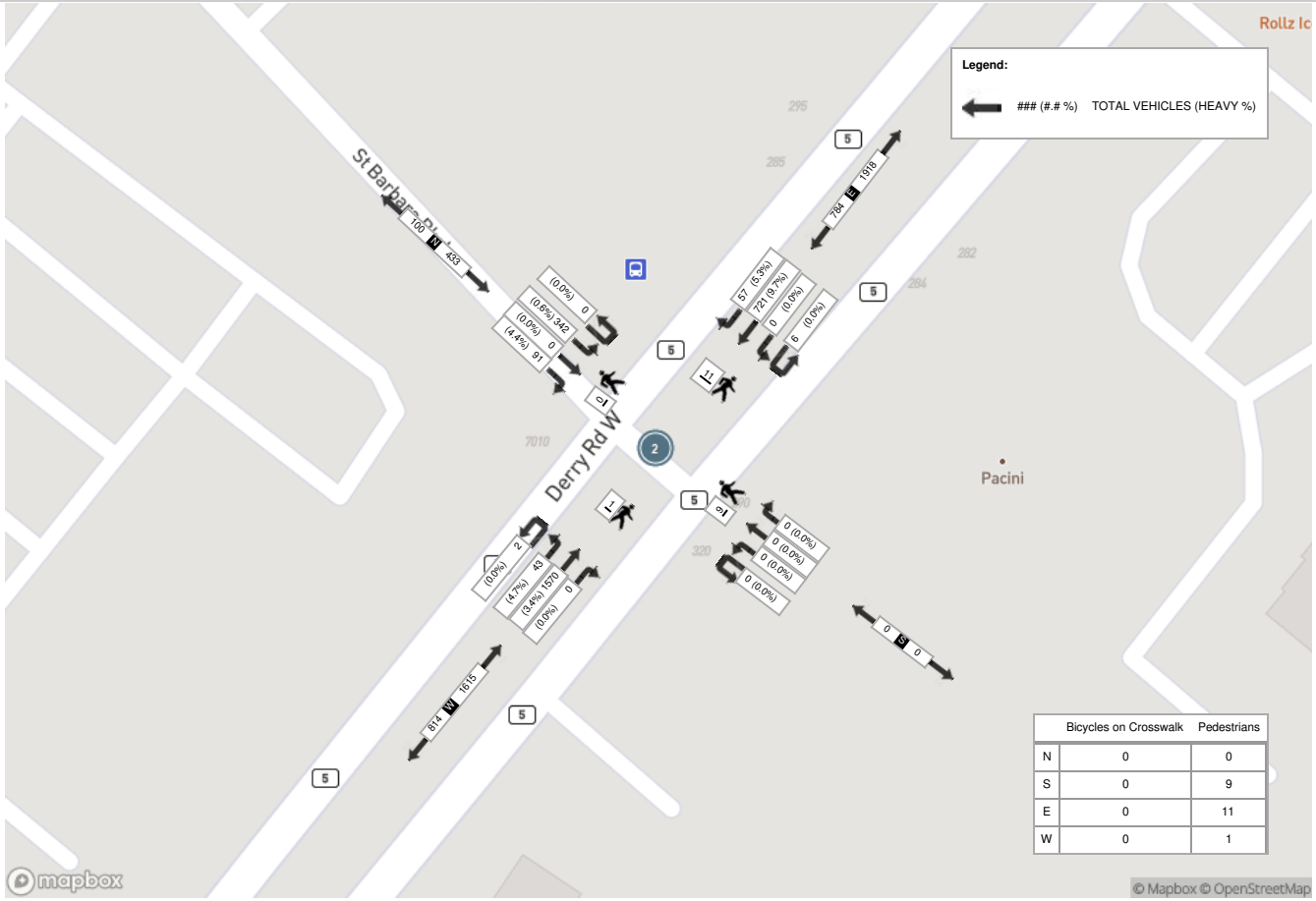
Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 04:45 PM - 05:45 PM **Weather: Light Shower Snow (3.13 °C)**

Start Time	N Approach ST BARBARA BLVD						E Approach DERRY RD						S Approach ST BARBARA BLVD						W Approach DERRY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	9	0	24	0	2	33	74	500	0	10	0	584	0	0	0	0	3	0	0	222	18	1	1	241	858
17:00:00	7	0	28	0	4	35	89	475	0	2	2	566	0	0	0	0	5	0	0	179	17	0	0	196	797
17:15:00	16	0	19	0	6	35	74	403	0	2	1	479	0	0	0	0	6	0	0	229	22	0	0	251	765
17:30:00	9	0	27	0	9	36	83	449	0	4	10	536	0	0	0	0	12	0	0	202	19	3	1	224	796
Grand Total	41	0	98	0	21	139	320	1827	0	18	13	2165	0	0	0	0	26	0	0	832	76	4	2	912	**3216**
Approach%	29.5%	0%	70.5%	0%		-	14.8%	84.4%	0%	0.8%		-	0%	0%	0%	0%		-	0%	91.2%	8.3%	0.4%		-	**-**
Totals %	1.3%	0%	3%	0%		4.3%	10%	56.8%	0%	0.6%		67.3%	0%	0%	0%	0%		0%	0%	25.9%	2.4%	0.1%		28.4%	**-**
PHF	0.64	0	0.88	0		0.97	0.9	0.91	0	0.45		0.93	0	0	0	0		0	0	0.91	0.86	0.33		0.91	**-**
Heavy	0	0	6	0		6	1	50	0	0		51	0	0	0	0		0	0	57	3	0		60	**-**
Heavy %	0%	0%	6.1%	0%		4.3%	0.3%	2.7%	0%	0%		2.4%	0%	0%	0%	0%		0%	0%	6.9%	3.9%	0%		6.6%	**-**
Lights	41	0	92	0		133	319	1777	0	18		2114	0	0	0	0		0	0	775	73	4		852	**-**
Lights %	100%	0%	93.9%	0%		95.7%	99.7%	97.3%	0%	100%		97.6%	0%	0%	0%	0%		0%	0%	93.1%	96.1%	100%		93.4%	**-**
Single-Unit Trucks	0	0	5	0		5	1	22	0	0		23	0	0	0	0		0	0	17	2	0		19	**-**
Single-Unit Trucks %	0%	0%	5.1%	0%		3.6%	0.3%	1.2%	0%	0%		1.1%	0%	0%	0%	0%		0%	0%	2%	2.6%	0%		2.1%	**-**
Buses	0	0	1	0		1	0	11	0	0		11	0	0	0	0		0	0	14	1	0		15	**-**
Buses %	0%	0%	1%	0%		0.7%	0%	0.6%	0%	0%		0.5%	0%	0%	0%	0%		0%	0%	1.7%	1.3%	0%		1.6%	**-**
Articulated Trucks	0	0	0	0		0	0	17	0	0		17	0	0	0	0		0	0	26	0	0		26	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.9%	0%	0%		0.8%	0%	0%	0%	0%		0%	0%	3.1%	0%	0%		2.9%	**-**
Bicycles on Road	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	**-**
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	21	-	-	-	-	-	13	-	-	-	-	-	26	-	-	-	-	-	2	-	**-**
Pedestrians%	-	-	-	-	33.9%		-	-	-	-	21%		-	-	-	-	41.9%		-	-	-	-	3.2%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

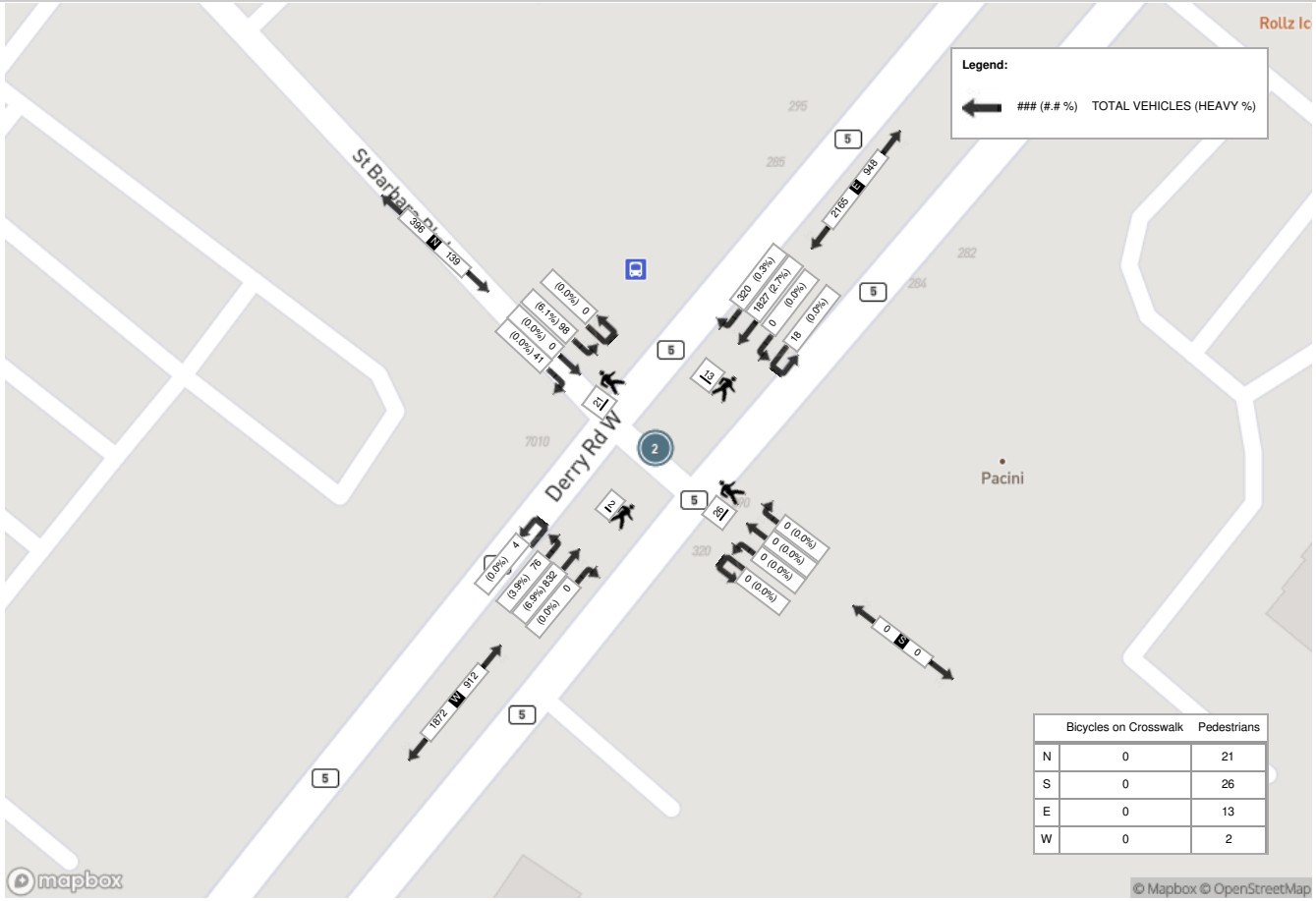
Peak Hour: 07:45 AM - 08:45 AM **Weather: Broken Clouds (2.32 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	0
S	0	9
E	0	11
W	0	1

Tatham Engineering
UNIT 4 41 KING STREET
BARRIE ONTARIO, L4N 6B5
CANADA

Peak Hour: 04:45 PM - 05:45 PM **Weather: Light Shower Snow (3.13 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	21
S	0	26
E	0	13
W	0	2

Appendix C:
Signal Timing Plans

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	**April 21, 2023**	**Prepared Date:**	**April 25, 2023**
Database Rev	**iNet**	**Completed By:**	**MJY**
Timing Card / Field rev	**iNet**	**Checked By:**	**MH**
Location	**Derry Rd @ McLaughlin Rd**		

Phase #	Direction	Vehicle Minimum (sec.)	Pedestrian Minimum (sec.)		Amber (sec.)	All Red (sec.)	TIME PERIOD (sec.) *Peak Split= (Green+Amber+All Red) **Max = Green		
			WALK	FDWALK			AM Peak Split	OFF Peak Split	PM Peak Split
1	Derry Rd - WB P.P. LT	7.0	-	-	3.0	-	14.0	16.0	14.0
2	Derry Rd - EB	10.0	10.0	27.0	4.2	2.4	65.0	66.0	61.0
3	McLaughlin Rd - SB PROT. LT	7.0	-	-	3.0	2.0	26.0	19.0	16.0
4	McLaughlin Rd - NB	10.0	10.0	30.0	4.0	2.9	55.0	59.0	69.0
5	Derry Rd - EB P.P. LT	7.0	-	-	3.0	-	14.0	16.0	13.0
6	Derry Rd - WB	10.0	10.0	27.0	4.2	2.4	65.0	66.0	62.0
7	McLaughlin Rd - NB PROT. LT	7.0	-	-	3.0	2.0	15.0	19.0	19.0
8	McLaughlin Rd - SB	10.0	10.0	30.0	4.0	2.9	66.0	59.0	66.0

System Control	Yes
Local Control	No
Semi-Actuated Mode	Yes

TIME (M-F)	PEAK	CYCLE LENGTH (sec.)	OFFSET (sec.)
06:00-09:30	**AM**	**160**	**14**
09:30 - 15:00	**OFF**	**160**	**150**
15:00 - 19:00	**PM**	**160**	**18**

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	**June 25, 2022**	**Prepared Date:**	**April 25, 2023**
Database Rev	**iNet**	**Completed By:**	**MY**
Timing Card / Field rev	**iNet**	**Checked By:**	**MH**
Location	**Derry Rd @ St. Barbara Blvd**		

Phase #	Direction	Vehicle Minimum (sec.)	Pedestrian Minimum (sec.) WALK	Pedestrian Minimum (sec.) FDWALK	Amber (sec.)	All Red (sec.)	TIME PERIOD (sec.) *Peak Split= (Green+Amber+All Red) **Max = Green AM Peak Split	OFF Peak Split	PM Peak Split
1	NIU	-	-	-	-	-	-	-	-
2	Derry Rd - EB	10.0	10.0	19.0	4.2	2.1	102.0	104.0	110.0
3	NIU	-	-	-	-	-	-	-	-
4	St. Barbara Blvd - COMP	10.0	10.0	30.0	4.0	3.1	58.0	56.0	50.0
5	NIU	-	-	-	-	-	-	-	-
6	Derry Rd - WB	10.0	10.0	19.0	4.2	2.1	102.0	104.0	110.0
7	NIU	-	-	-	-	-	-	-	-
8	St. Barbara Blvd - SB	10.0	10.0	30.0	4.0	3.1	58.0	56.0	50.0
							320	320	320

System Control	Yes
Local Control	No
Semi-Actuated Mode	Yes

TIME (M-F)	PEAK	CYCLE LENGTH (sec.)	OFFSET (sec.)
06:00-09:30	AM	160	6
09:30 - 15:00 19:30 - 00:00	OFF	160	131
15:00 - 19:30	PM	160	155

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	**January 24, 2023**	**Prepared Date:**	**April 25, 2023**
Database Rev	**iNet**	**Completed By:**	**MY**
Timing Card / Field rev	**iNet**	**Checked By:**	**MH**
Location	**Derry Rd @ Maritz Blvd/Derrycrest Dr**		

Phase #	Direction	Vehicle Minimum (sec.)	Pedestrian Minimum (sec.) WALK	Pedestrian Minimum (sec.) FDWALK	Amber (sec.)	All Red (sec.)	TIME PERIOD (sec.) *Peak Split= (Green+Amber+All Red) **Max = Green AM Peak Split	OFF Peak Split	PM Peak Split
1	Derry Rd - WB P.P. LT	7.0	-	-	3.0	-	16.0	-	-
2	Derry Rd - EB	10.0	10.0	25.0	4.2	2.0	85.0	101.0	101.0
3	NIU	-	-	-	-	-	-	-	-
4	Maritz Blvd - NB	10.0	10.0	39.0	4.0	3.7	59.0	59.0	59.0
5	Derry Rd - EB P.P. LT	7.0	-	-	3.0	-	12.0	-	12.0
6	Derry Rd - WB	10.0	10.0	25.0	4.2	2.0	89.0	101.0	89.0
7	Maritz Blvd - NB P.P. LT	7.0	-	-	3.0	-	-	-	35.0
8	Derrycrest Dr - SB	10.0	10.0	39.0	4.0	3.7	59.0	59.0	24.0
							320	320	320

System Control	Yes
Local Control	No
Semi-Actuated Mode	Yes

TIME (M-F)	PEAK	CYCLE LENGTH (sec.)	OFFSET (sec.)
06:00-09:30	AM	160	80
09:30 - 15:00 19:30 - 00:00	OFF	160	64
15:00 - 19:30	PM	160	92

File: CA.13.SIG
Signal Timing Request
RT.07.4412

April 19, 2023

To Jennifer Conners:

Re: Traffic Signal Timing

McLaughlin Road at Novo Star Drive/Arrowsmith Drive

The side street phases (4,8) are actuated, unless noted in the timing plan, this means a vehicle or pedestrian must be present on the side street before the side street is given a green indication. Vehicle presence on the side street would result in a possible green time of between the minimum and maximum time noted, depending on demand. Similarly phase 1 is also actuated. Pedestrian "Walk" and flashing "Don't Walk" time on the side street, as noted, would be used in the event that the pedestrian push button is activated. During the side street pedestrian indications, the side street vehicle green is concurrently displayed. Should there be no demand on the actuated phase, the signals would result in a green indication on the major street (2,6).

Note: All times recorded in seconds, based on full demand.

The time of day plan is used for system control operation. In the event that the coordination pattern has a cycle length, offset and split value identified, the cycle length, split and offset values, as noted, would be used. However, when the time of day plan is programed using 'Action' 8, the mode is 'Free', meaning no cycle length, split and offset values are given and the intersection operates using the phase timings provided in the report.

Should you require further information, please contact Steve Gee, at 905-615-3200 ext. 5169.

Sincerely,

Steve Gee
Traffic System Coordinator, Traffic Systems and ITS
Traffic Systems and ITS
Transportation and Works Department
City of Mississauga
905-615-3200 ext. 5169
steve.gee@mississauga.ca

c: Jim Kartsomanis, Supervisor, Traffic Systems and ITS

Generic ASC | 4412 | MCLAUGHLIN ROAD N @ Nova Star Drive/Arrowsmith Drive

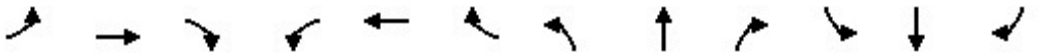
Phase - Parameter 1-16	Units	1	2	3	4	5	6	7	8
Walk	Sec	0	10	0	10	0	10	0	10
Ped Clear	Sec	0	19	0	26	0	19	0	26
Min Green	Sec	7	10	0	10	0	10	0	10
Passage	Sec	2.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0
Maximum 1	Sec	10	32	0	30	0	32	0	30
Maximum 2	Sec	10	32	0	30	0	32	0	30
Yellow Change	Sec	3.0	4.5	3.0	3.5	3.0	4.5	3.0	3.5
Red Clearance	Sec	0.0	2.0	0.0	3.0	0.0	2.0	0.0	3.0
Red Revert	Sec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Added Initial	Sec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Initial	Sec	0	0	0	0	0	0	0	0
Time Before Reduction	Sec	0	0	0	0	0	0	0	0
Cars Before Reduction	Veh	0	0	0	0	0	0	0	0
Time To Reduce	Sec	0	0	0	0	0	0	0	0
Reduce By	Sec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min Gap	Sec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dynamic Max Limit	Sec	0	0	0	0	0	0	0	0
Dynamic Max Step	Sec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[P2] Start Up	Enum	phaseNotOn	redClear	other	phaseNotOn	other	redClear	other	phaseNotOn
[P2] Options	Bit	0:Enabled Phase 5:Non Lock Detector Memory	0:Enabled Phase 3:Non-Actuated 1 7:Max Vehicle Recall 8:Ped. Recall 10:Dual Entry Phase 13:Actuated Rest In Walk		0:Enabled Phase 5:Non Lock Detector Memory 10:Dual Entry Phase		0:Enabled Phase 3:Non-Actuated 1 7:Max Vehicle Recall 8:Ped. Recall 10:Dual Entry Phase 13:Actuated Rest In Walk		0:Enabled Phase 5:Non Lock Detector Memory 10:Dual Entry Phase
[P2] Ring	Ring	1	1	0	1	0	2	0	2
[P2] Concurrency	Phase (,)	(6)	(6)	()	(8)	()	(1,2)	()	(4)

Coordination - Pattern 1-16	Units	1	2	3	4	5	6	7	8
Cycle Time	Sec	160	0	160	0	0	0	0	0
Offset	Sec	109	0	94	0	0	0	0	0
Split	Split	1	2	3	4	5	6	7	8

Sequence	Sequence	1	1	1	1	1	1	1	1
Coordination - Splits	**Units**	**Phase 1**	**Phase 2**	**Phase 4**	**Phase 6**	**Phase 8**			
Split 1 - Mode	Enum	none	none	none	none	none			
Split 1 - Time	Sec	13	101	46	114	46			
Split 1 - Coord	Enum	False	True	False	True	False			
Split 2 - Mode	Enum	none	none	none	none	none			
Split 2 - Time	Sec	0	0	0	0	0			
Split 2 - Coord	Enum	False	True	False	True	False			
Split 3 - Mode	Enum	none	none	none	none	none			
Split 3 - Time	Sec	13	101	46	114	46			
Split 3 - Coord	Enum	False	True	False	True	False			
Time Base - Schedule 1-16	**Units**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Month	Bit	JFMAMJJASOND	JFMAMJJASOND	JFMAMJJASOND	J----------	-F---------	---A--------	----M-------	------J-----
Day of Week	Bit	-MTWTF-	S------	------S	-M-----	-M-----	-----F-	-M-----	-----F-
Day of Month	Bit	12345678901234567 89012345678901	12345678901234567 89012345678901	12345678901234567 89012345678901	--3---------- --	----------1-------- --	----------5---------- --	----------3------ --	1---------- --
Day Plan	Number	1	3	2	3	3	3	3	3
Time Base - Schedule 1-16	**Units**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Month	Bit	-------A----	--------S---	---------O--	----------D	----------D	----------D	--------S---	----------
Day of Week	Bit	-M-----	-M-----	-M-----	--T----	-M-----	---W---	-----F-	SMTWTFS
Day of Month	Bit	1---------- --	----5---------- --	---------0---------- --	----------7-- --	----------6--- --	----------8- --	---------- 0-	---------- -
Day Plan	Number	3	3	3	3	3	3	3	0
Time Base - Day Plans	**Units**	**Evt 1**	**Evt 2**	**Evt 3**	**Evt 4**	**Evt 5**	**Evt 6**		
Plan 1 Hour	Hour	0	3	6	9	15	19		
Plan 1 Minute	Min	0	0	0	30	0	30		
Plan 1 Action	Number	8	7	1	8	3	8		
Plan 2 Hour	Hour	0	3	0	0	0	0		
Plan 2 Minute	Min	0	0	0	0	0	0		
Plan 2 Action	Number	8	7	0	0	0	0		
Plan 3 Hour	Hour	0	3	0	0	0	0		
Plan 3 Minute	Min	0	0	0	0	0	0		

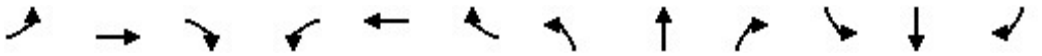
Plan 3 Action	Number	8	7	0	0	0	0		
Time Base - Action 1-16	**Units**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Pattern	Enum	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 6	Free	Free
Aux. Functions	Bit								
Spec. Functions	Bit								
Time Base - Action 1-16	**Units**	**9**	**10**						
Pattern	Enum	Pattern 9	Pattern 10						
Aux. Functions	Bit								
Spec. Functions	Bit								

Appendix D:
Traffic Operations
Existing Conditions



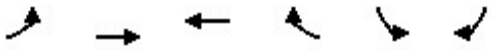
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1168	283	172	559	89	129	580	158	210	1267	79
Future Volume (vph)	130	1168	283	172	559	89	129	580	158	210	1267	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.38	1.00	1.00	0.12	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	713	5043	1617	226	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	133	1192	289	176	570	91	132	592	161	214	1293	81
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	78	0	0	51
Lane Group Flow (vph)	133	1192	289	176	570	91	132	592	83	214	1293	30
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	68.5	58.4	160.0	69.5	58.9	160.0	9.7	53.8	53.8	15.2	59.3	59.3
Effective Green, g (s)	68.5	58.4	160.0	69.5	58.9	160.0	9.7	53.8	53.8	15.2	59.3	59.3
Actuated g/C Ratio	0.43	0.36	1.00	0.43	0.37	1.00	0.06	0.34	0.34	0.09	0.37	0.37
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	372	1840	1617	198	1755	1526	210	1191	538	329	1326	576
v/s Ratio Prot	0.02	0.24		c0.06	0.12		0.04	0.17		c0.06	c0.36	
v/s Ratio Perm	0.13		c0.18	c0.33		0.06			0.05			0.02
v/c Ratio	0.36	0.65	0.18	0.89	0.32	0.06	0.63	0.50	0.15	0.65	0.98	0.05
Uniform Delay, d1	28.4	42.2	0.0	32.3	36.3	0.0	73.4	42.3	37.2	69.8	49.6	32.3
Progression Factor	1.00	1.00	1.00	1.88	1.06	1.00	1.02	0.99	0.95	1.00	1.00	1.00
Incremental Delay, d2	0.6	1.8	0.2	34.2	0.5	0.1	5.6	0.3	0.1	4.6	18.9	0.0
Delay (s)	29.0	44.0	0.2	95.0	38.8	0.1	80.6	42.1	35.5	74.4	68.5	32.4
Level of Service	C	D	A	F	D	A	F	D	D	E	E	C
Approach Delay (s)		35.0			46.4			46.7			67.4	
Approach LOS		C			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	49.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



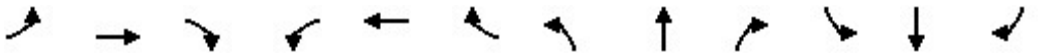
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	19	122	32	22	70	71	762	8	26	1640	34
Future Volume (vph)	55	19	122	32	22	70	71	762	8	26	1640	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1666		1772	3574		1690	3563	
Flt Permitted	0.58	1.00		0.31	1.00		0.08	1.00		0.34	1.00	
Satd. Flow (perm)	1106	1622		583	1666		151	3574		599	3563	
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)	60	21	133	35	24	76	77	828	9	28	1783	37
RTOR Reduction (vph)	0	94	0	0	70	0	0	0	0	0	0	0
Lane Group Flow (vph)	60	60	0	35	30	0	77	837	0	28	1820	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	12.8	12.8		12.8	12.8		134.2	134.2		120.1	120.1	
Effective Green, g (s)	12.8	12.8		12.8	12.8		134.2	134.2		120.1	120.1	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.84	0.84		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	88	129		46	133		218	2997		449	2674	
v/s Ratio Prot		0.04			0.02		c0.02	0.23			c0.51	
v/s Ratio Perm	0.05			c0.06			0.27			0.05		
v/c Ratio	0.68	0.47		0.76	0.23		0.35	0.28		0.06	0.68	
Uniform Delay, d1	71.6	70.3		72.1	69.0		11.2	2.7		5.2	10.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.39	0.73	
Incremental Delay, d2	19.6	2.7		52.3	0.9		1.0	0.2		0.2	0.8	
Delay (s)	91.2	73.0		124.4	69.8		12.2	2.9		2.2	8.3	
Level of Service	F	E		F	E		B	A		A	A	
Approach Delay (s)		78.1			84.0			3.7			8.2	
Approach LOS		E			F			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



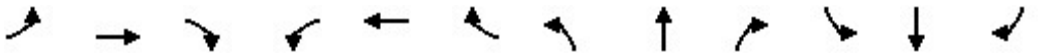
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	45	1570	721	57	342	91
Future Volume (vph)	45	1570	721	57	342	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	7.1	7.1
Lane Util. Factor	1.00	0.91	0.91	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1738	5092	4768	1555	1807	1570
Flt Permitted	0.32	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	587	5092	4768	1555	1807	1570
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	51	1764	810	64	384	102
RTOR Reduction (vph)	0	0	0	17	0	72
Lane Group Flow (vph)	51	1764	810	47	384	30
Heavy Vehicles (%)	5%	3%	10%	5%	1%	4%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		8	
Permitted Phases	2			6		8
Actuated Green, G (s)	107.1	107.1	107.1	107.1	39.5	39.5
Effective Green, g (s)	107.1	107.1	107.1	107.1	39.5	39.5
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.25	0.25
Clearance Time (s)	6.3	6.3	6.3	6.3	7.1	7.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	392	3408	3191	1040	446	387
v/s Ratio Prot		c0.35	0.17		c0.21	
v/s Ratio Perm	0.09			0.03		0.02
v/c Ratio	0.13	0.52	0.25	0.05	0.86	0.08
Uniform Delay, d1	9.6	13.4	10.5	9.0	57.6	46.3
Progression Factor	0.76	0.65	0.91	0.82	1.00	1.00
Incremental Delay, d2	0.6	0.5	0.0	0.0	15.5	0.1
Delay (s)	7.9	9.3	9.7	7.4	73.2	46.3
Level of Service	A	A	A	A	E	D
Approach Delay (s)		9.2	9.5		67.5	
Approach LOS		A	A		E	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	13.4
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



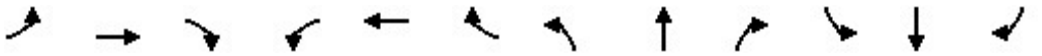
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	1533	269	63	698	126	51	38	33	34	45	58
Future Volume (vph)	132	1533	269	63	698	126	51	38	33	34	45	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1513		1772	1921	1601
Flt Permitted	0.35	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.71	1.00	1.00
Satd. Flow (perm)	675	5092	1601	1426	4768	1601	1315	1513		1320	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	142	1648	289	68	751	135	55	41	35	37	48	62
RTOR Reduction (vph)	0	0	22	0	0	27	0	26	0	0	0	57
Lane Group Flow (vph)	142	1648	267	68	751	108	55	50	0	37	48	5
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	124.3	116.7	116.7	13.1	122.2	122.2	12.8	12.8		12.8	12.8	12.8
Effective Green, g (s)	124.3	116.7	116.7	13.1	122.2	122.2	12.8	12.8		12.8	12.8	12.8
Actuated g/C Ratio	0.78	0.73	0.73	0.08	0.76	0.76	0.08	0.08		0.08	0.08	0.08
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	578	3713	1167	116	3641	1222	105	121		105	153	128
v/s Ratio Prot	0.01	c0.32		c0.05	0.16			0.03			0.02	
v/s Ratio Perm	0.18		0.17			0.07	c0.04			0.03		0.00
v/c Ratio	0.25	0.44	0.23	0.59	0.21	0.09	0.52	0.42		0.35	0.31	0.04
Uniform Delay, d1	4.3	8.7	7.0	70.8	5.3	4.8	70.7	70.0		69.7	69.5	67.9
Progression Factor	0.56	0.76	0.74	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.4	7.4	0.0	0.0	4.7	2.3		2.0	1.2	0.1
Delay (s)	2.6	6.9	5.6	78.2	5.3	4.8	75.3	72.3		71.7	70.6	68.0
Level of Service	A	A	A	E	A	A	E	E		E	E	E
Approach Delay (s)		6.4			10.5			73.6			69.8	
Approach LOS		A			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



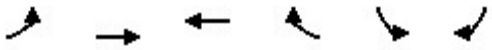
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	188	634	93	198	1320	380	214	1086	88	161	675	135
Future Volume (vph)	188	634	93	198	1320	380	214	1086	88	161	675	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.07	1.00	1.00	0.35	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	136	4856	1633	659	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	194	654	96	204	1361	392	221	1120	91	166	696	139
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	53	0	0	92
Lane Group Flow (vph)	194	654	96	204	1361	392	221	1120	38	166	696	47
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	72.6	58.0	160.0	67.4	55.4	160.0	13.4	57.3	57.3	10.7	54.6	54.6
Effective Green, g (s)	72.6	58.0	160.0	67.4	55.4	160.0	13.4	57.3	57.3	10.7	54.6	54.6
Actuated g/C Ratio	0.45	0.36	1.00	0.42	0.35	1.00	0.08	0.36	0.36	0.07	0.34	0.34
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	215	1760	1633	363	1763	1617	296	1294	579	227	1233	557
v/s Ratio Prot	c0.08	0.13		0.04	0.27		c0.06	c0.31		0.05	0.19	
v/s Ratio Perm	c0.32		0.06	0.19		c0.24			0.02			0.03
v/c Ratio	0.90	0.37	0.06	0.56	0.77	0.24	0.75	0.87	0.07	0.73	0.56	0.09
Uniform Delay, d1	45.0	37.6	0.0	30.4	46.7	0.0	71.6	47.8	33.8	73.2	43.0	35.8
Progression Factor	1.00	1.00	1.00	0.72	0.86	1.00	0.97	1.04	1.66	1.00	1.00	1.00
Incremental Delay, d2	35.8	0.6	0.1	1.8	3.0	0.3	9.1	5.8	0.0	11.5	0.6	0.1
Delay (s)	80.8	38.2	0.1	23.7	43.4	0.3	78.5	55.7	56.1	84.7	43.6	35.8
Level of Service	F	D	A	C	D	A	E	E	E	F	D	D
Approach Delay (s)		43.1			32.7			59.2			49.3	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	44.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



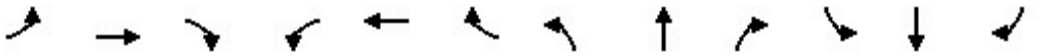
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	13	38	19	5	39	62	1355	10	39	936	44
Future Volume (vph)	40	13	38	19	5	39	62	1355	10	39	936	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.87		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1671		1825	1664		1789	3610		1825	3558	
Flt Permitted	0.73	1.00		0.72	1.00		0.25	1.00		0.18	1.00	
Satd. Flow (perm)	1397	1671		1387	1664		474	3610		355	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	42	14	40	20	5	41	65	1426	11	41	985	46
RTOR Reduction (vph)	0	38	0	0	39	0	0	0	0	0	1	0
Lane Group Flow (vph)	42	16	0	20	7	0	65	1437	0	41	1030	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	9.1	9.1		9.1	9.1		137.9	137.9		127.7	127.7	
Effective Green, g (s)	9.1	9.1		9.1	9.1		137.9	137.9		127.7	127.7	
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.86	0.86		0.80	0.80	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	79	95		78	94		451	3111		283	2839	
v/s Ratio Prot		0.01			0.00		0.00	c0.40			0.29	
v/s Ratio Perm	c0.03			0.01			0.12			0.12		
v/c Ratio	0.53	0.17		0.26	0.08		0.14	0.46		0.14	0.36	
Uniform Delay, d1	73.4	71.9		72.2	71.5		2.1	2.5		3.7	4.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.43	1.55	
Incremental Delay, d2	6.7	0.9		1.7	0.4		0.1	0.5		1.0	0.3	
Delay (s)	80.1	72.7		74.0	71.8		2.3	3.0		6.2	7.4	
Level of Service	F	E		E	E		A	A		A	A	
Approach Delay (s)		75.9			72.5			3.0			7.4	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	832	1827	320	98	41
Future Volume (vph)	80	832	1827	320	98	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	7.1	7.1
Lane Util. Factor	1.00	0.91	0.91	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1755	4902	5092	1633	1722	1633
Flt Permitted	0.09	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	168	4902	5092	1633	1722	1633
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	85	885	1944	340	104	44
RTOR Reduction (vph)	0	0	0	23	0	16
Lane Group Flow (vph)	85	885	1944	317	104	28
Heavy Vehicles (%)	4%	7%	3%	0%	6%	0%
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		2	6		8	
Permitted Phases	2			6		8
Actuated Green, G (s)	131.4	131.4	131.4	131.4	15.2	15.2
Effective Green, g (s)	131.4	131.4	131.4	131.4	15.2	15.2
Actuated g/C Ratio	0.82	0.82	0.82	0.82	0.09	0.09
Clearance Time (s)	6.3	6.3	6.3	6.3	7.1	7.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	137	4025	4181	1341	163	155
v/s Ratio Prot		0.18	0.38		c0.06	
v/s Ratio Perm	c0.50			0.19		0.02
v/c Ratio	0.62	0.22	0.46	0.24	0.64	0.18
Uniform Delay, d1	5.2	3.1	4.1	3.2	69.7	66.7
Progression Factor	3.12	1.32	1.57	1.28	1.00	1.00
Incremental Delay, d2	18.2	0.1	0.1	0.1	7.9	0.6
Delay (s)	34.5	4.2	6.5	4.1	77.7	67.2
Level of Service	C	A	A	A	E	E
Approach Delay (s)		6.9	6.2		74.6	
Approach LOS		A	A		E	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	13.4
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

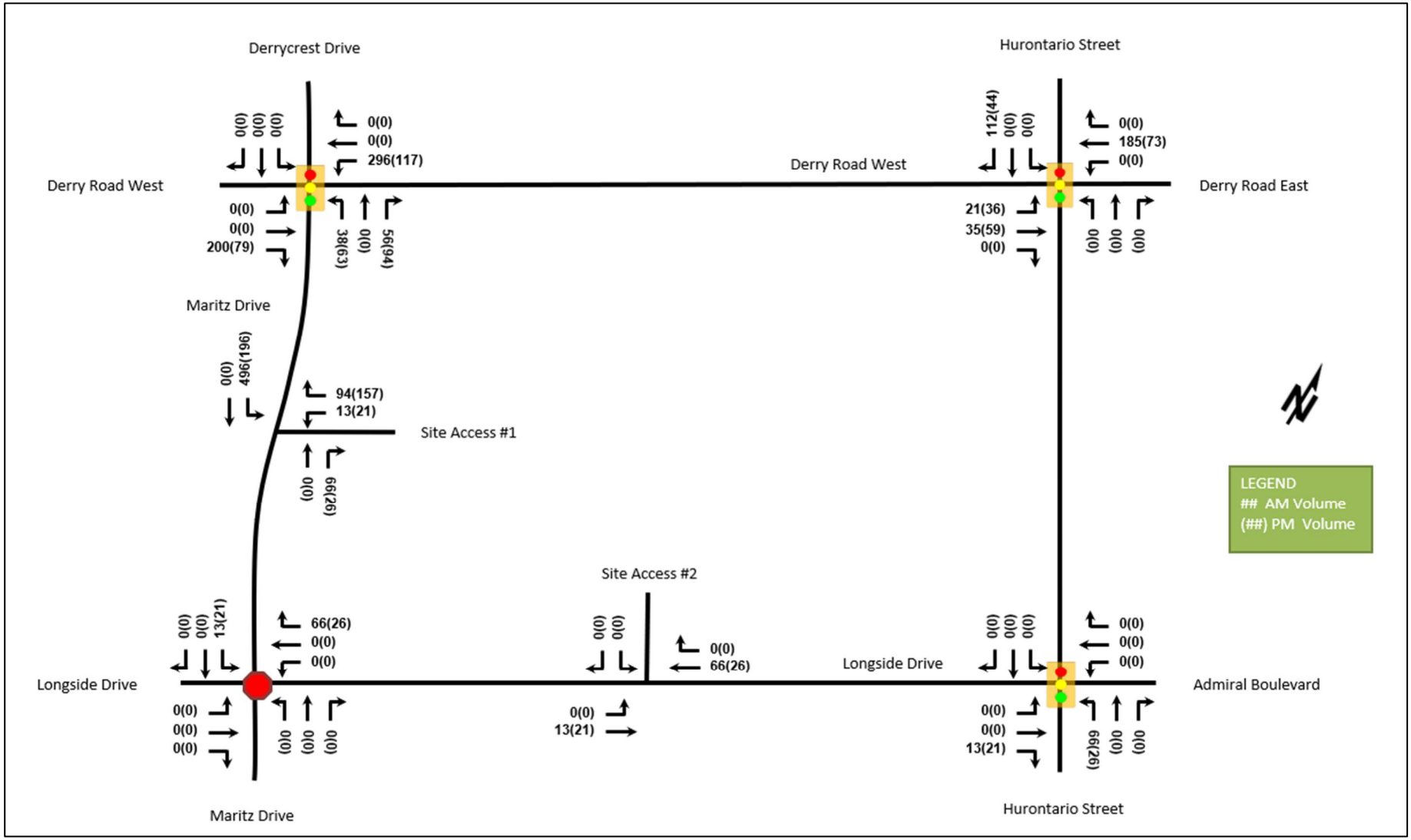


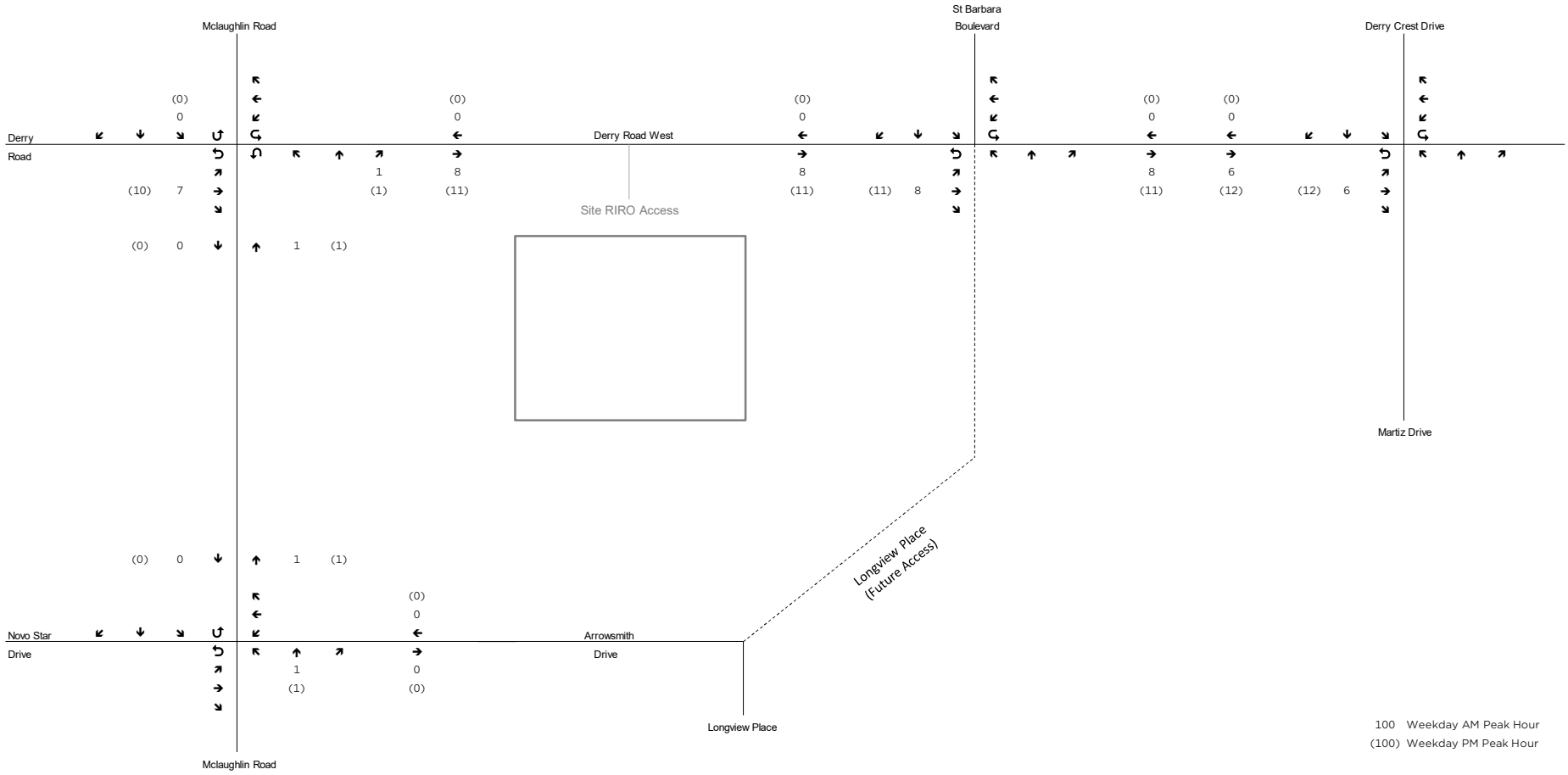
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	821	85	25	1414	13	464	111	95	2	16	9
Future Volume (vph)	44	821	85	25	1414	13	464	111	95	2	16	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1732		1825	1921	1617
Flt Permitted	0.12	1.00	1.00	0.31	1.00	1.00	0.49	1.00		0.85	1.00	1.00
Satd. Flow (perm)	233	4902	1512	537	5142	1512	910	1732		1635	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	47	873	90	27	1504	14	494	118	101	2	17	10
RTOR Reduction (vph)	0	0	19	0	0	5	0	21	0	0	0	10
Lane Group Flow (vph)	47	873	71	27	1504	9	494	198	0	2	17	0
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	106.4	106.4	106.4	97.2	97.2	97.2	39.7	39.7		4.7	4.7	4.7
Effective Green, g (s)	106.4	106.4	106.4	97.2	97.2	97.2	39.7	39.7		4.7	4.7	4.7
Actuated g/C Ratio	0.67	0.67	0.67	0.61	0.61	0.61	0.25	0.25		0.03	0.03	0.03
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	211	3259	1005	326	3123	918	395	429		48	56	47
v/s Ratio Prot	0.01	c0.18			c0.29		c0.25	0.11			0.01	
v/s Ratio Perm	0.14		0.05	0.05		0.01	c0.06			0.00		0.00
v/c Ratio	0.22	0.27	0.07	0.08	0.48	0.01	1.25	0.46		0.04	0.30	0.01
Uniform Delay, d1	11.5	10.9	9.4	13.0	17.4	12.4	58.6	51.1		75.5	76.0	75.4
Progression Factor	0.83	0.99	1.24	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	0.1	0.1	0.1	0.0	132.2	0.8		0.4	3.1	0.1
Delay (s)	10.1	11.0	11.9	13.1	17.5	12.4	190.8	51.9		75.8	79.1	75.4
Level of Service	B	B	B	B	B	B	F	D		E	E	E
Approach Delay (s)		11.0			17.4			148.1			77.6	
Approach LOS		B			B			F			E	

Intersection Summary			
HCM 2000 Control Delay	44.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	20.9
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Appendix E:
Background Development

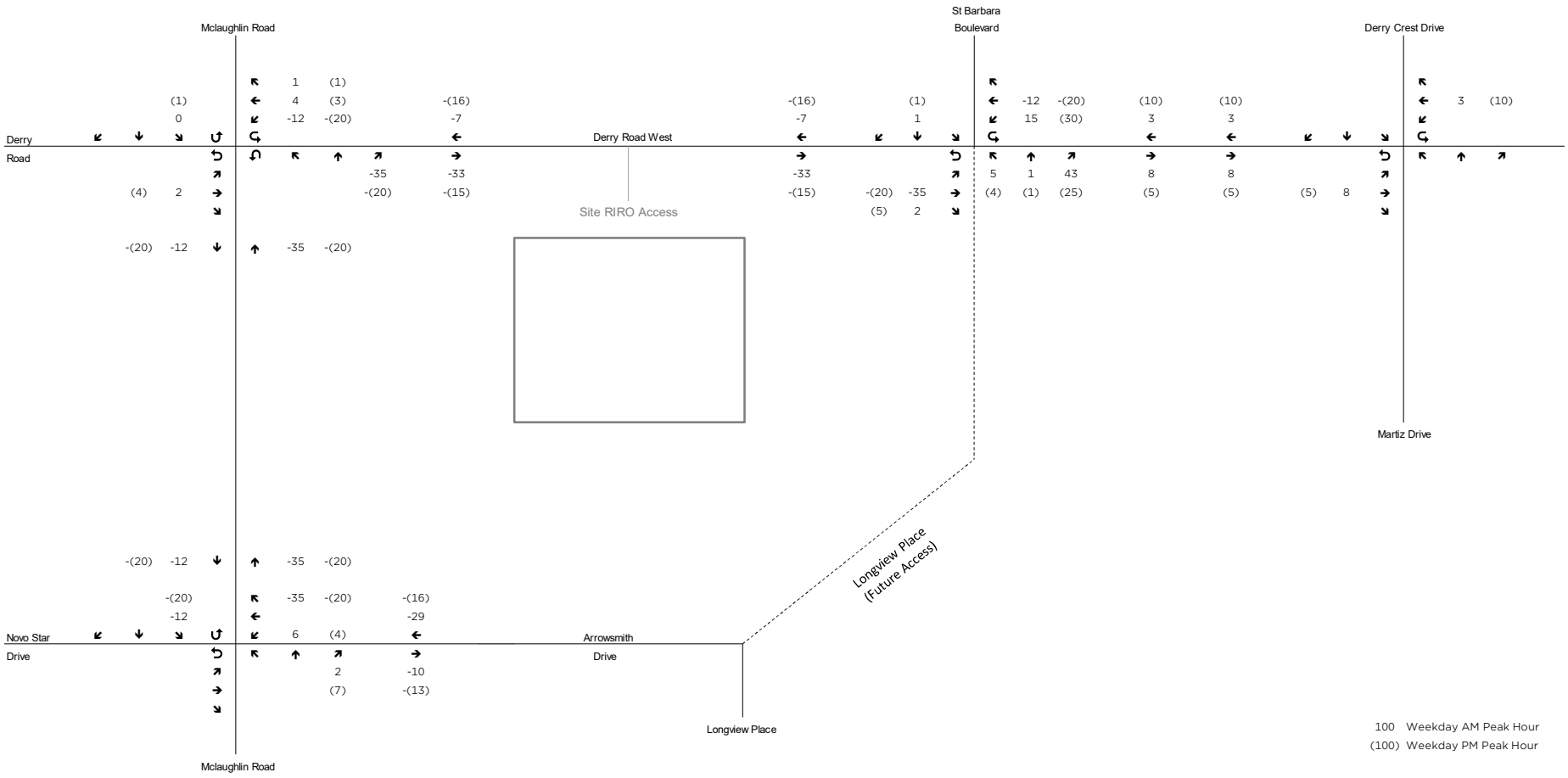
Figure 10: New Site Generated Auto Volumes





376 & 390 Derry Road

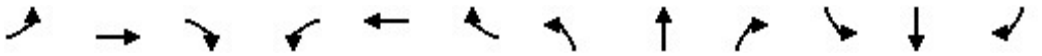
Figure A2 – 250 Derry Road West - 6-storey self-storage facility



376 & 390 Derry Road

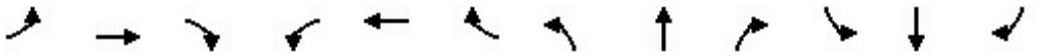
Figure A3 – 320 Derry Road West - Proposed Residential Development

Appendix F:
Traffic Operations
Future Background Conditions



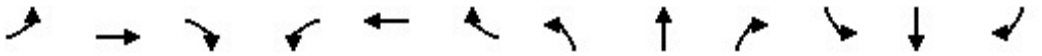
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	1374	287	171	601	91	131	589	147	214	1286	80
Future Volume (vph)	132	1374	287	171	601	91	131	589	147	214	1286	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.35	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	661	5043	1617	192	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	135	1402	293	174	613	93	134	601	150	218	1312	82
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	97	0	0	50
Lane Group Flow (vph)	135	1402	293	174	613	93	134	601	53	218	1312	32
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	46.5	37.4	125.0	48.1	38.2	125.0	7.0	43.3	43.3	12.4	48.7	48.7
Effective Green, g (s)	46.5	37.4	125.0	48.1	38.2	125.0	7.0	43.3	43.3	12.4	48.7	48.7
Actuated g/C Ratio	0.37	0.30	1.00	0.38	0.31	1.00	0.06	0.35	0.35	0.10	0.39	0.39
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	326	1508	1617	196	1457	1526	194	1227	554	344	1394	605
v/s Ratio Prot	0.03	c0.28		c0.07	0.13		0.04	0.17		c0.06	c0.37	
v/s Ratio Perm	0.12		c0.18	0.27		0.06			0.03			0.02
v/c Ratio	0.41	0.93	0.18	0.89	0.42	0.06	0.69	0.49	0.09	0.63	0.94	0.05
Uniform Delay, d1	26.8	42.5	0.0	30.6	34.6	0.0	57.9	32.2	27.6	54.1	36.8	23.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	11.6	0.2	34.8	0.9	0.1	10.1	0.3	0.1	3.8	12.6	0.0
Delay (s)	27.7	54.1	0.2	65.4	35.5	0.1	68.1	32.5	27.7	57.9	49.4	23.8
Level of Service	C	D	A	E	D	A	E	C	C	E	D	C
Approach Delay (s)		43.5			37.6			37.0			49.3	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	96.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



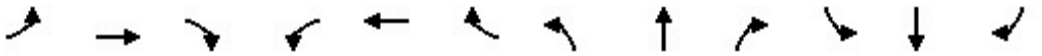
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	19	124	38	22	36	72	794	10	14	1673	35
Future Volume (vph)	56	19	124	38	22	36	72	794	10	14	1673	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.91		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1685		1772	3573		1690	3563	
Flt Permitted	0.72	1.00		0.31	1.00		0.08	1.00		0.32	1.00	
Satd. Flow (perm)	1375	1622		583	1685		142	3573		578	3563	
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)	61	21	135	41	24	39	78	863	11	15	1818	38
RTOR Reduction (vph)	0	92	0	0	36	0	0	0	0	0	0	0
Lane Group Flow (vph)	61	64	0	41	27	0	78	874	0	15	1856	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	12.8	12.8		12.8	12.8		134.2	134.2		120.1	120.1	
Effective Green, g (s)	12.8	12.8		12.8	12.8		134.2	134.2		120.1	120.1	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.84	0.84		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	110	129		46	134		211	2996		433	2674	
v/s Ratio Prot		0.04			0.02		c0.02	0.24			c0.52	
v/s Ratio Perm	0.04			c0.07			0.29			0.03		
v/c Ratio	0.55	0.50		0.89	0.20		0.37	0.29		0.03	0.69	
Uniform Delay, d1	70.9	70.5		72.9	68.8		12.2	2.8		5.1	10.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.9	3.0		91.9	0.7		1.1	0.2		0.1	1.5	
Delay (s)	76.8	73.5		164.8	69.6		13.3	3.0		5.3	11.9	
Level of Service	E	E		F	E		B	A		A	B	
Approach Delay (s)		74.4			107.1			3.8			11.8	
Approach LOS		E			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



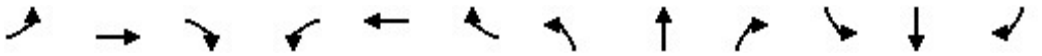
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	1767	2	15	758	58	5	1	43	347	1	92
Future Volume (vph)	46	1767	2	15	758	58	5	1	43	347	1	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	5092	1601	1789	4768	1555	1789	1607		1807	1573	
Flt Permitted	0.32	1.00	1.00	0.05	1.00	1.00	0.69	1.00		0.48	1.00	
Satd. Flow (perm)	585	5092	1601	99	4768	1555	1299	1607		920	1573	
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.89	0.89	0.92	0.92	0.92	0.89	0.92	0.89
Adj. Flow (vph)	52	1985	2	16	852	65	5	1	47	390	1	103
RTOR Reduction (vph)	0	0	1	0	0	24	0	44	0	0	71	0
Lane Group Flow (vph)	52	1985	1	16	852	41	5	4	0	390	33	0
Heavy Vehicles (%)	5%	3%	2%	2%	10%	5%	2%	2%	2%	1%	2%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Effective Green, g (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Actuated g/C Ratio	0.57	0.57	0.57	0.63	0.63	0.63	0.06	0.06		0.27	0.27	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	334	2914	916	95	2989	974	79	98		412	430	
v/s Ratio Prot		c0.39		0.00	c0.18			0.00		c0.17	0.02	
v/s Ratio Perm	0.09		0.00	0.10		0.03	0.00			c0.09		
v/c Ratio	0.16	0.68	0.00	0.17	0.29	0.04	0.06	0.04		0.95	0.08	
Uniform Delay, d1	13.1	19.5	11.9	14.6	11.0	9.3	57.5	57.4		44.2	35.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	1.3	0.0	0.8	0.1	0.0	0.3	0.2		30.7	0.1	
Delay (s)	14.0	20.8	11.9	15.4	11.1	9.3	57.8	57.6		74.9	35.1	
Level of Service	B	C	B	B	B	A	E	E		E	D	
Approach Delay (s)		20.6			11.0			57.6			66.5	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



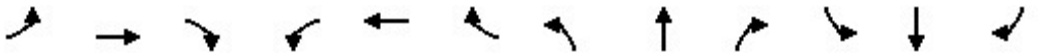
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	1570	473	360	712	128	90	39	89	35	46	59
Future Volume (vph)	134	1570	473	360	712	128	90	39	89	35	46	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1366		1772	1921	1601
Flt Permitted	0.35	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.55	1.00	1.00
Satd. Flow (perm)	665	5092	1601	1426	4768	1601	1314	1366		1019	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	144	1688	509	387	766	138	97	42	96	38	49	63
RTOR Reduction (vph)	0	0	53	0	0	32	0	76	0	0	0	56
Lane Group Flow (vph)	144	1688	456	387	766	106	97	62	0	38	49	7
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	65.7	57.7	57.7	53.6	103.3	103.3	16.3	16.3		16.3	16.3	16.3
Effective Green, g (s)	65.7	57.7	57.7	53.6	103.3	103.3	16.3	16.3		16.3	16.3	16.3
Actuated g/C Ratio	0.45	0.40	0.40	0.37	0.71	0.71	0.11	0.11		0.11	0.11	0.11
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	364	2026	637	527	3396	1140	147	153		114	215	179
v/s Ratio Prot	0.02	c0.33		c0.27	0.16			0.05			0.03	
v/s Ratio Perm	0.16		0.28			0.07	c0.07			0.04		0.00
v/c Ratio	0.40	0.83	0.72	0.73	0.23	0.09	0.66	0.40		0.33	0.23	0.04
Uniform Delay, d1	27.7	39.3	36.7	39.5	7.1	6.4	61.7	59.8		59.3	58.6	57.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	4.2	6.8	5.3	0.0	0.0	10.2	1.7		1.7	0.5	0.1
Delay (s)	28.4	43.5	43.5	44.8	7.2	6.5	71.9	61.6		61.1	59.2	57.5
Level of Service	C	D	D	D	A	A	E	E		E	E	E
Approach Delay (s)		42.6			18.4			65.8			58.9	
Approach LOS		D			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



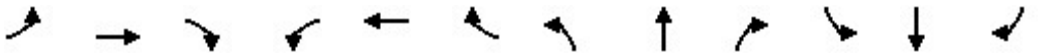
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	722	94	193	1394	387	217	1102	84	164	685	137
Future Volume (vph)	191	722	94	193	1394	387	217	1102	84	164	685	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.09	1.00	1.00	0.30	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	174	4856	1633	568	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	197	744	97	199	1437	399	224	1136	87	169	706	141
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	57	0	0	95
Lane Group Flow (vph)	197	744	97	199	1437	399	224	1136	30	169	706	46
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	54.2	44.1	125.0	52.8	43.4	125.0	9.0	42.5	42.5	7.0	40.5	40.5
Effective Green, g (s)	54.2	44.1	125.0	52.8	43.4	125.0	9.0	42.5	42.5	7.0	40.5	40.5
Actuated g/C Ratio	0.43	0.35	1.00	0.42	0.35	1.00	0.07	0.34	0.34	0.06	0.32	0.32
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	208	1713	1633	333	1767	1617	254	1228	549	190	1170	529
v/s Ratio Prot	c0.08	0.15		0.04	0.28		c0.06	c0.31		0.05	0.20	
v/s Ratio Perm	c0.33		0.06	0.21		c0.25			0.02			0.03
v/c Ratio	0.95	0.43	0.06	0.60	0.81	0.25	0.88	0.93	0.05	0.89	0.60	0.09
Uniform Delay, d1	31.0	30.9	0.0	23.7	37.1	0.0	57.5	39.7	27.7	58.6	35.5	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	47.1	0.8	0.1	2.9	4.2	0.4	28.0	11.7	0.0	35.8	0.9	0.1
Delay (s)	78.0	31.7	0.1	26.6	41.3	0.4	85.5	51.4	27.8	94.4	36.4	29.5
Level of Service	E	C	A	C	D	A	F	D	C	F	D	C
Approach Delay (s)		37.5			31.9			55.3			45.1	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



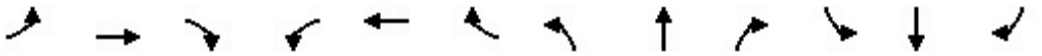
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	13	39	23	5	20	63	1391	17	20	962	45
Future Volume (vph)	41	13	39	23	5	20	63	1391	17	20	962	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1669		1825	1688		1789	3608		1825	3558	
Flt Permitted	0.74	1.00		0.72	1.00		0.24	1.00		0.18	1.00	
Satd. Flow (perm)	1422	1669		1385	1688		456	3608		339	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	43	14	41	24	5	21	66	1464	18	21	1013	47
RTOR Reduction (vph)	0	39	0	0	20	0	0	0	0	0	1	0
Lane Group Flow (vph)	43	16	0	24	6	0	66	1482	0	21	1059	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	9.1	9.1		9.1	9.1		137.9	137.9		126.6	126.6	
Effective Green, g (s)	9.1	9.1		9.1	9.1		137.9	137.9		126.6	126.6	
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.86	0.86		0.79	0.79	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	80	94		78	96		445	3109		268	2815	
v/s Ratio Prot		0.01			0.00		0.01	c0.41			0.30	
v/s Ratio Perm	c0.03			0.02			0.12			0.06		
v/c Ratio	0.54	0.17		0.31	0.06		0.15	0.48		0.08	0.38	
Uniform Delay, d1	73.4	71.9		72.4	71.4		2.2	2.6		3.7	5.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	0.9		2.2	0.3		0.2	0.5		0.6	0.4	
Delay (s)	80.2	72.8		74.7	71.7		2.4	3.1		4.3	5.3	
Level of Service	F	E		E	E		A	A		A	A	
Approach Delay (s)		76.0			73.1			3.1			5.3	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.3%	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)	81	915	5	30	1898	325	4	1	25	99	1	42
Future Volume (vph)	81	915	5	30	1898	325	4	1	25	99	1	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4902	1601	1789	5092	1633	1789	1611		1722	1638	
Flt Permitted	0.08	1.00	1.00	0.25	1.00	1.00	0.73	1.00		0.95	1.00	
Satd. Flow (perm)	149	4902	1601	476	5092	1633	1369	1611		1722	1638	
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94
Adj. Flow (vph)	86	973	5	33	2019	346	4	1	27	105	1	45
RTOR Reduction (vph)	0	0	2	0	0	26	0	26	0	0	3	0
Lane Group Flow (vph)	86	973	3	33	2019	320	4	2	0	105	43	0
Heavy Vehicles (%)	4%	7%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	99.1	99.1	99.1	108.8	108.8	108.8	6.0	6.0		14.7	30.4	
Effective Green, g (s)	99.1	99.1	99.1	108.8	108.8	108.8	6.0	6.0		14.7	30.4	
Actuated g/C Ratio	0.66	0.66	0.66	0.73	0.73	0.73	0.04	0.04		0.10	0.20	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	98	3238	1057	390	3693	1184	54	64		168	331	
v/s Ratio Prot		0.20		0.00	c0.40			0.00		c0.06	c0.03	
v/s Ratio Perm	c0.58		0.00	0.06		0.20	0.00					
v/c Ratio	0.88	0.30	0.00	0.08	0.55	0.27	0.07	0.03		0.62	0.13	
Uniform Delay, d1	20.6	10.8	8.7	6.2	9.4	7.0	69.3	69.2		65.0	49.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	62.0	0.2	0.0	0.1	0.2	0.1	0.6	0.2		7.1	0.2	
Delay (s)	82.5	11.0	8.7	6.3	9.5	7.2	69.9	69.4		72.1	49.1	
Level of Service	F	B	A	A	A	A	E	E		E	D	
Approach Delay (s)		16.8			9.2			69.5			65.1	
Approach LOS		B			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

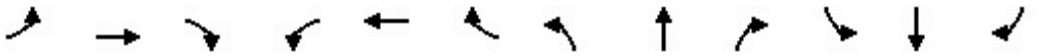


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	850	165	142	1445	13	534	113	190	2	16	9
Future Volume (vph)	45	850	165	142	1445	13	534	113	190	2	16	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1667		1825	1921	1617
Flt Permitted	0.08	1.00	1.00	0.30	1.00	1.00	0.51	1.00		0.91	1.00	1.00
Satd. Flow (perm)	154	4902	1512	520	5142	1512	944	1667		1746	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	48	904	176	151	1537	14	568	120	202	2	17	10
RTOR Reduction (vph)	0	0	38	0	0	8	0	39	0	0	0	10
Lane Group Flow (vph)	48	904	138	151	1537	6	568	283	0	2	17	0
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	65.2	65.2	65.2	55.7	55.7	55.7	45.9	45.9		4.4	4.4	4.4
Effective Green, g (s)	65.2	65.2	65.2	55.7	55.7	55.7	45.9	45.9		4.4	4.4	4.4
Actuated g/C Ratio	0.52	0.52	0.52	0.45	0.45	0.45	0.37	0.37		0.04	0.04	0.04
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	160	2556	788	231	2291	673	598	612		61	67	56
v/s Ratio Prot	0.01	c0.18			c0.30		c0.29	0.17			0.01	
v/s Ratio Perm	0.14		0.09	0.29		0.00	c0.06			0.00		0.00
v/c Ratio	0.30	0.35	0.18	0.65	0.67	0.01	0.95	0.46		0.03	0.25	0.01
Uniform Delay, d1	18.7	17.5	15.7	27.1	27.4	19.3	36.9	30.1		58.2	58.7	58.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	0.4	0.5	6.5	0.8	0.0	24.6	0.6		0.2	2.0	0.0
Delay (s)	19.7	17.9	16.2	33.6	28.2	19.3	61.5	30.7		58.5	60.7	58.2
Level of Service	B	B	B	C	C	B	E	C		E	E	E
Approach Delay (s)		17.7			28.6			50.4			59.7	
Approach LOS		B			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	20.9
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

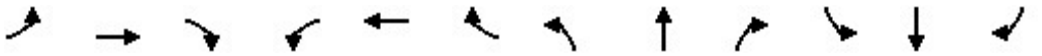
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	1404	295	169	616	94	133	604	150	220	1319	82
Future Volume (vph)	135	1404	295	169	616	94	133	604	150	220	1319	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.34	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	642	5043	1617	187	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	138	1433	301	172	629	96	136	616	153	224	1346	84
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	98	0	0	52
Lane Group Flow (vph)	138	1433	301	172	629	96	136	616	55	224	1346	32
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	47.5	38.8	125.0	48.3	39.2	125.0	7.0	43.0	43.0	12.1	48.1	48.1
Effective Green, g (s)	47.5	38.8	125.0	48.3	39.2	125.0	7.0	43.0	43.0	12.1	48.1	48.1
Actuated g/C Ratio	0.38	0.31	1.00	0.39	0.31	1.00	0.06	0.34	0.34	0.10	0.38	0.38
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	322	1565	1617	185	1495	1526	194	1219	550	335	1377	598
v/s Ratio Prot	0.03	0.28		c0.07	0.13		0.04	0.17		c0.06	c0.38	
v/s Ratio Perm	0.13		c0.19	c0.29		0.06			0.03			0.02
v/c Ratio	0.43	0.92	0.19	0.93	0.42	0.06	0.70	0.51	0.10	0.67	0.98	0.05
Uniform Delay, d1	26.2	41.5	0.0	30.6	33.9	0.0	58.0	32.6	27.9	54.5	37.9	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	9.9	0.3	45.8	0.9	0.1	10.9	0.3	0.1	5.0	18.9	0.0
Delay (s)	27.1	51.4	0.3	76.4	34.8	0.1	68.8	32.9	27.9	59.5	56.8	24.2
Level of Service	C	D	A	E	C	A	E	C	C	E	E	C
Approach Delay (s)		41.4			39.1			37.5			55.5	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	44.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



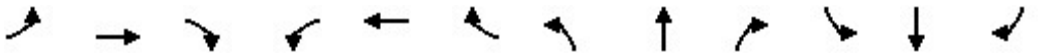
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	20	127	39	23	38	74	814	10	15	1715	35
Future Volume (vph)	57	20	127	39	23	38	74	814	10	15	1715	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.91		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1685		1772	3573		1690	3563	
Flt Permitted	0.71	1.00		0.31	1.00		0.07	1.00		0.32	1.00	
Satd. Flow (perm)	1372	1622		574	1685		131	3573		565	3563	
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)	62	22	138	42	25	41	80	885	11	16	1864	38
RTOR Reduction (vph)	0	91	0	0	38	0	0	0	0	0	1	0
Lane Group Flow (vph)	62	69	0	42	28	0	80	896	0	16	1901	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	13.0	13.0		13.0	13.0		134.0	134.0		119.9	119.9	
Effective Green, g (s)	13.0	13.0		13.0	13.0		134.0	134.0		119.9	119.9	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.84	0.84		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	111	131		46	136		203	2992		423	2670	
v/s Ratio Prot		0.04			0.02		c0.02	0.25			c0.53	
v/s Ratio Perm	0.05			c0.07			0.31			0.03		
v/c Ratio	0.56	0.53		0.91	0.21		0.39	0.30		0.04	0.71	
Uniform Delay, d1	70.7	70.5		72.9	68.7		14.1	2.8		5.2	10.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.0	3.8		99.4	0.8		1.3	0.3		0.2	1.6	
Delay (s)	76.7	74.3		172.3	69.5		15.3	3.1		5.3	12.4	
Level of Service	E	E		F	E		B	A		A	B	
Approach Delay (s)		75.0			109.5			4.1			12.4	
Approach LOS		E			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



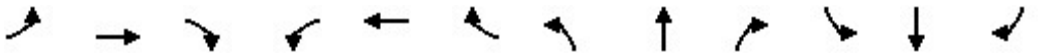
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	1807	2	15	776	59	5	1	43	356	1	95
Future Volume (vph)	47	1807	2	15	776	59	5	1	43	356	1	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	5092	1601	1789	4768	1555	1789	1607		1807	1573	
Flt Permitted	0.31	1.00	1.00	0.05	1.00	1.00	0.69	1.00		0.48	1.00	
Satd. Flow (perm)	573	5092	1601	95	4768	1555	1295	1607		920	1573	
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.89	0.89	0.92	0.92	0.92	0.89	0.92	0.89
Adj. Flow (vph)	53	2030	2	16	872	66	5	1	47	400	1	107
RTOR Reduction (vph)	0	0	1	0	0	24	0	44	0	0	68	0
Lane Group Flow (vph)	53	2030	1	16	872	42	5	4	0	400	40	0
Heavy Vehicles (%)	5%	3%	2%	2%	10%	5%	2%	2%	2%	1%	2%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Effective Green, g (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Actuated g/C Ratio	0.57	0.57	0.57	0.63	0.63	0.63	0.06	0.06		0.27	0.27	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	327	2914	916	93	2989	974	79	98		412	430	
v/s Ratio Prot		c0.40		0.00	c0.18			0.00		c0.18	0.03	
v/s Ratio Perm	0.09		0.00	0.10		0.03	0.00			c0.09		
v/c Ratio	0.16	0.70	0.00	0.17	0.29	0.04	0.06	0.04		0.97	0.09	
Uniform Delay, d1	13.1	19.8	11.9	15.0	11.1	9.3	57.5	57.4		44.7	35.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	1.4	0.0	0.9	0.1	0.0	0.3	0.2		36.6	0.1	
Delay (s)	14.2	21.2	11.9	15.9	11.1	9.3	57.8	57.6		81.2	35.3	
Level of Service	B	C	B	B	B	A	E	E		F	D	
Approach Delay (s)		21.0			11.1			57.6			71.5	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



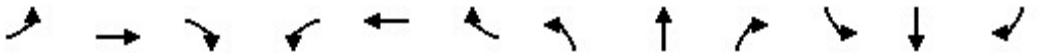
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	1609	480	360	729	131	91	40	90	35	47	60
Future Volume (vph)	137	1609	480	360	729	131	91	40	90	35	47	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1368		1772	1921	1601
Flt Permitted	0.34	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.54	1.00	1.00
Satd. Flow (perm)	653	5092	1601	1426	4768	1601	1312	1368		1008	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	147	1730	516	387	784	141	98	43	97	38	51	65
RTOR Reduction (vph)	0	0	53	0	0	33	0	75	0	0	0	58
Lane Group Flow (vph)	147	1730	463	387	784	108	98	65	0	38	51	7
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	65.6	57.5	57.5	53.6	103.0	103.0	16.5	16.5		16.5	16.5	16.5
Effective Green, g (s)	65.6	57.5	57.5	53.6	103.0	103.0	16.5	16.5		16.5	16.5	16.5
Actuated g/C Ratio	0.45	0.40	0.40	0.37	0.71	0.71	0.11	0.11		0.11	0.11	0.11
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	359	2019	634	527	3386	1137	149	155		114	218	182
v/s Ratio Prot	0.02	c0.34		c0.27	0.16			0.05			0.03	
v/s Ratio Perm	0.16		0.29			0.07	c0.07			0.04		0.00
v/c Ratio	0.41	0.86	0.73	0.73	0.23	0.10	0.66	0.42		0.33	0.23	0.04
Uniform Delay, d1	28.1	40.0	37.2	39.5	7.3	6.5	61.5	59.8		59.2	58.5	57.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	5.0	7.2	5.3	0.0	0.0	10.0	1.8		1.7	0.6	0.1
Delay (s)	28.8	44.9	44.4	44.8	7.3	6.6	71.6	61.6		60.9	59.0	57.3
Level of Service	C	D	D	D	A	A	E	E		E	E	E
Approach Delay (s)		43.8			18.3			65.7			58.8	
Approach LOS		D			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



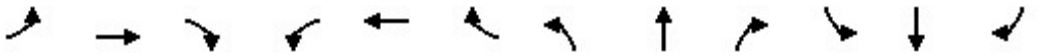
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	196	739	97	198	1428	396	223	1130	87	169	702	140
Future Volume (vph)	196	739	97	198	1428	396	223	1130	87	169	702	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.09	1.00	1.00	0.29	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	175	4856	1633	546	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	202	762	100	204	1472	408	230	1165	90	174	724	144
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	59	0	0	97
Lane Group Flow (vph)	202	762	100	204	1472	408	230	1165	31	174	724	47
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	53.7	43.8	125.0	52.9	43.4	125.0	9.0	42.7	42.7	7.0	40.7	40.7
Effective Green, g (s)	53.7	43.8	125.0	52.9	43.4	125.0	9.0	42.7	42.7	7.0	40.7	40.7
Actuated g/C Ratio	0.43	0.35	1.00	0.42	0.35	1.00	0.07	0.34	0.34	0.06	0.33	0.33
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	205	1701	1633	326	1767	1617	254	1234	552	190	1176	531
v/s Ratio Prot	c0.08	0.16		0.05	0.29		c0.06	c0.32		0.05	0.20	
v/s Ratio Perm	c0.34		0.06	0.22		c0.25			0.02			0.03
v/c Ratio	0.99	0.45	0.06	0.63	0.83	0.25	0.91	0.94	0.06	0.92	0.62	0.09
Uniform Delay, d1	32.0	31.3	0.0	23.8	37.5	0.0	57.6	40.0	27.6	58.7	35.6	29.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	58.2	0.9	0.1	3.7	4.8	0.4	32.4	14.2	0.0	41.9	1.0	0.1
Delay (s)	90.1	32.1	0.1	27.5	42.3	0.4	90.0	54.2	27.7	100.6	36.5	29.3
Level of Service	F	C	A	C	D	A	F	D	C	F	D	C
Approach Delay (s)		40.1			32.6			58.1			46.2	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



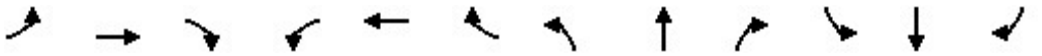
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	14	40	24	5	21	65	1425	17	21	986	46
Future Volume (vph)	42	14	40	24	5	21	65	1425	17	21	986	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1672		1825	1686		1789	3608		1825	3558	
Flt Permitted	0.74	1.00		0.72	1.00		0.23	1.00		0.17	1.00	
Satd. Flow (perm)	1421	1672		1383	1686		442	3608		327	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	44	15	42	25	5	22	68	1500	18	22	1038	48
RTOR Reduction (vph)	0	40	0	0	21	0	0	0	0	0	1	0
Lane Group Flow (vph)	44	17	0	25	6	0	68	1518	0	22	1085	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	9.1	9.1		9.1	9.1		137.9	137.9		126.5	126.5	
Effective Green, g (s)	9.1	9.1		9.1	9.1		137.9	137.9		126.5	126.5	
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.86	0.86		0.79	0.79	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	80	95		78	95		434	3109		258	2813	
v/s Ratio Prot		0.01			0.00		0.01	c0.42			0.30	
v/s Ratio Perm	c0.03			0.02			0.13			0.07		
v/c Ratio	0.55	0.18		0.32	0.07		0.16	0.49		0.09	0.39	
Uniform Delay, d1	73.5	71.9		72.5	71.4		2.3	2.6		3.8	5.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.9	0.9		2.4	0.3		0.2	0.6		0.6	0.4	
Delay (s)	81.4	72.8		74.9	71.7		2.5	3.2		4.4	5.4	
Level of Service	F	E		E	E		A	A		A	A	
Approach Delay (s)		76.6			73.2			3.2			5.4	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



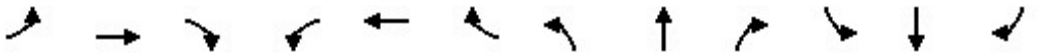
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	936	5	30	1944	333	4	1	25	102	1	43
Future Volume (vph)	83	936	5	30	1944	333	4	1	25	102	1	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4902	1601	1789	5092	1633	1789	1611		1722	1638	
Flt Permitted	0.08	1.00	1.00	0.25	1.00	1.00	0.73	1.00		0.95	1.00	
Satd. Flow (perm)	139	4902	1601	463	5092	1633	1368	1611		1722	1638	
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94
Adj. Flow (vph)	88	996	5	33	2068	354	4	1	27	109	1	46
RTOR Reduction (vph)	0	0	2	0	0	26	0	26	0	0	2	0
Lane Group Flow (vph)	88	996	3	33	2068	328	4	2	0	109	45	0
Heavy Vehicles (%)	4%	7%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	98.8	98.8	98.8	108.5	108.5	108.5	6.0	6.0		15.0	30.7	
Effective Green, g (s)	98.8	98.8	98.8	108.5	108.5	108.5	6.0	6.0		15.0	30.7	
Actuated g/C Ratio	0.66	0.66	0.66	0.72	0.72	0.72	0.04	0.04		0.10	0.20	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	91	3228	1054	380	3683	1181	54	64		172	335	
v/s Ratio Prot		0.20		0.00	c0.41			0.00		c0.06	c0.03	
v/s Ratio Perm	c0.63		0.00	0.06		0.20	0.00					
v/c Ratio	0.97	0.31	0.00	0.09	0.56	0.28	0.07	0.03		0.63	0.13	
Uniform Delay, d1	24.1	11.0	8.8	6.3	9.7	7.2	69.3	69.2		64.9	48.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	85.7	0.2	0.0	0.1	0.2	0.1	0.6	0.2		7.4	0.2	
Delay (s)	109.7	11.2	8.8	6.4	9.9	7.3	69.9	69.4		72.3	49.0	
Level of Service	F	B	A	A	A	A	E	E		E	D	
Approach Delay (s)		19.2			9.4			69.5			65.2	
Approach LOS		B			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



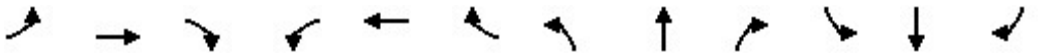
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	871	167	143	1482	14	546	116	193	2	17	9
Future Volume (vph)	46	871	167	143	1482	14	546	116	193	2	17	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1668		1825	1921	1617
Flt Permitted	0.07	1.00	1.00	0.30	1.00	1.00	0.50	1.00		0.89	1.00	1.00
Satd. Flow (perm)	136	4902	1512	508	5142	1512	933	1668		1708	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	49	927	178	152	1577	15	581	123	205	2	18	10
RTOR Reduction (vph)	0	0	38	0	0	8	0	34	0	0	0	10
Lane Group Flow (vph)	49	927	140	152	1577	7	581	294	0	2	18	0
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	64.1	64.1	64.1	54.6	54.6	54.6	47.0	47.0		4.5	4.5	4.5
Effective Green, g (s)	64.1	64.1	64.1	54.6	54.6	54.6	47.0	47.0		4.5	4.5	4.5
Actuated g/C Ratio	0.51	0.51	0.51	0.44	0.44	0.44	0.38	0.38		0.04	0.04	0.04
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	150	2513	775	221	2246	660	612	627		61	69	58
v/s Ratio Prot	0.02	c0.19			c0.31		c0.30	0.18			0.01	
v/s Ratio Perm	0.15		0.09	0.30		0.00	c0.06			0.00		0.00
v/c Ratio	0.33	0.37	0.18	0.69	0.70	0.01	0.95	0.47		0.03	0.26	0.01
Uniform Delay, d1	19.8	18.3	16.4	28.3	28.6	19.9	36.3	29.6		58.1	58.6	58.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.3	0.4	0.5	8.6	1.0	0.0	24.2	0.6		0.2	2.0	0.0
Delay (s)	21.0	18.7	16.9	36.9	29.6	19.9	60.5	30.1		58.4	60.6	58.1
Level of Service	C	B	B	D	C	B	E	C		E	E	E
Approach Delay (s)		18.5			30.2			49.5			59.7	
Approach LOS		B			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	20.9
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	1435	302	179	630	96	137	619	154	224	1352	84
Future Volume (vph)	139	1435	302	179	630	96	137	619	154	224	1352	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.33	1.00	1.00	0.11	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	616	5043	1617	194	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	142	1464	308	183	643	98	140	632	157	229	1380	86
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	97	0	0	52
Lane Group Flow (vph)	142	1464	308	183	643	98	140	632	60	229	1380	34
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	43.4	43.4	12.7	49.1	49.1
Effective Green, g (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	43.4	43.4	12.7	49.1	49.1
Actuated g/C Ratio	0.37	0.30	1.00	0.38	0.30	1.00	0.06	0.35	0.35	0.10	0.39	0.39
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	314	1508	1617	190	1438	1526	194	1230	555	352	1405	610
v/s Ratio Prot	0.03	c0.29		c0.07	0.13		0.04	0.18		c0.07	c0.39	
v/s Ratio Perm	0.13		c0.19	0.29		0.06			0.04			0.02
v/c Ratio	0.45	0.97	0.19	0.96	0.45	0.06	0.72	0.51	0.11	0.65	0.98	0.06
Uniform Delay, d1	26.9	43.3	0.0	31.7	35.2	0.0	58.0	32.4	27.7	54.0	37.5	23.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	17.2	0.3	54.3	1.0	0.1	12.4	0.4	0.1	4.3	19.7	0.0
Delay (s)	28.0	60.5	0.3	85.9	36.2	0.1	70.5	32.8	27.8	58.3	57.3	23.6
Level of Service	C	E	A	F	D	A	E	C	C	E	E	C
Approach Delay (s)		48.4			42.2			37.6			55.7	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	47.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	99.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	20	130	40	23	40	76	834	11	16	1758	36
Future Volume (vph)	59	20	130	40	23	40	76	834	11	16	1758	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.91		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1683		1772	3572		1690	3563	
Flt Permitted	0.71	1.00		0.30	1.00		0.06	1.00		0.31	1.00	
Satd. Flow (perm)	1369	1622		561	1683		118	3572		552	3563	
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)	64	22	141	43	25	43	83	907	12	17	1911	39
RTOR Reduction (vph)	0	89	0	0	39	0	0	0	0	0	1	0
Lane Group Flow (vph)	64	74	0	43	29	0	83	919	0	17	1949	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	13.3	13.3		13.3	13.3		133.7	133.7		119.5	119.5	
Effective Green, g (s)	13.3	13.3		13.3	13.3		133.7	133.7		119.5	119.5	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.84	0.84		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	113	134		46	139		193	2984		412	2661	
v/s Ratio Prot		0.05			0.02		c0.02	0.26			c0.55	
v/s Ratio Perm	0.05			c0.08			0.33			0.03		
v/c Ratio	0.57	0.55		0.93	0.21		0.43	0.31		0.04	0.73	
Uniform Delay, d1	70.6	70.5		72.9	68.4		16.6	2.9		5.3	11.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.4	4.9		107.1	0.7		1.5	0.3		0.2	1.8	
Delay (s)	76.9	75.4		180.0	69.2		18.2	3.2		5.5	13.1	
Level of Service	E	E		F	E		B	A		A	B	
Approach Delay (s)		75.8			112.1			4.4			13.1	
Approach LOS		E			F			A			B	

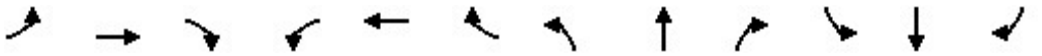
Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	1848	2	15	795	61	5	1	43	365	1	97
Future Volume (vph)	48	1848	2	15	795	61	5	1	43	365	1	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	5092	1601	1789	4768	1555	1789	1607		1807	1573	
Flt Permitted	0.31	1.00	1.00	0.05	1.00	1.00	0.69	1.00		0.48	1.00	
Satd. Flow (perm)	561	5092	1601	95	4768	1555	1292	1607		920	1573	
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.89	0.89	0.92	0.92	0.92	0.89	0.92	0.89
Adj. Flow (vph)	54	2076	2	16	893	69	5	1	47	410	1	109
RTOR Reduction (vph)	0	0	1	0	0	24	0	44	0	0	63	0
Lane Group Flow (vph)	54	2076	1	16	893	45	5	4	0	410	47	0
Heavy Vehicles (%)	5%	3%	2%	2%	10%	5%	2%	2%	2%	1%	2%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Effective Green, g (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Actuated g/C Ratio	0.57	0.57	0.57	0.63	0.63	0.63	0.06	0.06		0.27	0.27	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	321	2914	916	93	2989	974	79	98		412	430	
v/s Ratio Prot		c0.41		0.00	c0.19			0.00		c0.18	0.03	
v/s Ratio Perm	0.10		0.00	0.10		0.03	0.00			c0.09		
v/c Ratio	0.17	0.71	0.00	0.17	0.30	0.05	0.06	0.04		1.00	0.11	
Uniform Delay, d1	13.2	20.1	11.9	15.5	11.1	9.3	57.5	57.4		45.1	35.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	1.5	0.0	0.9	0.1	0.0	0.3	0.2		42.8	0.1	
Delay (s)	14.3	21.6	11.9	16.4	11.2	9.3	57.8	57.6		87.9	35.4	
Level of Service	B	C	B	B	B	A	E	E		F	D	
Approach Delay (s)		21.4			11.1			57.6			76.8	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

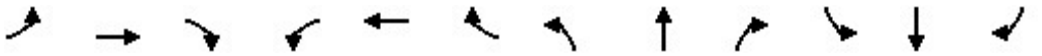
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	1650	487	363	748	134	92	41	91	36	48	62
Future Volume (vph)	141	1650	487	363	748	134	92	41	91	36	48	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1369		1772	1921	1601
Flt Permitted	0.34	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.53	1.00	1.00
Satd. Flow (perm)	639	5092	1601	1426	4768	1601	1311	1369		996	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	152	1774	524	390	804	144	99	44	98	39	52	67
RTOR Reduction (vph)	0	0	54	0	0	33	0	74	0	0	0	59
Lane Group Flow (vph)	152	1774	470	390	804	111	99	68	0	39	52	8
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	64.9	56.7	56.7	54.3	102.8	102.8	16.6	16.6		16.6	16.6	16.6
Effective Green, g (s)	64.9	56.7	56.7	54.3	102.8	102.8	16.6	16.6		16.6	16.6	16.6
Actuated g/C Ratio	0.45	0.39	0.39	0.37	0.71	0.71	0.11	0.11		0.11	0.11	0.11
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	352	1991	626	534	3380	1135	150	156		114	219	183
v/s Ratio Prot	0.02	c0.35		c0.27	0.17			0.05			0.03	
v/s Ratio Perm	0.17		0.29			0.07	c0.08			0.04		0.00
v/c Ratio	0.43	0.89	0.75	0.73	0.24	0.10	0.66	0.43		0.34	0.24	0.04
Uniform Delay, d1	29.0	41.3	38.1	39.0	7.4	6.6	61.5	59.8		59.2	58.4	57.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.9	6.5	8.1	5.1	0.0	0.0	10.4	1.9		1.8	0.6	0.1
Delay (s)	29.9	47.8	46.2	44.1	7.4	6.6	71.9	61.7		61.0	59.0	57.2
Level of Service	C	D	D	D	A	A	E	E		E	E	E
Approach Delay (s)		46.3			18.0			65.9			58.7	
Approach LOS		D			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	38.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



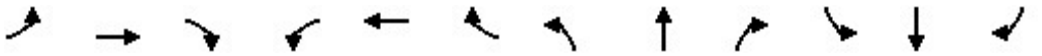
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	201	755	99	204	1462	406	228	1159	89	173	720	144
Future Volume (vph)	201	755	99	204	1462	406	228	1159	89	173	720	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.09	1.00	1.00	0.27	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	180	4856	1633	522	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	207	778	102	210	1507	419	235	1195	92	178	742	148
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	60	0	0	99
Lane Group Flow (vph)	207	778	102	210	1507	419	235	1195	32	178	742	49
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	53.1	42.6	125.0	52.7	42.4	125.0	9.0	43.1	43.1	7.0	41.1	41.1
Effective Green, g (s)	53.1	42.6	125.0	52.7	42.4	125.0	9.0	43.1	43.1	7.0	41.1	41.1
Actuated g/C Ratio	0.42	0.34	1.00	0.42	0.34	1.00	0.07	0.34	0.34	0.06	0.33	0.33
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	214	1654	1633	325	1727	1617	254	1246	557	190	1188	536
v/s Ratio Prot	c0.08	0.16		0.05	0.30		c0.07	c0.33		0.05	0.21	
v/s Ratio Perm	c0.33		0.06	0.22		c0.26			0.02			0.03
v/c Ratio	0.97	0.47	0.06	0.65	0.87	0.26	0.93	0.96	0.06	0.94	0.62	0.09
Uniform Delay, d1	32.3	32.3	0.0	24.1	38.8	0.0	57.7	40.1	27.4	58.8	35.4	29.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.6	1.0	0.1	4.4	6.4	0.4	36.6	16.5	0.0	47.0	1.0	0.1
Delay (s)	83.9	33.3	0.1	28.5	45.2	0.4	94.3	56.5	27.4	105.8	36.5	29.1
Level of Service	F	C	A	C	D	A	F	E	C	F	D	C
Approach Delay (s)		39.8			34.8			60.6			47.0	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	44.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	96.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



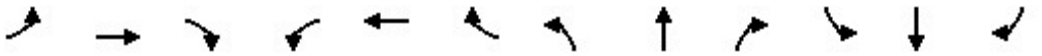
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	14	41	24	5	22	66	1461	18	22	1011	47
Future Volume (vph)	43	14	41	24	5	22	66	1461	18	22	1011	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1670		1825	1684		1789	3608		1825	3558	
Flt Permitted	0.74	1.00		0.72	1.00		0.23	1.00		0.16	1.00	
Satd. Flow (perm)	1420	1670		1382	1684		425	3608		310	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	45	15	43	25	5	23	69	1538	19	23	1064	49
RTOR Reduction (vph)	0	40	0	0	21	0	0	0	0	0	1	0
Lane Group Flow (vph)	45	18	0	25	7	0	69	1557	0	23	1112	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Effective Green, g (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Actuated g/C Ratio	0.07	0.07		0.07	0.07		0.85	0.85		0.78	0.78	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	93	109		90	110		417	3078		242	2781	
v/s Ratio Prot		0.01			0.00		0.01	c0.43			0.31	
v/s Ratio Perm	c0.03			0.02			0.13			0.07		
v/c Ratio	0.48	0.16		0.28	0.06		0.17	0.51		0.10	0.40	
Uniform Delay, d1	72.1	70.6		71.1	70.1		2.7	3.0		4.1	5.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.7		1.7	0.2		0.2	0.6		0.8	0.4	
Delay (s)	76.1	71.3		72.8	70.3		2.8	3.6		4.9	6.0	
Level of Service	E	E		E	E		A	A		A	A	
Approach Delay (s)		73.4			71.5			3.6			5.9	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	958	5	30	1992	341	4	1	25	105	1	44
Future Volume (vph)	85	958	5	30	1992	341	4	1	25	105	1	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4902	1601	1789	5092	1633	1789	1611		1722	1638	
Flt Permitted	0.05	1.00	1.00	0.26	1.00	1.00	0.73	1.00		0.95	1.00	
Satd. Flow (perm)	92	4902	1601	489	5092	1633	1367	1611		1722	1638	
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94
Adj. Flow (vph)	90	1019	5	33	2119	363	4	1	27	112	1	47
RTOR Reduction (vph)	0	0	2	0	0	42	0	26	0	0	37	0
Lane Group Flow (vph)	90	1019	3	33	2119	321	4	2	0	112	11	0
Heavy Vehicles (%)	4%	7%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	107.7	98.6	98.6	99.9	94.7	94.7	6.0	6.0		15.2	30.9	
Effective Green, g (s)	107.7	98.6	98.6	99.9	94.7	94.7	6.0	6.0		15.2	30.9	
Actuated g/C Ratio	0.72	0.66	0.66	0.67	0.63	0.63	0.04	0.04		0.10	0.21	
Clearance Time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	166	3222	1052	370	3214	1030	54	64		174	337	
v/s Ratio Prot	c0.03	0.21		0.00	c0.42			0.00		c0.07	0.01	
v/s Ratio Perm	0.35		0.00	0.06		0.20	c0.00					
v/c Ratio	0.54	0.32	0.00	0.09	0.66	0.31	0.07	0.03		0.64	0.03	
Uniform Delay, d1	18.8	11.1	8.8	8.6	17.5	12.7	69.3	69.2		64.8	47.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	0.3	0.0	0.1	0.5	0.2	0.6	0.2		7.9	0.0	
Delay (s)	22.4	11.4	8.8	8.7	18.0	12.9	69.9	69.4		72.7	47.6	
Level of Service	C	B	A	A	B	B	E	E		E	D	
Approach Delay (s)		12.3			17.1			69.5			65.2	
Approach LOS		B			B			E			E	

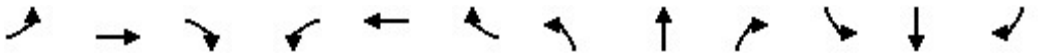
Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	901	170	144	1519	14	558	118	195	2	17	10
Future Volume (vph)	47	901	170	144	1519	14	558	118	195	2	17	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1669		1825	1921	1617
Flt Permitted	0.07	1.00	1.00	0.29	1.00	1.00	0.50	1.00		0.89	1.00	1.00
Satd. Flow (perm)	131	4902	1512	491	5142	1512	933	1669		1708	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	959	181	153	1616	15	594	126	207	2	18	11
RTOR Reduction (vph)	0	0	37	0	0	8	0	33	0	0	0	11
Lane Group Flow (vph)	50	959	144	153	1616	7	594	300	0	2	18	0
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	64.7	64.7	64.7	55.2	55.2	55.2	46.4	46.4		4.5	4.5	4.5
Effective Green, g (s)	64.7	64.7	64.7	55.2	55.2	55.2	46.4	46.4		4.5	4.5	4.5
Actuated g/C Ratio	0.52	0.52	0.52	0.44	0.44	0.44	0.37	0.37		0.04	0.04	0.04
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	149	2537	782	216	2270	667	604	619		61	69	58
v/s Ratio Prot	0.02	c0.20			c0.31		c0.30	0.18			0.01	
v/s Ratio Perm	0.16		0.10	0.31		0.00	c0.06			0.00		0.00
v/c Ratio	0.34	0.38	0.18	0.71	0.71	0.01	0.98	0.49		0.03	0.26	0.01
Uniform Delay, d1	19.8	18.1	16.1	28.4	28.4	19.6	37.4	30.1		58.1	58.6	58.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.3	0.4	0.5	10.1	1.1	0.0	32.2	0.6		0.2	2.0	0.0
Delay (s)	21.1	18.5	16.6	38.5	29.5	19.6	69.6	30.7		58.4	60.6	58.1
Level of Service	C	B	B	D	C	B	E	C		E	E	E
Approach Delay (s)		18.3			30.2			55.6			59.6	
Approach LOS		B			C			E			E	

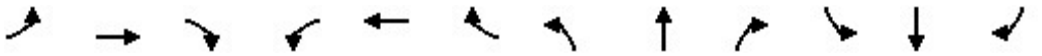
Intersection Summary			
HCM 2000 Control Delay	32.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	20.9
Intersection Capacity Utilization	86.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Appendix G:
Traffic Operations
Future Background Conditions
Sensitivity Analysis



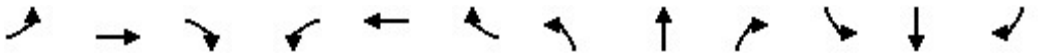
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	1734	332	197	774	96	137	681	171	278	1487	105
Future Volume (vph)	139	1734	332	197	774	96	137	681	171	278	1487	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.25	1.00	1.00	0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	465	5043	1617	173	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	142	1769	339	201	790	98	140	695	174	284	1517	107
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	93	0	0	60
Lane Group Flow (vph)	142	1769	339	201	790	98	140	695	81	284	1517	47
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	54.1	42.4	135.0	53.7	42.2	135.0	7.0	43.7	43.7	15.4	52.1	52.1
Effective Green, g (s)	54.1	42.4	135.0	53.7	42.2	135.0	7.0	43.7	43.7	15.4	52.1	52.1
Actuated g/C Ratio	0.40	0.31	1.00	0.40	0.31	1.00	0.05	0.32	0.32	0.11	0.39	0.39
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	299	1583	1617	202	1490	1526	179	1147	518	395	1381	600
v/s Ratio Prot	0.04	c0.35		c0.08	0.17		0.04	0.20		c0.08	c0.42	
v/s Ratio Perm	0.15		c0.21	0.31		0.06			0.05			0.03
v/c Ratio	0.47	1.12	0.21	1.00	0.53	0.06	0.78	0.61	0.16	0.72	1.10	0.08
Uniform Delay, d1	27.0	46.3	0.0	37.7	38.2	0.0	63.2	38.4	32.5	57.7	41.5	26.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	62.1	0.3	61.6	1.4	0.1	19.6	0.9	0.1	6.2	55.9	0.1
Delay (s)	28.2	108.4	0.3	99.3	39.6	0.1	82.9	39.3	32.7	63.9	97.3	26.3
Level of Service	C	F	A	F	D	A	F	D	C	E	F	C
Approach Delay (s)		87.0			47.0			44.2			88.3	
Approach LOS		F			D			D			F	

Intersection Summary			
HCM 2000 Control Delay	73.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	110.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



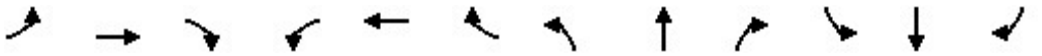
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	20	130	40	23	40	76	834	11	16	1933	36
Future Volume (vph)	59	20	130	40	23	40	76	834	11	16	1933	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.91		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1683		1772	3572		1690	3564	
Flt Permitted	0.71	1.00		0.30	1.00		0.04	1.00		0.31	1.00	
Satd. Flow (perm)	1369	1622		553	1683		79	3572		552	3564	
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)	64	22	141	43	25	43	83	907	12	17	2101	39
RTOR Reduction (vph)	0	85	0	0	39	0	0	0	0	0	1	0
Lane Group Flow (vph)	64	78	0	43	29	0	83	919	0	17	2139	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	13.5	13.5		13.5	13.5		133.5	133.5		119.8	119.8	
Effective Green, g (s)	13.5	13.5		13.5	13.5		133.5	133.5		119.8	119.8	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.83	0.83		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	115	136		46	142		157	2980		413	2668	
v/s Ratio Prot		0.05			0.02		c0.03	0.26			c0.60	
v/s Ratio Perm	0.05			c0.08			0.41			0.03		
v/c Ratio	0.56	0.57		0.93	0.20		0.53	0.31		0.04	0.80	
Uniform Delay, d1	70.4	70.5		72.8	68.2		30.0	3.0		5.2	12.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.7	5.7		107.1	0.7		3.2	0.3		0.2	2.7	
Delay (s)	76.1	76.2		179.9	68.9		33.1	3.2		5.4	15.3	
Level of Service	E	E		F	E		C	A		A	B	
Approach Delay (s)		76.2			111.9			5.7			15.2	
Approach LOS		E			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



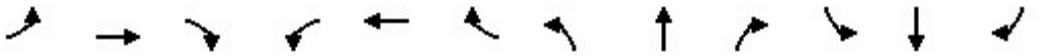
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	2250	2	15	980	61	5	1	43	452	1	120
Future Volume (vph)	48	2250	2	15	980	61	5	1	43	452	1	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	5092	1601	1789	4768	1555	1789	1607		1807	1572	
Flt Permitted	0.24	1.00	1.00	0.05	1.00	1.00	0.67	1.00		0.48	1.00	
Satd. Flow (perm)	448	5092	1601	95	4768	1555	1262	1607		920	1572	
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.89	0.89	0.92	0.92	0.92	0.89	0.92	0.89
Adj. Flow (vph)	54	2528	2	16	1101	69	5	1	47	508	1	135
RTOR Reduction (vph)	0	0	1	0	0	24	0	44	0	0	34	0
Lane Group Flow (vph)	54	2528	1	16	1101	45	5	4	0	508	102	0
Heavy Vehicles (%)	5%	3%	2%	2%	10%	5%	2%	2%	2%	1%	2%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Effective Green, g (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Actuated g/C Ratio	0.57	0.57	0.57	0.63	0.63	0.63	0.06	0.06		0.27	0.27	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	256	2914	916	93	2989	974	77	98		412	430	
v/s Ratio Prot		c0.50		0.00	c0.23			0.00		c0.22	0.06	
v/s Ratio Perm	0.12		0.00	0.10		0.03	0.00			c0.11		
v/c Ratio	0.21	0.87	0.00	0.17	0.37	0.05	0.06	0.04		1.23	0.24	
Uniform Delay, d1	13.5	23.6	11.9	22.3	11.8	9.3	57.5	57.4		45.2	36.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	3.8	0.0	0.9	0.1	0.0	0.4	0.2		124.3	0.3	
Delay (s)	15.4	27.4	11.9	23.2	11.8	9.3	57.8	57.6		169.6	36.9	
Level of Service	B	C	B	C	B	A	E	E		F	D	
Approach Delay (s)		27.2			11.8			57.6			141.6	
Approach LOS		C			B			E			F	

Intersection Summary			
HCM 2000 Control Delay	39.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



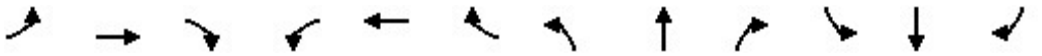
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	174	2042	556	379	926	134	92	50	91	36	60	62
Future Volume (vph)	174	2042	556	379	926	134	92	50	91	36	60	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1396		1772	1921	1601
Flt Permitted	0.28	1.00	1.00	0.95	1.00	1.00	0.71	1.00		0.50	1.00	1.00
Satd. Flow (perm)	524	5092	1601	1426	4768	1601	1295	1396		927	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	187	2196	598	408	996	144	99	54	98	39	65	67
RTOR Reduction (vph)	0	0	55	0	0	26	0	60	0	0	0	59
Lane Group Flow (vph)	187	2196	543	408	996	118	99	92	0	39	65	8
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	72.8	63.8	63.8	47.1	101.9	101.9	16.7	16.7		16.7	16.7	16.7
Effective Green, g (s)	72.8	63.8	63.8	47.1	101.9	101.9	16.7	16.7		16.7	16.7	16.7
Actuated g/C Ratio	0.50	0.44	0.44	0.32	0.70	0.70	0.12	0.12		0.12	0.12	0.12
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	342	2240	704	463	3350	1125	149	160		106	221	184
v/s Ratio Prot	0.03	c0.43		c0.29	0.21			0.07			0.03	
v/s Ratio Perm	0.24		0.34			0.07	c0.08			0.04		0.00
v/c Ratio	0.55	0.98	0.77	0.88	0.30	0.11	0.66	0.57		0.37	0.29	0.04
Uniform Delay, d1	28.0	40.0	34.4	46.3	8.1	6.9	61.5	60.8		59.3	58.8	57.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.8	14.9	8.0	17.5	0.1	0.0	10.6	4.9		2.2	0.7	0.1
Delay (s)	29.7	54.9	42.4	63.8	8.1	7.0	72.1	65.7		61.4	59.5	57.1
Level of Service	C	D	D	E	A	A	E	E		E	E	E
Approach Delay (s)		50.8			22.7			68.2			59.0	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	98.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



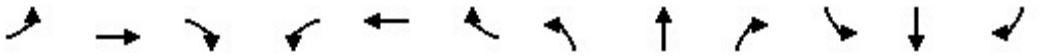
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	248	918	109	224	1800	406	251	1275	98	173	720	179
Future Volume (vph)	248	918	109	224	1800	406	251	1275	98	173	720	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.08	1.00	1.00	0.19	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	154	4856	1633	362	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	256	946	112	231	1856	419	259	1314	101	178	742	185
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	67	0	0	130
Lane Group Flow (vph)	256	946	112	231	1856	419	259	1314	34	178	742	55
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	64.3	49.8	145.0	67.5	51.4	145.0	14.2	48.1	48.1	9.0	42.9	42.9
Effective Green, g (s)	64.3	49.8	145.0	67.5	51.4	145.0	14.2	48.1	48.1	9.0	42.9	42.9
Actuated g/C Ratio	0.44	0.34	1.00	0.47	0.35	1.00	0.10	0.33	0.33	0.06	0.30	0.30
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	235	1667	1633	328	1805	1617	346	1198	536	211	1069	483
v/s Ratio Prot	c0.11	0.19		c0.08	0.36		c0.07	c0.36		0.05	0.21	
v/s Ratio Perm	c0.37		0.07	0.25		0.26			0.02			0.03
v/c Ratio	1.09	0.57	0.07	0.70	1.03	0.26	0.75	1.10	0.06	0.84	0.69	0.11
Uniform Delay, d1	44.9	38.8	0.0	25.6	46.8	0.0	63.7	48.5	33.1	67.3	45.2	37.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	84.6	1.4	0.1	6.7	28.8	0.4	8.6	56.7	0.0	25.2	2.0	0.1
Delay (s)	129.5	40.2	0.1	32.3	75.6	0.4	72.2	105.1	33.1	92.5	47.2	37.3
Level of Service	F	D	A	C	E	A	E	F	C	F	D	D
Approach Delay (s)		54.2			59.0			95.7			52.8	
Approach LOS		D			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	66.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	108.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



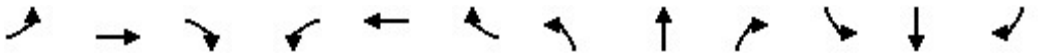
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	14	41	24	5	22	66	1605	18	22	1011	47
Future Volume (vph)	43	14	41	24	5	22	66	1605	18	22	1011	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1670		1825	1684		1789	3608		1825	3558	
Flt Permitted	0.74	1.00		0.72	1.00		0.23	1.00		0.13	1.00	
Satd. Flow (perm)	1420	1670		1382	1684		425	3608		257	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	45	15	43	25	5	23	69	1689	19	23	1064	49
RTOR Reduction (vph)	0	40	0	0	21	0	0	0	0	0	1	0
Lane Group Flow (vph)	45	18	0	25	7	0	69	1708	0	23	1112	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Effective Green, g (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Actuated g/C Ratio	0.07	0.07		0.07	0.07		0.85	0.85		0.78	0.78	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	93	109		90	110		417	3078		200	2781	
v/s Ratio Prot		0.01			0.00		0.01	c0.47			0.31	
v/s Ratio Perm	c0.03			0.02			0.13			0.09		
v/c Ratio	0.48	0.16		0.28	0.06		0.17	0.55		0.12	0.40	
Uniform Delay, d1	72.1	70.6		71.1	70.1		2.7	3.3		4.2	5.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.7		1.7	0.2		0.2	0.7		1.2	0.4	
Delay (s)	76.1	71.3		72.8	70.3		2.8	4.0		5.3	6.0	
Level of Service	E	E		E	E		A	A		A	A	
Approach Delay (s)		73.4			71.5			4.0			6.0	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	1171	5	30	2460	423	4	1	25	105	1	44
Future Volume (vph)	85	1171	5	30	2460	423	4	1	25	105	1	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4902	1601	1789	5092	1633	1789	1611		1722	1638	
Flt Permitted	0.04	1.00	1.00	0.20	1.00	1.00	0.73	1.00		0.95	1.00	
Satd. Flow (perm)	75	4902	1601	369	5092	1633	1367	1611		1722	1638	
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94
Adj. Flow (vph)	90	1246	5	33	2617	450	4	1	27	112	1	47
RTOR Reduction (vph)	0	0	2	0	0	42	0	26	0	0	37	0
Lane Group Flow (vph)	90	1246	3	33	2617	408	4	2	0	112	11	0
Heavy Vehicles (%)	4%	7%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	107.7	98.6	98.6	99.9	94.7	94.7	6.0	6.0		15.2	30.9	
Effective Green, g (s)	107.7	98.6	98.6	99.9	94.7	94.7	6.0	6.0		15.2	30.9	
Actuated g/C Ratio	0.72	0.66	0.66	0.67	0.63	0.63	0.04	0.04		0.10	0.21	
Clearance Time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	155	3222	1052	294	3214	1030	54	64		174	337	
v/s Ratio Prot	c0.04	0.25		0.00	c0.51			0.00		c0.07	0.01	
v/s Ratio Perm	0.38		0.00	0.07		0.25	c0.00					
v/c Ratio	0.58	0.39	0.00	0.11	0.81	0.40	0.07	0.03		0.64	0.03	
Uniform Delay, d1	33.2	11.8	8.8	8.7	21.0	13.6	69.3	69.2		64.8	47.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.4	0.4	0.0	0.2	1.7	0.3	0.6	0.2		7.9	0.0	
Delay (s)	38.7	12.2	8.8	8.9	22.7	13.8	69.9	69.4		72.7	47.6	
Level of Service	D	B	A	A	C	B	E	E		E	D	
Approach Delay (s)		13.9			21.2			69.5			65.2	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	77.5%	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)	47	1103	170	144	1881	14	677	147	220	3	21	12
Future Volume (vph)	47	1103	170	144	1881	14	677	147	220	3	21	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1678		1825	1921	1617
Flt Permitted	0.07	1.00	1.00	0.22	1.00	1.00	0.49	1.00		0.85	1.00	1.00
Satd. Flow (perm)	129	4902	1512	372	5142	1512	910	1678		1635	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	1173	181	153	2001	15	720	156	234	3	22	13
RTOR Reduction (vph)	0	0	34	0	0	8	0	17	0	0	0	13
Lane Group Flow (vph)	50	1173	147	153	2001	7	720	373	0	3	22	0
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	65.4	65.4	65.4	55.9	55.9	55.9	45.7	45.7		4.7	4.7	4.7
Effective Green, g (s)	65.4	65.4	65.4	55.9	55.9	55.9	45.7	45.7		4.7	4.7	4.7
Actuated g/C Ratio	0.52	0.52	0.52	0.45	0.45	0.45	0.37	0.37		0.04	0.04	0.04
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	148	2564	791	166	2299	676	591	613		61	72	60
v/s Ratio Prot	0.02	c0.24			0.39		c0.37	0.22			0.01	
v/s Ratio Perm	0.16		0.10	c0.41		0.00	c0.08			0.00		0.00
v/c Ratio	0.34	0.46	0.19	0.92	0.87	0.01	1.22	0.61		0.05	0.31	0.01
Uniform Delay, d1	23.5	18.7	15.7	32.5	31.3	19.2	38.0	32.3		58.0	58.6	57.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.4	0.6	0.5	47.4	3.9	0.0	113.0	1.7		0.3	2.4	0.1
Delay (s)	24.8	19.3	16.3	79.9	35.2	19.2	151.0	34.1		58.3	61.0	58.0
Level of Service	C	B	B	E	D	B	F	C		E	E	E
Approach Delay (s)		19.1			38.2			109.9			59.7	
Approach LOS		B			D			F			E	

Intersection Summary			
HCM 2000 Control Delay	49.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	20.9
Intersection Capacity Utilization	99.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Appendix H:
Vehicle Turning Assessment

Appendix I:
TTS Data

Thur April 27 2023 12:52:51 GMT-0400 (Eastern Daylight Time) - Run Time: 2526ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
Primary travel mode of trip - mode_prime In d,m,p,t,u
and
Type of dwelling unit - dwell_type In 1, 3,
and
Start time of trip - start_time In 600-900, 1400-1900
and
2006 GTA zone of destination - gta06_dest In 3620

Trip 2016
Table:

			Commercial Distribution																															
			RIRO trip distribution																						Traffic Signal - Sensitivity Analysis									
																									%					Trips				
			Exiting					Entering RIRO						Exiting					Entering RIRO						Exiting/Entering					Exiting/Entering				
Place of residence	3620 GTA Zone	%	North	South	West	East	Total	North Mclau.	North Barba	South	West	East	Total	North	South	West	East	Total	North Mclau.	North Barba	South	West	East	Total	North Mclau.	South	West	East	Total	North Mclau.	South	West	East	Total
Mississauga	6432	59.9%		0.50	0.25	0.25	1			0.50	0.50		1	0	3216	1608	1608	6432	0	0	3216	3216	0	6432		0.50	0.25	0.25	1.0	0	3216	1608	1608	6432
Brampton	2081	19.4%				1	1				1		1	0	0	0	2081	2081	0	0	0	2081	0	2081				1	1.0	0	0	0	2081	2081
PD 8 of Toronto	250	2.3%				1	1				1		1	0	0	0	250	250	0	0	0	250	0	250				1	1.0	0	0	0	250	250
Milton	232	2.2%	0.8		0.20		1				1		1	186	0	46	0	232	0	0	0	232	0	232			1.00		1.0	0	0	232	0	232
Oakville	202	1.9%	1				1				1		1	202	0	0	0	202	0	0	0	202	0	202	1				1.0	202	0	0	0	202
Vaughan	194	1.8%				1	1				1		1	0	0	0	194	194	0	0	0	194	0	194				1	1.0	0	0	0	194	194
Caledon	158	1.5%				1	1				1		1	0	0	0	158	158	0	0	0	158	0	158				1	1.0	0	0	0	158	158
PD 9 of Toronto	128	1.2%				1	1				1		1	0	0	0	128	128	0	0	0	128	0	128				1	1.0	0	0	0	128	128
Burlington	127	1.2%	0.8			0.2	1				1		1	102	0	0	25	127	0	0	0	127	0	127			0.80	0.2	1.0	0	0	102	25	127
Halton Hills	118	1.1%	0.8		0.20		1				1		1	94	0	24	0	118	0	0	0	118	0	118			1.00		1.0	0	0	118	0	118
Hamilton	115	1.1%	0.8		0.20		1				1		1	92	0	23	0	115	0	0	0	115	0	115			1.00		1.0	0	0	115	0	115
Markham	90	0.8%				1	1				1		1	0	0	0	90	90	0	0	0	90	0	90				1	1.0	0	0	0	90	90
PD 7 of Toronto	83	0.8%				1	1				1		1	0	0	0	83	83	0	0	0	83	0	83				1	1.0	0	0	0	83	83
PD 4 of Toronto	72	0.7%				1	1				1		1	0	0	0	72	72	0	0	0	72	0	72				1	1.0	0	0	0	72	72
Kitchener	60	0.6%	0.8		0.20		1				1		1	48	0	12	0	60	0	0	0	60	0	60			1.00		1.0	0	0	60	0	60
City of Guelph	54	0.5%	0.8		0.20		1				1		1	43	0	11	0	54	0	0	0	54	0	54			1.00		1.0	0	0	54	0	54
Whitchurch-Stouffville	44	0.4%				1	1				1		1	0	0	0	44	44	0	0	0	44	0	44				1	1.0	0	0	0	44	44
Haliburton	38	0.4%				1	1				1		1	0	0	0	38	38	0	0	0	38	0	38				1	1.0	0	0	0	38	38
Orangeville	33	0.3%				1	1				1		1	0	0	0	33	33	0	0	0	33	0	33				1	1.0	0	0	0	33	33
PD 10 of Toronto	31	0.3%				1	1				1		1	0	0	0	31	31	0	0	0	31	0	31				1	1.0	0	0	0	31	31
PD 16 of Toronto	30	0.3%				1	1				1		1	0	0	0	30	30	0	0	0	30	0	30				1	1.0	0	0	0	30	30
Richmond Hill	26	0.2%				1	1				1		1	0	0	0	26	26	0	0	0	26	0	26				1	1.0	0	0	0	26	26
PD 1 of Toronto	22	0.2%				1	1				1		1	0	0	0	22	22	0	0	0	22	0	22				1	1.0	0	0	0	22	22
PD 15 of Toronto	18	0.2%				1	1				1		1	0	0	0	18	18	0	0	0	18	0	18				1	1.0	0	0	0	18	18
Woolwich	16	0.1%	0.8		0.20		1				1		1	13	0	3	0	16	0	0	0	16	0	16			1.00		1.0	0	0	16	0	16
PD 3 of Toronto	14	0.1%				1	1				1		1	0	0	0	14	14	0	0	0	14	0	14				1	1.0	0	0	0	14	14
Stoney Creek	14	0.1%	0.8		0.20		1				1		1	11	0	3	0	14	0	0	0	14	0	14			1.00		1.0	0	0	14	0	14
Erin	14	0.1%	0.8		0.20		1				1		1	11	0	3	0	14	0	0	0	14	0	14			1.00		1.0	0	0	14	0	14
Mono	13	0.1%				1	1				1		1	0	0	0	13	13	0	0	0	13	0	13				1	1.0	0	0	0	13	13
PD 13 of Toronto	10	0.1%				1	1				1		1	0	0	0	10	10	0	0	0	10	0	10				1	1.0	0	0	0	10	10
Barrie	10	0.1%				1	1				1		1	0	0	0	10	10	0	0	0	10	0	10				1	1.0	0	0	0	10	10
PD 2 of Toronto	8	0.1%				1	1				1		1	0	0	0	8	8	0	0	0	8	0	8				1	1.0	0	0	0	8	8
Whitby	8	0.1%				1	1				1		1	0	0	0	10	10	0	0	0	10	0	10				1	1.0	0	0	0	10	8
	10745													802	3216	1733	4996	10747	0	0	3216	7531	0	10747						202	3216	2333	4996	10745
														7%	30%	16%	46%		0%	0%	30%	70%	0%							2%	30%	22%	46%	
													Say	8%	30%	16%	46%	1	0%	0%	30%	70%	0%	1						5%	30%	20%	45%	1

Thur April 27 2023 10:58:55 GMT-0400 (Eastern Daylight Time) - Run Time: 2430ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: Planning district of destination - pd_dest

Filters:
Primary travel mode of trip - mode_prime In D, M, P, T, U,
and
2006 GTA zone of origin - gta06_orig In 3620
and
Start time of trip - start_time In 600-900, 1600-1900
and
Type of dwelling unit - dwell_type In 1, 3,

Trip 2016
Table:

Residential Distribuion

RIRO trip distribution

Place of work	3620 GTA Zone	%	Exiting					Entering RIRO						Exiting					Entering RIRO						Traffic Signal - Sensitivity Analysis									
																									% Exiting/Entering						Trips Exiting/Entering				
			North	South	West	East	Total	North Mclau.	North Barba	South	West	East	Total	North	South	West	East	Total	North Mclau.	North Barba	South	West	East	Total	North Mclau.	South	West	East	Total	North Mclau.	South	West	East	Total
Mississauga	6334	66.4%		0.50	0.25	0.25	1			0.50	0.50		1	0	3167	1584	1584	6334	0	0	3167	3167	0	6334		0.50	0.25	0.25	1.0	0	3167	1584	1584	6334
Brampton	1385	14.5%				1	1	0.20			0.8		1	0	0	0	1385	1385	277	0	0	1108	0	1385				1	1.0	0	0	0	1385	1385
PD 8 of Toronto	227	2.4%				1	1				1.0		1	0	0	0	227	227	0	0	0	227	0	227				1	1.0	0	0	0	227	227
Oakville	136	1.4%	1				1				1.0		1	136	0	0	0	136	0	0	0	136	0	136	1				1.0	136	0	0	0	136
PD 9 of Toronto	133	1.4%				1	1				1.0		1	0	0	0	133	133	0	0	0	133	0	133				1	1.0	0	0	0	133	133
Vaughan	131	1.4%				1	1				1.0		1	0	0	0	131	131	0	0	0	131	0	131				1	1.0	0	0	0	131	131
Halton Hills	118	1.2%	0.8		0.20		1				1.0		1	94	0	24	0	118	0	0	0	118	0	118			1		1.0	0	0	118	0	118
PD 7 of Toronto	114	1.2%				1	1				1.0		1	0	0	0	114	114	0	0	0	114	0	114				1	1.0	0	0	0	114	114
Milton	114	1.2%	0.8		0.20		1				1.0		1	91	0	23	0	114	0	0	0	114	0	114			1		1.0	0	0	114	0	114
PD 1 of Toronto	109	1.1%				1	1				1.0		1	0	0	0	109	109	0	0	0	109	0	109				1	1.0	0	0	0	109	109
Caledon	108	1.1%				1	1				1.0		1	0	0	0	108	108	0	0	0	108	0	108				1	1.0	0	0	0	108	108
Hamilton	94	1.0%	0.8		0.20		1				1.0		1	75	0	19	0	94	0	0	0	94	0	94			1		1.0	0	0	94	0	94
PD 10 of Toronto	76	0.8%				1	1				1.0		1	0	0	0	76	76	0	0	0	76	0	76				1	1.0	0	0	0	76	76
Whitchurch-Stouffville	60	0.6%				1	1				1.0		1	0	0	0	60	60	0	0	0	60	0	60				1	1.0	0	0	0	60	60
Markham	60	0.6%				1	1				1.0		1	0	0	0	60	60	0	0	0	60	0	60				1	1.0	0	0	0	60	60
Kitchener	60	0.6%	0.8		0.20		1				1.0		1	48	0	12	0	60	0	0	0	60	0	60			1		1.0	0	0	60	0	60
Orangeville	51	0.5%				1	1				1.0		1	0	0	0	51	51	0	0	0	51	0	51				1	1.0	0	0	0	51	51
Cambridge	44	0.5%	0.8		0.20		1				1.0		1	35	0	9	0	44	0	0	0	44	0	44			1		1.0	0	0	44	0	44
PD 3 of Toronto	31	0.3%				1	1				1.0		1	0	0	0	31	31	0	0	0	31	0	31				1	1.0	0	0	0	31	31
City of Guelph	27	0.3%	0.8		0.20		1				1.0		1	22	0	5	0	27	0	0	0	27	0	27			1		1.0	0	0	27	0	27
PD 15 of Toronto	18	0.2%				1	1				1.0		1	0	0	0	18	18	0	0	0	18	0	18				1	1.0	0	0	0	18	18
PD 2 of Toronto	16	0.2%				1	1				1.0		1	0	0	0	16	16	0	0	0	16	0	16				1	1.0	0	0	0	16	16
PD 4 of Toronto	16	0.2%				1	1				1.0		1	0	0	0	16	16	0	0	0	16	0	16				1	1.0	0	0	0	16	16
Stoney Creek	14	0.1%	0.8		0.20		1				1.0		1	11	0	3	0	14	0	0	0	14	0	14			1		1.0	0	0	14	0	14
Erin	14	0.1%				1	1				1.0		1	0	0	0	14	14	0	0	0	14	0	14				1	1.0	0	0	0	14	14
PD 16 of Toronto	13	0.1%				1	1				1.0		1	0	0	0	13	13	0	0	0	13	0	13				1	1.0	0	0	0	13	13
Burlington	13	0.1%	0.8			0.2	1				1.0		1	10	0	0	3	13	0	0	0	13	0	13			0.80	0.2	1.0	0	0	10	3	13
PD 13 of Toronto	10	0.1%				1	1				1.0		1	0	0	0	10	10	0	0	0	10	0	10				1	1.0	0	0	0	10	10
Mono	7	0.1%				1	1				1.0		1	0	0	0	7	7	0	0	0	7	0	7				1	1.0	0	0	0	7	7
Aurora	4	0.0%				1	1				1.0		1	0	0	0	4	4	0	0	0	4	0	4				1	1.0	0	0	0	4	4
	9537													523	3167	1678	4169	9537	277	0	3167	6093	0	9537						136	3167	2065	4169	9537
														5%	33%	18%	44%		3%	0%	33%	64%	0%							1%	33%	22%	44%	
													Say	5%	30%	20%	45%	1.000	5%	0%	30%	65%	0%	1.000						5%	30%	20%	45%	1

Thur April 27 2023 10:20:14 GMT-0400 (Eastern Daylight Time) - Run Time: 2639ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: 2006 GTA zone of household - gta06_hhld

Filters:
Primary travel mode of trip - mode_prime In B, C, D, G, J, M, P, T, U, W
and
2006 GTA zone of household - gta06_hhld In 3620
and
Start time of trip - start_time In 400 - 2800,
and
Type of dwelling unit - dwell_type In 1, 3,

Trip 2016

Table: 2006 GTA zone 3620

	Average		AM		PM	
	trips	**%**	**trips**	**%**	**trips**	**%**
Transit excluding GO rail	2177	8.8%	675	9%	666	10%
Auto driver	16707	67.3%	4922	66%	4619	70%
GO rail only	196	0.8%	112	1%	84	1%
Joint GO rail and local transit	33	0.1%	8	0%	24	0%
Motorcycle	26	0.1%		0%		0%
Auto passenger	4583	18.5%	1405	19%	1136	17%
Paid rideshare	119	0.5%	35	0%		0%
Walk	999	4.0%	346	5%	40	1%

Appendix J:
Traffic Operations
Future Total Conditions

OAKTREE CIRCLE

DERRY ROAD WEST

WATERHOUSE CRESCENT

WATERHOUSE CRESCENT

BLOCK 8
3 STOREY 5.5m TOWNHOUSES
6 UNITS

BLOCK 7
3 STOREY 5.5m TOWNHOUSES
6 UNITS

BLOCK 6
3 STOREY 5.5m TOWNHOUSES
8 UNITS

BLOCK 5
3 STOREY 5.5m TOWNHOUSES
8 UNITS

BLOCK 1
3 STOREY 5.5m
REAR LANE TOWNHOUSES
6 UNITS

BLOCK 2
3 STOREY 5.5m
REAR LANE TOWNHOUSES
7 UNITS

BLOCK 3
3 STOREY 6.1m BACK TO
BACK TOWNS
16 UNITS

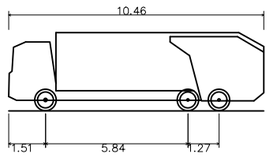
BLOCK 4
3 STOREY 6.1m BACK TO
BACK TOWNS
14 UNITS

BLOCK 9
3 STOREY 5.5m TOWNHOUSES
7 UNITS

BLOCK 10
3 STOREY 6.1m BACK TO
BACK TOWNS
16 UNITS

BLOCK 11
3 STOREY 6.1m BACK TO
BACK TOWNS
16 UNITS

BLOCK 12
3 STOREY 6.1m BACK TO
BACK TOWNS
10 UNITS



GARBAGE TRUCK 1	
Overall Length	10.460m
Overall Width	2.550m
Overall Body Height	3.205m
Min Body Ground Clearance	0.410m
Track Width	2.500m
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	31.80°

TATHAM ENGINEERING

CITY OF MISSISSAUGA
WASTE MANAGEMENT PLAN
376 & 390 DERRY ROAD WEST

DWG. No. **Fig 1**

SCALE: 1:800 | DRAWN: JC | DATE: May 2023 | JOB NO. 423394

Drawing Name: 423394 – Autoturn– Update – REV 1.dwg, Plotted: Sep 15, 2023

OAKTREE CIRCLE

DERRY ROAD WEST

WATERHOUSE CRESCENT

WATERHOUSE CRESCENT

BLOCK 8
3 STOREY 5.5m TOWNHOUSES
6 UNITS

BLOCK 7
3 STOREY 5.5m TOWNHOUSES
6 UNITS

BLOCK 6
3 STOREY 5.5m TOWNHOUSES
8 UNITS

BLOCK 5
3 STOREY 5.5m TOWNHOUSES
8 UNITS

BLOCK 1
3 STOREY 5.5m
REAR LANE TOWNHOUSES
6 UNITS

BLOCK 2
3 STOREY 5.5m
REAR LANE TOWNHOUSES
7 UNITS

BLOCK 3
3 STOREY 6.1m BACK TO
BACK TOWNS
16 UNITS

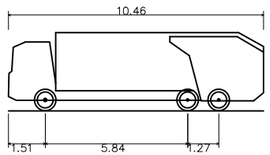
BLOCK 4
3 STOREY 6.1m BACK TO
BACK TOWNS
14 UNITS

BLOCK 9
3 STOREY 5.5m TOWNHOUSES
7 UNITS

BLOCK 10
3 STOREY 6.1m BACK TO
BACK TOWNS
16 UNITS

BLOCK 11
3 STOREY 6.1m BACK TO
BACK TOWNS
16 UNITS

BLOCK 12
3 STOREY 6.1m BACK TO
BACK TOWNS
10 UNITS



GARBAGE TRUCK 1	
Overall Length	10.460m
Overall Width	2.550m
Overall Body Height	3.205m
Min Body Ground Clearance	0.410m
Track Width	2.500m
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	31.80°

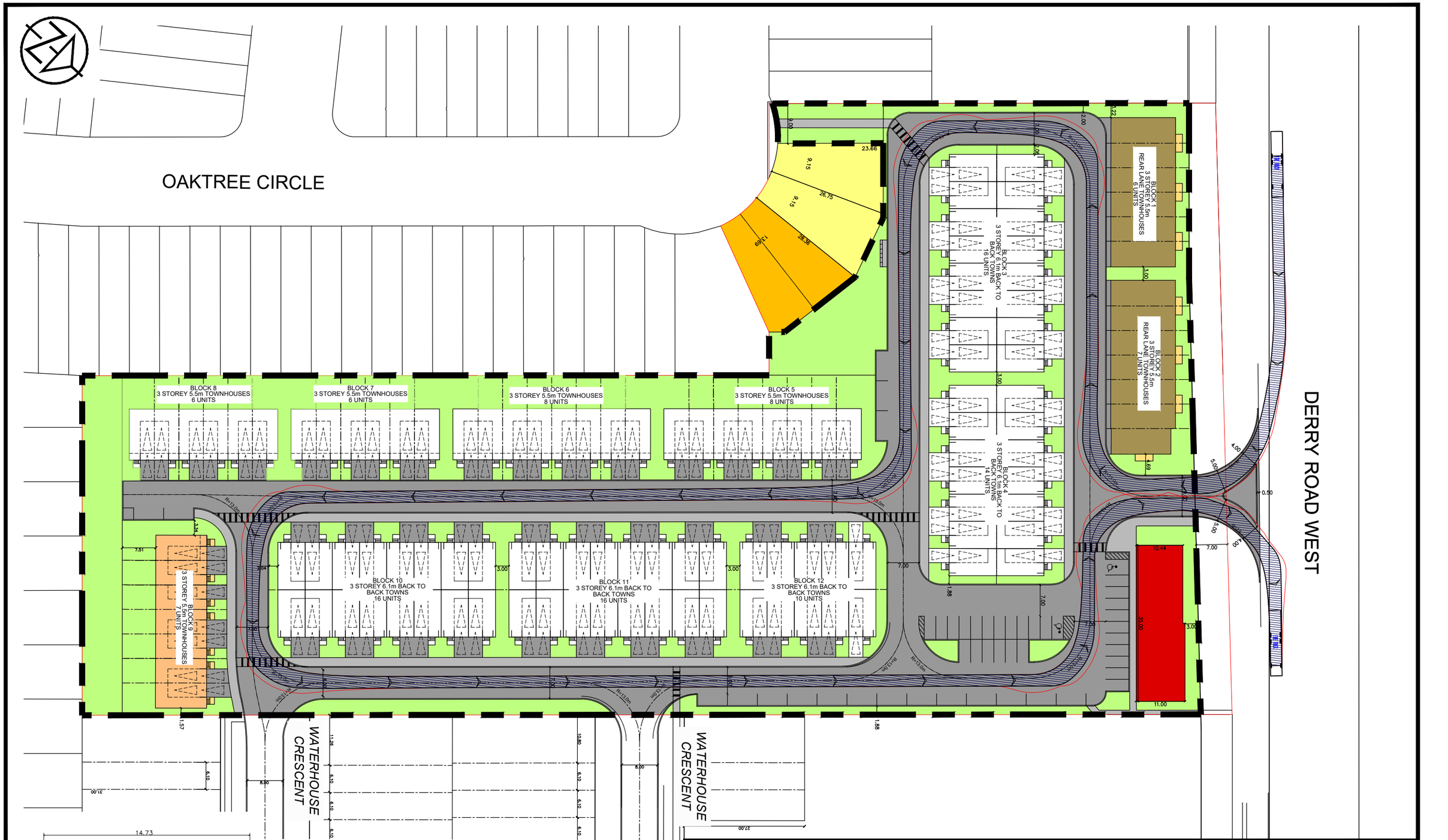
TATHAM ENGINEERING

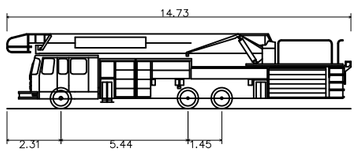
CITY OF MISSISSAUGA
WASTE MANAGEMENT PLAN
376 & 390 DERRY ROAD WEST

DWG. No. **Fig 2**

SCALE: 1:800 | DRAWN: JC | DATE: May 2023 | JOB NO. 423394

Drawing Name: 423394 – Autoturn– Update – REV 1.dwg, Plotted: Sep 15, 2023





FIRE TRUCK	
Overall Length	14.730m
Overall Width	2.600m
Overall Body Height	3.197m
Min Body Ground Clearance	0.281m
Track Width	2.540m
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	29.20°

TATHAM ENGINEERING

CITY OF MISSISSAUGA
FIRE TRUCK TURNING MOVEMENT
376 & 390 DERRY ROAD WEST

DWG. No. **Fig 3**

SCALE: 1:800 | DRAWN: JC | DATE: May 2023 | JOB NO. 423394

Drawing Name: 423394 – Autoturn– Update – REV 1.dwg, Plotted: Sep 15, 2023

OAKTREE CIRCLE

DERRY ROAD WEST

WATERHOUSE CRESCENT

WATERHOUSE CRESCENT

BLOCK 8
3 STOREY 5.5m TOWNHOUSES
6 UNITS

BLOCK 7
3 STOREY 5.5m TOWNHOUSES
6 UNITS

BLOCK 6
3 STOREY 5.5m TOWNHOUSES
8 UNITS

BLOCK 5
3 STOREY 5.5m TOWNHOUSES
8 UNITS

BLOCK 1
3 STOREY 5.5m
REAR LANE TOWNHOUSES
6 UNITS

BLOCK 2
3 STOREY 5.5m
REAR LANE TOWNHOUSES
7 UNITS

BLOCK 3
3 STOREY 6.1m BACK TO
BACK TOWNS
16 UNITS

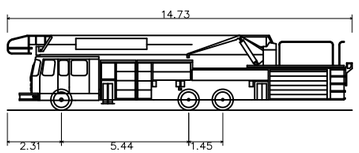
BLOCK 4
3 STOREY 6.1m BACK TO
BACK TOWNS
14 UNITS

BLOCK 10
3 STOREY 6.1m BACK TO
BACK TOWNS
16 UNITS

BLOCK 11
3 STOREY 6.1m BACK TO
BACK TOWNS
16 UNITS

BLOCK 12
3 STOREY 6.1m BACK TO
BACK TOWNS
10 UNITS

BLOCK 9
3 STOREY 5.5m TOWNHOUSES
7 UNITS



FIRE TRUCK	
Overall Length	14.730m
Overall Width	2.600m
Overall Body Height	3.197m
Min Body Ground Clearance	0.281m
Track Width	2.540m
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	29.20°

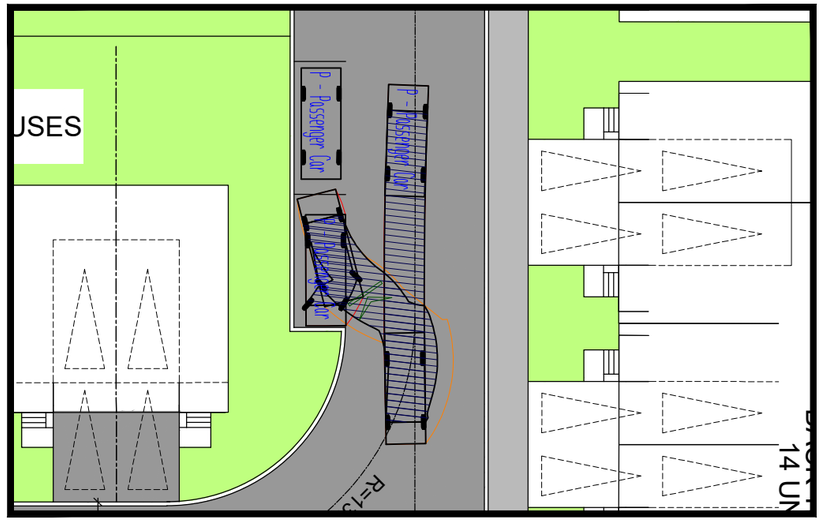
TATHAM ENGINEERING

CITY OF MISSISSAUGA
FIRE TRUCK TURNING MOVEMENT
376 & 390 DERRY ROAD WEST

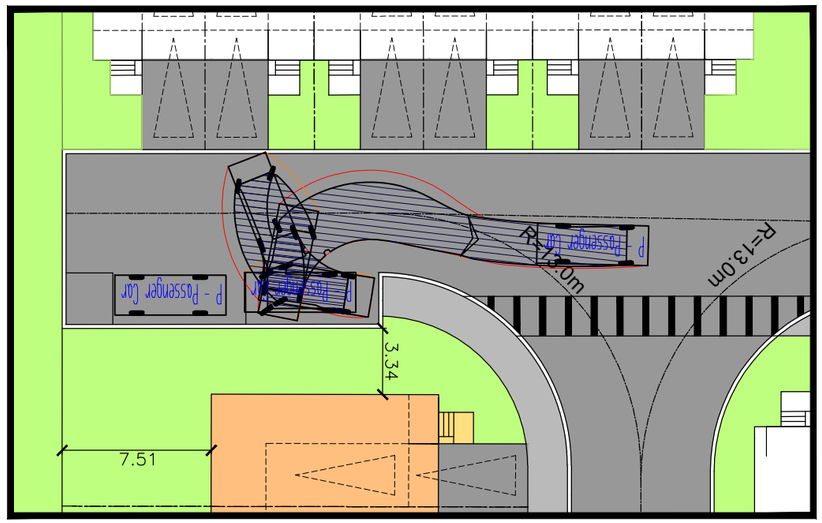
DWG. No. **Fig 4**

SCALE: 1:800 | DRAWN: JC | DATE: May 2023 | JOB NO. 423394

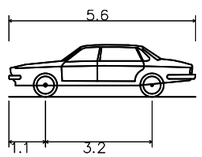
Drawing Name: 423394 – Autoturn– Update – REV 1.dwg, Plotted: Sep 15, 2023



DETAIL A
ENTERING VISITOR PARKING SPACE
Esc: 1/300



DETAIL B
EXITING VISITOR PARKING SPACE
Esc: 1/300



P – Passenger Car	
Overall Length	5.600m
Overall Width	2.000m
Overall Body Height	1.555m
Min Body Ground Clearance	0.340m
Track Width	2.000m
Lock–to–lock time	4.00s
Curb to Curb Turning Radius	6.300m

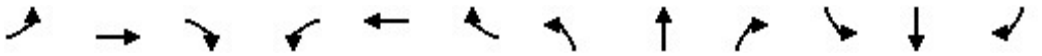
TATHAM ENGINEERING

CITY OF MISSISSAUGA
PASSENGER VEHICLE TURNING MOVEMENT
376 & 390 DERRY ROAD WEST

DWG. No. **Fig 5**

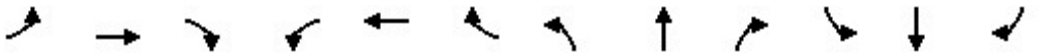
SCALE: --	DRAWN: JC	DATE: MAY 2023	JOB NO. 423394

Drawing Name: 423394 – Autoturn– Update – REV 1.dwg, Plotted: Sep 15, 2023



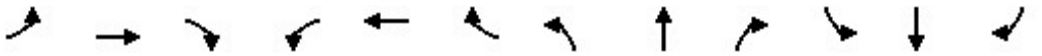
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	1384	288	171	601	91	132	589	151	215	1291	80
Future Volume (vph)	132	1384	288	171	601	91	132	589	151	215	1291	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.36	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	663	5043	1617	184	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	135	1412	294	174	613	93	135	601	154	219	1317	82
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	99	0	0	51
Lane Group Flow (vph)	135	1412	294	174	613	93	135	601	55	219	1317	31
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	48.5	39.4	125.0	49.3	39.8	125.0	7.0	42.0	42.0	12.1	47.1	47.1
Effective Green, g (s)	48.5	39.4	125.0	49.3	39.8	125.0	7.0	42.0	42.0	12.1	47.1	47.1
Actuated g/C Ratio	0.39	0.32	1.00	0.39	0.32	1.00	0.06	0.34	0.34	0.10	0.38	0.38
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	337	1589	1617	190	1518	1526	194	1190	537	335	1348	585
v/s Ratio Prot	0.03	0.28		c0.07	0.13		0.04	0.17		c0.06	c0.37	
v/s Ratio Perm	0.13		c0.18	c0.29		0.06			0.03			0.02
v/c Ratio	0.40	0.89	0.18	0.92	0.40	0.06	0.70	0.51	0.10	0.65	0.98	0.05
Uniform Delay, d1	25.5	40.7	0.0	29.9	33.3	0.0	58.0	33.2	28.5	54.4	38.4	24.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	7.8	0.2	41.9	0.8	0.1	10.3	0.3	0.1	4.5	19.0	0.0
Delay (s)	26.3	48.5	0.2	71.8	34.1	0.1	68.3	33.5	28.6	59.0	57.4	24.8
Level of Service	C	D	A	E	C	A	E	C	C	E	E	C
Approach Delay (s)		39.2			38.0			38.0			56.0	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	44.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	19	124	38	23	37	72	799	10	15	1678	35
Future Volume (vph)	56	19	124	38	23	37	72	799	10	15	1678	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.91		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1685		1772	3573		1690	3563	
Flt Permitted	0.71	1.00		0.31	1.00		0.08	1.00		0.32	1.00	
Satd. Flow (perm)	1373	1622		583	1685		141	3573		575	3563	
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)	61	21	135	41	25	40	78	868	11	16	1824	38
RTOR Reduction (vph)	0	92	0	0	37	0	0	0	0	0	0	0
Lane Group Flow (vph)	61	64	0	41	28	0	78	879	0	16	1862	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	12.8	12.8		12.8	12.8		134.2	134.2		120.1	120.1	
Effective Green, g (s)	12.8	12.8		12.8	12.8		134.2	134.2		120.1	120.1	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.84	0.84		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	109	129		46	134		211	2996		431	2674	
v/s Ratio Prot		0.04			0.02		c0.02	0.25			c0.52	
v/s Ratio Perm	0.04			c0.07			0.29			0.03		
v/c Ratio	0.56	0.50		0.89	0.21		0.37	0.29		0.04	0.70	
Uniform Delay, d1	70.9	70.5		72.9	68.9		12.4	2.8		5.1	10.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.1	3.0		91.9	0.8		1.1	0.2		0.2	1.5	
Delay (s)	77.0	73.5		164.8	69.7		13.5	3.0		5.3	11.9	
Level of Service	E	E		F	E		B	A		A	B	
Approach Delay (s)		74.5			106.4			3.9			11.9	
Approach LOS		E			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1789	2	15	758	58	5	1	43	347	1	92
Future Volume (vph)	60	1789	2	15	758	58	5	1	43	347	1	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	5092	1601	1789	4768	1555	1789	1607		1807	1573	
Flt Permitted	0.32	1.00	1.00	0.05	1.00	1.00	0.69	1.00		0.48	1.00	
Satd. Flow (perm)	585	5092	1601	95	4768	1555	1299	1607		920	1573	
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.89	0.89	0.92	0.92	0.92	0.89	0.92	0.89
Adj. Flow (vph)	67	2010	2	16	852	65	5	1	47	390	1	103
RTOR Reduction (vph)	0	0	1	0	0	24	0	44	0	0	71	0
Lane Group Flow (vph)	67	2010	1	16	852	41	5	4	0	390	33	0
Heavy Vehicles (%)	5%	3%	2%	2%	10%	5%	2%	2%	2%	1%	2%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Effective Green, g (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Actuated g/C Ratio	0.57	0.57	0.57	0.63	0.63	0.63	0.06	0.06		0.27	0.27	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	334	2914	916	93	2989	974	79	98		412	430	
v/s Ratio Prot		c0.39		0.00	c0.18			0.00		c0.17	0.02	
v/s Ratio Perm	0.11		0.00	0.10		0.03	0.00			c0.09		
v/c Ratio	0.20	0.69	0.00	0.17	0.29	0.04	0.06	0.04		0.95	0.08	
Uniform Delay, d1	13.4	19.6	11.9	14.8	11.0	9.3	57.5	57.4		44.2	35.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	1.4	0.0	0.9	0.1	0.0	0.3	0.2		30.7	0.1	
Delay (s)	14.8	21.0	11.9	15.7	11.1	9.3	57.8	57.6		74.9	35.1	
Level of Service	B	C	B	B	B	A	E	E		E	D	
Approach Delay (s)		20.8			11.0			57.6			66.5	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

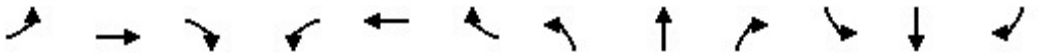
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	1587	478	360	712	128	90	39	89	35	46	59
Future Volume (vph)	134	1587	478	360	712	128	90	39	89	35	46	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1366		1772	1921	1601
Flt Permitted	0.35	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.55	1.00	1.00
Satd. Flow (perm)	665	5092	1601	1426	4768	1601	1314	1366		1019	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	144	1706	514	387	766	138	97	42	96	38	49	63
RTOR Reduction (vph)	0	0	53	0	0	32	0	76	0	0	0	56
Lane Group Flow (vph)	144	1706	461	387	766	106	97	62	0	38	49	7
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	65.7	57.7	57.7	53.6	103.3	103.3	16.3	16.3		16.3	16.3	16.3
Effective Green, g (s)	65.7	57.7	57.7	53.6	103.3	103.3	16.3	16.3		16.3	16.3	16.3
Actuated g/C Ratio	0.45	0.40	0.40	0.37	0.71	0.71	0.11	0.11		0.11	0.11	0.11
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	364	2026	637	527	3396	1140	147	153		114	215	179
v/s Ratio Prot	0.02	c0.34		c0.27	0.16			0.05			0.03	
v/s Ratio Perm	0.16		0.29			0.07	c0.07			0.04		0.00
v/c Ratio	0.40	0.84	0.72	0.73	0.23	0.09	0.66	0.40		0.33	0.23	0.04
Uniform Delay, d1	27.7	39.5	36.9	39.5	7.1	6.4	61.7	59.8		59.3	58.6	57.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	4.5	7.0	5.3	0.0	0.0	10.2	1.7		1.7	0.5	0.1
Delay (s)	28.4	44.0	43.9	44.8	7.2	6.5	71.9	61.6		61.1	59.2	57.5
Level of Service	C	D	D	D	A	A	E	E		E	E	E
Approach Delay (s)		43.0			18.4			65.8			58.9	
Approach LOS		D			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	37.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1740	16	0	857	0	36
Future Volume (Veh/h)	1740	16	0	857	0	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1891	17	0	932	0	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	255			255		
pX, platoon unblocked			0.74		0.77	0.74
vC, conflicting volume			1908		2210	639
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			979		955	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	95
cM capacity (veh/h)			516		197	798

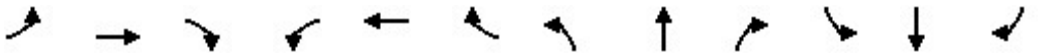
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	756	756	395	311	311	311	39
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	17	0	0	0	39
cSH	1700	1700	1700	1700	1700	1700	798
Volume to Capacity	0.44	0.44	0.23	0.18	0.18	0.18	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	9.7
Lane LOS							A
Approach Delay (s)	0.0			0.0			9.7
Approach LOS							A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		



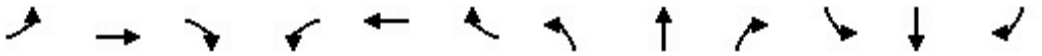
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	1418	296	169	616	94	135	604	157	220	1324	82
Future Volume (vph)	135	1418	296	169	616	94	135	604	157	220	1324	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.34	1.00	1.00	0.11	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	632	5043	1617	194	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	138	1447	302	172	629	96	138	616	160	224	1351	84
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	97	0	0	51
Lane Group Flow (vph)	138	1447	302	172	629	96	138	616	63	224	1351	33
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	43.5	43.5	12.6	49.1	49.1
Effective Green, g (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	43.5	43.5	12.6	49.1	49.1
Actuated g/C Ratio	0.37	0.30	1.00	0.38	0.30	1.00	0.06	0.35	0.35	0.10	0.39	0.39
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	319	1508	1617	190	1438	1526	194	1233	557	349	1405	610
v/s Ratio Prot	0.03	c0.29		c0.07	0.13		0.04	0.17		c0.06	c0.38	
v/s Ratio Perm	0.13		c0.19	0.27		0.06			0.04			0.02
v/c Ratio	0.43	0.96	0.19	0.91	0.44	0.06	0.71	0.50	0.11	0.64	0.96	0.05
Uniform Delay, d1	26.8	43.1	0.0	31.3	35.1	0.0	58.0	32.2	27.7	54.0	37.0	23.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	15.4	0.3	39.5	1.0	0.1	11.6	0.3	0.1	4.0	15.7	0.0
Delay (s)	27.8	58.4	0.3	70.8	36.1	0.1	69.6	32.5	27.7	58.0	52.7	23.6
Level of Service	C	E	A	E	D	A	E	C	C	E	D	C
Approach Delay (s)		46.9			38.9			37.3			52.0	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	45.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	97.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	745	95	193	1394	387	218	1102	94	166	689	137
Future Volume (vph)	191	745	95	193	1394	387	218	1102	94	166	689	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.09	1.00	1.00	0.29	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	174	4856	1633	546	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	197	768	98	199	1437	399	225	1136	97	171	710	141
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	64	0	0	95
Lane Group Flow (vph)	197	768	98	199	1437	399	225	1136	33	171	710	46
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	54.2	44.1	125.0	52.8	43.4	125.0	9.0	42.5	42.5	7.0	40.5	40.5
Effective Green, g (s)	54.2	44.1	125.0	52.8	43.4	125.0	9.0	42.5	42.5	7.0	40.5	40.5
Actuated g/C Ratio	0.43	0.35	1.00	0.42	0.35	1.00	0.07	0.34	0.34	0.06	0.32	0.32
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	208	1713	1633	325	1767	1617	254	1228	549	190	1170	529
v/s Ratio Prot	c0.08	0.16		0.05	0.28		c0.06	c0.31		0.05	0.20	
v/s Ratio Perm	c0.33		0.06	0.21		c0.25			0.02			0.03
v/c Ratio	0.95	0.45	0.06	0.61	0.81	0.25	0.89	0.93	0.06	0.90	0.61	0.09
Uniform Delay, d1	31.0	31.1	0.0	23.8	37.1	0.0	57.5	39.7	27.8	58.7	35.6	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	47.1	0.9	0.1	3.4	4.2	0.4	28.6	11.7	0.0	38.6	0.9	0.1
Delay (s)	78.0	31.9	0.1	27.2	41.3	0.4	86.0	51.4	27.8	97.2	36.4	29.5
Level of Service	E	C	A	C	D	A	F	D	C	F	D	C
Approach Delay (s)		37.5			31.9			55.2			45.7	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	41.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

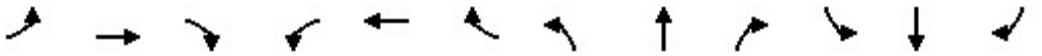


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	13	39	23	5	21	63	1401	17	22	966	45
Future Volume (vph)	41	13	39	23	5	21	63	1401	17	22	966	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1669		1825	1686		1789	3608		1825	3558	
Flt Permitted	0.74	1.00		0.72	1.00		0.24	1.00		0.17	1.00	
Satd. Flow (perm)	1421	1669		1385	1686		454	3608		335	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	43	14	41	24	5	22	66	1475	18	23	1017	47
RTOR Reduction (vph)	0	39	0	0	21	0	0	0	0	0	1	0
Lane Group Flow (vph)	43	16	0	24	6	0	66	1493	0	23	1063	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	9.1	9.1		9.1	9.1		137.9	137.9		126.6	126.6	
Effective Green, g (s)	9.1	9.1		9.1	9.1		137.9	137.9		126.6	126.6	
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.86	0.86		0.79	0.79	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	80	94		78	95		443	3109		265	2815	
v/s Ratio Prot		0.01			0.00		0.01	c0.41			0.30	
v/s Ratio Perm	c0.03			0.02			0.12			0.07		
v/c Ratio	0.54	0.17		0.31	0.07		0.15	0.48		0.09	0.38	
Uniform Delay, d1	73.4	71.9		72.4	71.4		2.2	2.6		3.7	5.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	0.9		2.2	0.3		0.2	0.5		0.6	0.4	
Delay (s)	80.2	72.8		74.7	71.7		2.4	3.1		4.4	5.4	
Level of Service	F	E		E	E		A	A		A	A	
Approach Delay (s)		76.0			73.1			3.1			5.3	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.6%	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)	91	931	5	30	1898	325	4	1	25	99	1	42
Future Volume (vph)	91	931	5	30	1898	325	4	1	25	99	1	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4902	1601	1789	5092	1633	1789	1611		1722	1638	
Flt Permitted	0.06	1.00	1.00	0.27	1.00	1.00	0.73	1.00		0.95	1.00	
Satd. Flow (perm)	108	4902	1601	510	5092	1633	1369	1611		1722	1638	
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94
Adj. Flow (vph)	97	990	5	33	2019	346	4	1	27	105	1	45
RTOR Reduction (vph)	0	0	2	0	0	42	0	26	0	0	36	0
Lane Group Flow (vph)	97	990	3	33	2019	304	4	2	0	105	10	0
Heavy Vehicles (%)	4%	7%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	108.7	99.1	99.1	99.9	94.7	94.7	6.0	6.0		14.7	30.4	
Effective Green, g (s)	108.7	99.1	99.1	99.9	94.7	94.7	6.0	6.0		14.7	30.4	
Actuated g/C Ratio	0.72	0.66	0.66	0.67	0.63	0.63	0.04	0.04		0.10	0.20	
Clearance Time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	183	3238	1057	383	3214	1030	54	64		168	331	
v/s Ratio Prot	c0.03	0.20		0.00	c0.40			0.00		c0.06	0.01	
v/s Ratio Perm	0.35		0.00	0.05		0.19	c0.00					
v/c Ratio	0.53	0.31	0.00	0.09	0.63	0.30	0.07	0.03		0.62	0.03	
Uniform Delay, d1	16.3	10.8	8.7	8.5	16.9	12.5	69.3	69.2		65.0	48.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	0.2	0.0	0.1	0.4	0.2	0.6	0.2		7.1	0.0	
Delay (s)	19.3	11.1	8.7	8.6	17.3	12.7	69.9	69.4		72.1	48.0	
Level of Service	B	B	A	A	B	B	E	E		E	D	
Approach Delay (s)		11.8			16.5			69.5			64.7	
Approach LOS		B			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



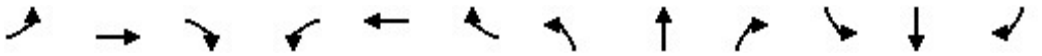
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	862	169	142	1445	13	534	113	190	2	16	9
Future Volume (vph)	45	862	169	142	1445	13	534	113	190	2	16	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1667		1825	1921	1617
Flt Permitted	0.08	1.00	1.00	0.30	1.00	1.00	0.51	1.00		0.91	1.00	1.00
Satd. Flow (perm)	158	4902	1512	513	5142	1512	944	1667		1746	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	48	917	180	151	1537	14	568	120	202	2	17	10
RTOR Reduction (vph)	0	0	38	0	0	8	0	40	0	0	0	10
Lane Group Flow (vph)	48	917	142	151	1537	6	568	282	0	2	17	0
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	66.0	66.0	66.0	56.6	56.6	56.6	45.1	45.1		4.4	4.4	4.4
Effective Green, g (s)	66.0	66.0	66.0	56.6	56.6	56.6	45.1	45.1		4.4	4.4	4.4
Actuated g/C Ratio	0.53	0.53	0.53	0.45	0.45	0.45	0.36	0.36		0.04	0.04	0.04
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	162	2588	798	232	2328	684	587	601		61	67	56
v/s Ratio Prot	0.01	c0.19			c0.30		c0.29	0.17			0.01	
v/s Ratio Perm	0.14		0.09	0.29		0.00	c0.06			0.00		0.00
v/c Ratio	0.30	0.35	0.18	0.65	0.66	0.01	0.97	0.47		0.03	0.25	0.01
Uniform Delay, d1	18.2	17.1	15.4	26.5	26.7	18.8	37.7	30.7		58.2	58.7	58.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	0.4	0.5	6.4	0.7	0.0	28.8	0.6		0.2	2.0	0.0
Delay (s)	19.2	17.5	15.9	32.9	27.4	18.8	66.5	31.3		58.5	60.7	58.2
Level of Service	B	B	B	C	C	B	E	C		E	E	E
Approach Delay (s)		17.3			27.8			53.8			59.7	
Approach LOS		B			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	20.9
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	978	35	0	1947	0	26
Future Volume (Veh/h)	978	35	0	1947	0	26
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1063	38	0	2116	0	28
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	255			255		
pX, platoon unblocked			0.90		0.80	0.90
vC, conflicting volume			1101		1787	373
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			712		242	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	97
cM capacity (veh/h)			793		580	973

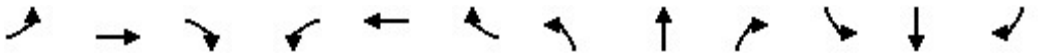
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	425	425	251	705	705	705	28
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	38	0	0	0	28
cSH	1700	1700	1700	1700	1700	1700	973
Volume to Capacity	0.25	0.25	0.15	0.41	0.41	0.41	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	8.8
Lane LOS							A
Approach Delay (s)	0.0			0.0			8.8
Approach LOS							A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		



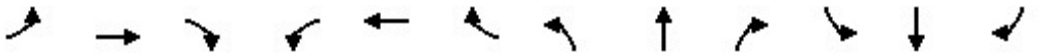
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	20	127	39	23	39	74	721	10	16	1720	35
Future Volume (vph)	57	20	127	39	23	39	74	721	10	16	1720	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.91		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1684		1772	3572		1690	3563	
Flt Permitted	0.71	1.00		0.31	1.00		0.07	1.00		0.35	1.00	
Satd. Flow (perm)	1370	1622		574	1684		129	3572		625	3563	
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)	62	22	138	42	25	42	80	784	11	17	1870	38
RTOR Reduction (vph)	0	90	0	0	39	0	0	0	0	0	1	0
Lane Group Flow (vph)	62	70	0	42	28	0	80	795	0	17	1907	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	13.0	13.0		13.0	13.0		134.0	134.0		119.9	119.9	
Effective Green, g (s)	13.0	13.0		13.0	13.0		134.0	134.0		119.9	119.9	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.84	0.84		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	111	131		46	136		201	2991		468	2670	
v/s Ratio Prot		0.04			0.02		c0.02	0.22			c0.54	
v/s Ratio Perm	0.05			c0.07			0.31			0.03		
v/c Ratio	0.56	0.53		0.91	0.21		0.40	0.27		0.04	0.71	
Uniform Delay, d1	70.7	70.6		72.9	68.7		14.3	2.7		5.2	10.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.0	4.1		99.4	0.8		1.3	0.2		0.1	1.7	
Delay (s)	76.7	74.7		172.3	69.5		15.6	2.9		5.3	12.5	
Level of Service	E	E		F	E		B	A		A	B	
Approach Delay (s)		75.3			109.1			4.1			12.4	
Approach LOS		E			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	1830	2	15	776	59	5	1	43	356	1	95
Future Volume (vph)	61	1830	2	15	776	59	5	1	43	356	1	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	5092	1601	1789	4768	1555	1789	1607		1807	1573	
Flt Permitted	0.31	1.00	1.00	0.05	1.00	1.00	0.69	1.00		0.48	1.00	
Satd. Flow (perm)	573	5092	1601	95	4768	1555	1295	1607		920	1573	
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.89	0.89	0.92	0.92	0.92	0.89	0.92	0.89
Adj. Flow (vph)	69	2056	2	16	872	66	5	1	47	400	1	107
RTOR Reduction (vph)	0	0	1	0	0	24	0	44	0	0	68	0
Lane Group Flow (vph)	69	2056	1	16	872	42	5	4	0	400	40	0
Heavy Vehicles (%)	5%	3%	2%	2%	10%	5%	2%	2%	2%	1%	2%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Effective Green, g (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Actuated g/C Ratio	0.57	0.57	0.57	0.63	0.63	0.63	0.06	0.06		0.27	0.27	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	327	2914	916	93	2989	974	79	98		412	430	
v/s Ratio Prot		c0.40		0.00	c0.18			0.00		c0.18	0.03	
v/s Ratio Perm	0.12		0.00	0.10		0.03	0.00			c0.09		
v/c Ratio	0.21	0.71	0.00	0.17	0.29	0.04	0.06	0.04		0.97	0.09	
Uniform Delay, d1	13.5	19.9	11.9	15.3	11.1	9.3	57.5	57.4		44.7	35.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	1.5	0.0	0.9	0.1	0.0	0.3	0.2		36.6	0.1	
Delay (s)	15.0	21.4	11.9	16.2	11.1	9.3	57.8	57.6		81.2	35.3	
Level of Service	B	C	B	B	B	A	E	E		F	D	
Approach Delay (s)		21.2			11.1			57.6			71.5	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



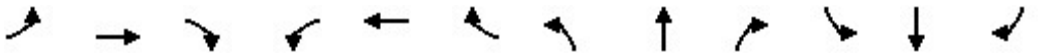
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	1627	485	360	729	131	91	40	90	35	47	60
Future Volume (vph)	137	1627	485	360	729	131	91	40	90	35	47	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1368		1772	1921	1601
Flt Permitted	0.34	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.54	1.00	1.00
Satd. Flow (perm)	653	5092	1601	1426	4768	1601	1312	1368		1008	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	147	1749	522	387	784	141	98	43	97	38	51	65
RTOR Reduction (vph)	0	0	53	0	0	33	0	75	0	0	0	58
Lane Group Flow (vph)	147	1749	469	387	784	108	98	65	0	38	51	7
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	65.6	57.5	57.5	53.6	103.0	103.0	16.5	16.5		16.5	16.5	16.5
Effective Green, g (s)	65.6	57.5	57.5	53.6	103.0	103.0	16.5	16.5		16.5	16.5	16.5
Actuated g/C Ratio	0.45	0.40	0.40	0.37	0.71	0.71	0.11	0.11		0.11	0.11	0.11
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	359	2019	634	527	3386	1137	149	155		114	218	182
v/s Ratio Prot	0.02	c0.34		c0.27	0.16			0.05			0.03	
v/s Ratio Perm	0.16		0.29			0.07	c0.07			0.04		0.00
v/c Ratio	0.41	0.87	0.74	0.73	0.23	0.10	0.66	0.42		0.33	0.23	0.04
Uniform Delay, d1	28.1	40.2	37.4	39.5	7.3	6.5	61.5	59.8		59.2	58.5	57.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	5.3	7.6	5.3	0.0	0.0	10.0	1.8		1.7	0.6	0.1
Delay (s)	28.8	45.5	44.9	44.8	7.3	6.6	71.6	61.6		60.9	59.0	57.3
Level of Service	C	D	D	D	A	A	E	E		E	E	E
Approach Delay (s)		44.4			18.3			65.7			58.8	
Approach LOS		D			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	37.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1780	22	0	878	0	37
Future Volume (Veh/h)	1780	22	0	878	0	37
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1935	24	0	954	0	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	255			255		
pX, platoon unblocked			0.73		0.76	0.73
vC, conflicting volume			1959		2265	657
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1015		1051	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	95
cM capacity (veh/h)			495		168	791

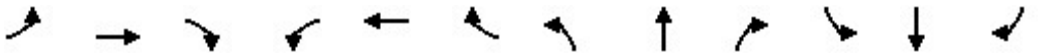
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	774	774	411	318	318	318	40
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	24	0	0	0	40
cSH	1700	1700	1700	1700	1700	1700	791
Volume to Capacity	0.46	0.46	0.24	0.19	0.19	0.19	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	9.8
Lane LOS							A
Approach Delay (s)	0.0			0.0			9.8
Approach LOS							A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	44.9%	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)	196	764	98	198	1428	396	224	1130	98	171	706	140
Future Volume (vph)	196	764	98	198	1428	396	224	1130	98	171	706	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.09	1.00	1.00	0.27	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	179	4856	1633	520	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	202	788	101	204	1472	408	231	1165	101	176	728	144
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	66	0	0	97
Lane Group Flow (vph)	202	788	101	204	1472	408	231	1165	35	176	728	47
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	53.9	43.0	125.0	52.7	42.4	125.0	9.0	42.7	42.7	7.0	40.7	40.7
Effective Green, g (s)	53.9	43.0	125.0	52.7	42.4	125.0	9.0	42.7	42.7	7.0	40.7	40.7
Actuated g/C Ratio	0.43	0.34	1.00	0.42	0.34	1.00	0.07	0.34	0.34	0.06	0.33	0.33
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	220	1670	1633	325	1727	1617	254	1234	552	190	1176	531
v/s Ratio Prot	c0.08	0.16		0.05	0.29		c0.07	c0.32		0.05	0.20	
v/s Ratio Perm	c0.32		0.06	0.21		c0.25			0.02			0.03
v/c Ratio	0.92	0.47	0.06	0.63	0.85	0.25	0.91	0.94	0.06	0.93	0.62	0.09
Uniform Delay, d1	31.2	32.1	0.0	24.0	38.4	0.0	57.6	40.0	27.7	58.7	35.6	29.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	38.4	1.0	0.1	3.8	5.6	0.4	33.0	14.2	0.0	44.4	1.0	0.1
Delay (s)	69.7	33.1	0.1	27.8	43.9	0.4	90.6	54.2	27.7	103.1	36.6	29.3
Level of Service	E	C	A	C	D	A	F	D	C	F	D	C
Approach Delay (s)		36.8			33.8			58.0			46.8	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	43.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

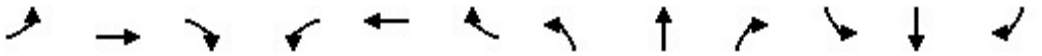


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	14	40	24	5	22	65	1436	17	23	990	46
Future Volume (vph)	42	14	40	24	5	22	65	1436	17	23	990	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1672		1825	1684		1789	3608		1825	3558	
Flt Permitted	0.74	1.00		0.72	1.00		0.23	1.00		0.17	1.00	
Satd. Flow (perm)	1420	1672		1383	1684		440	3608		323	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	44	15	42	25	5	23	68	1512	18	24	1042	48
RTOR Reduction (vph)	0	40	0	0	22	0	0	0	0	0	1	0
Lane Group Flow (vph)	44	17	0	25	6	0	68	1530	0	24	1089	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	9.2	9.2		9.2	9.2		137.8	137.8		126.4	126.4	
Effective Green, g (s)	9.2	9.2		9.2	9.2		137.8	137.8		126.4	126.4	
Actuated g/C Ratio	0.06	0.06		0.06	0.06		0.86	0.86		0.79	0.79	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	81	96		79	96		432	3107		255	2810	
v/s Ratio Prot		0.01			0.00		0.01	c0.42			0.31	
v/s Ratio Perm	c0.03			0.02			0.13			0.07		
v/c Ratio	0.54	0.18		0.32	0.07		0.16	0.49		0.09	0.39	
Uniform Delay, d1	73.4	71.8		72.4	71.3		2.3	2.7		3.8	5.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.2	0.9		2.3	0.3		0.2	0.6		0.7	0.4	
Delay (s)	80.6	72.7		74.7	71.6		2.5	3.2		4.5	5.5	
Level of Service	F	E		E	E		A	A		A	A	
Approach Delay (s)		76.2			73.1			3.2			5.5	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	69.6%	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)	95	956	5	30	1944	333	4	1	25	102	1	43
Future Volume (vph)	95	956	5	30	1944	333	4	1	25	102	1	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4902	1601	1789	5092	1633	1789	1611		1722	1638	
Flt Permitted	0.05	1.00	1.00	0.26	1.00	1.00	0.73	1.00		0.95	1.00	
Satd. Flow (perm)	98	4902	1601	496	5092	1633	1368	1611		1722	1638	
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94
Adj. Flow (vph)	101	1017	5	33	2068	354	4	1	27	109	1	46
RTOR Reduction (vph)	0	0	2	0	0	43	0	26	0	0	37	0
Lane Group Flow (vph)	101	1017	3	33	2068	311	4	2	0	109	10	0
Heavy Vehicles (%)	4%	7%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	108.5	98.8	98.8	99.1	93.9	93.9	6.0	6.0		15.0	30.7	
Effective Green, g (s)	108.5	98.8	98.8	99.1	93.9	93.9	6.0	6.0		15.0	30.7	
Actuated g/C Ratio	0.72	0.66	0.66	0.66	0.63	0.63	0.04	0.04		0.10	0.20	
Clearance Time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	182	3228	1054	372	3187	1022	54	64		172	335	
v/s Ratio Prot	c0.04	0.21		0.00	c0.41			0.00		c0.06	0.01	
v/s Ratio Perm	0.36		0.00	0.06		0.19	c0.00					
v/c Ratio	0.55	0.32	0.00	0.09	0.65	0.30	0.07	0.03		0.63	0.03	
Uniform Delay, d1	20.2	11.0	8.8	8.8	17.7	13.0	69.3	69.2		64.9	47.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	0.3	0.0	0.1	0.5	0.2	0.6	0.2		7.4	0.0	
Delay (s)	23.9	11.3	8.8	8.9	18.1	13.1	69.9	69.4		72.3	47.8	
Level of Service	C	B	A	A	B	B	E	E		E	D	
Approach Delay (s)		12.4			17.3			69.5			64.9	
Approach LOS		B			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



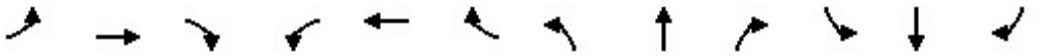
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	886	172	143	1482	14	546	116	193	2	17	9
Future Volume (vph)	46	886	172	143	1482	14	546	116	193	2	17	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1668		1825	1921	1617
Flt Permitted	0.07	1.00	1.00	0.29	1.00	1.00	0.50	1.00		0.89	1.00	1.00
Satd. Flow (perm)	144	4902	1512	499	5142	1512	933	1668		1708	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	49	943	183	152	1577	15	581	123	205	2	18	10
RTOR Reduction (vph)	0	0	38	0	0	8	0	37	0	0	0	10
Lane Group Flow (vph)	49	943	145	152	1577	7	581	291	0	2	18	0
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	65.7	65.7	65.7	56.2	56.2	56.2	45.4	45.4		4.5	4.5	4.5
Effective Green, g (s)	65.7	65.7	65.7	56.2	56.2	56.2	45.4	45.4		4.5	4.5	4.5
Actuated g/C Ratio	0.53	0.53	0.53	0.45	0.45	0.45	0.36	0.36		0.04	0.04	0.04
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	156	2576	794	224	2311	679	589	605		61	69	58
v/s Ratio Prot	0.02	c0.19			c0.31		c0.29	0.17			0.01	
v/s Ratio Perm	0.15		0.10	0.30		0.00	c0.06			0.00		0.00
v/c Ratio	0.31	0.37	0.18	0.68	0.68	0.01	0.99	0.48		0.03	0.26	0.01
Uniform Delay, d1	18.7	17.4	15.6	27.2	27.3	19.0	37.9	30.7		58.1	58.6	58.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.2	0.4	0.5	7.9	0.8	0.0	33.3	0.6		0.2	2.0	0.0
Delay (s)	19.9	17.8	16.1	35.2	28.2	19.0	71.2	31.3		58.4	60.6	58.1
Level of Service	B	B	B	D	C	B	E	C		E	E	E
Approach Delay (s)		17.6			28.7			56.8			59.7	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	20.9
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1001	38	0	1995	0	32
Future Volume (Veh/h)	1001	38	0	1995	0	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1088	41	0	2168	0	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	255			255		
pX, platoon unblocked			0.89		0.79	0.89
vC, conflicting volume			1129		1831	383
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			717		182	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	96
cM capacity (veh/h)			784		622	966

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	435	435	259	723	723	723	35
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	41	0	0	0	35
cSH	1700	1700	1700	1700	1700	1700	966
Volume to Capacity	0.26	0.26	0.15	0.43	0.43	0.43	0.04
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	8.9
Lane LOS							A
Approach Delay (s)	0.0			0.0			8.9
Approach LOS							A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

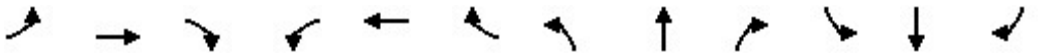


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	1449	303	179	630	96	138	619	161	225	1357	84
Future Volume (vph)	139	1449	303	179	630	96	138	619	161	225	1357	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.33	1.00	1.00	0.11	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	616	5043	1617	194	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	142	1479	309	183	643	98	141	632	164	230	1385	86
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	97	0	0	52
Lane Group Flow (vph)	142	1479	309	183	643	98	141	632	67	230	1385	34
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	43.4	43.4	12.7	49.1	49.1
Effective Green, g (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	43.4	43.4	12.7	49.1	49.1
Actuated g/C Ratio	0.37	0.30	1.00	0.38	0.30	1.00	0.06	0.35	0.35	0.10	0.39	0.39
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	314	1508	1617	190	1438	1526	194	1230	555	352	1405	610
v/s Ratio Prot	0.03	c0.29		c0.07	0.13		0.04	0.18		c0.07	c0.39	
v/s Ratio Perm	0.13		c0.19	0.29		0.06			0.04			0.02
v/c Ratio	0.45	0.98	0.19	0.96	0.45	0.06	0.73	0.51	0.12	0.65	0.99	0.06
Uniform Delay, d1	26.9	43.4	0.0	31.7	35.2	0.0	58.1	32.4	27.8	54.0	37.6	23.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	19.0	0.3	54.3	1.0	0.1	12.7	0.4	0.1	4.3	20.5	0.0
Delay (s)	28.0	62.5	0.3	86.0	36.2	0.1	70.8	32.8	27.9	58.3	58.1	23.6
Level of Service	C	E	A	F	D	A	E	C	C	E	E	C
Approach Delay (s)		50.0			42.3			37.6			56.4	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	48.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	100.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

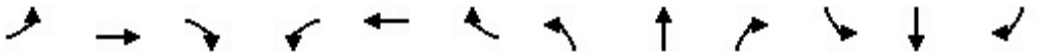
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	20	130	40	24	41	76	841	11	15	1763	36
Future Volume (vph)	59	20	130	40	24	41	76	841	11	15	1763	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.90		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1683		1772	3572		1690	3563	
Flt Permitted	0.71	1.00		0.30	1.00		0.06	1.00		0.31	1.00	
Satd. Flow (perm)	1365	1622		557	1683		117	3572		549	3563	
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)	64	22	141	43	26	45	83	914	12	16	1916	39
RTOR Reduction (vph)	0	89	0	0	41	0	0	0	0	0	1	0
Lane Group Flow (vph)	64	74	0	43	30	0	83	926	0	16	1954	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	13.4	13.4		13.4	13.4		133.6	133.6		119.4	119.4	
Effective Green, g (s)	13.4	13.4		13.4	13.4		133.6	133.6		119.4	119.4	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.83	0.83		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	114	135		46	140		192	2982		409	2658	
v/s Ratio Prot		0.05			0.02		c0.02	0.26			c0.55	
v/s Ratio Perm	0.05			c0.08			0.33			0.03		
v/c Ratio	0.56	0.55		0.93	0.21		0.43	0.31		0.04	0.74	
Uniform Delay, d1	70.5	70.4		72.9	68.4		17.0	2.9		5.3	11.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	4.5		107.1	0.8		1.6	0.3		0.2	1.9	
Delay (s)	76.7	74.9		180.0	69.1		18.5	3.2		5.5	13.3	
Level of Service	E	E		F	E		B	A		A	B	
Approach Delay (s)		75.4			110.9			4.5			13.2	
Approach LOS		E			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1871	2	15	795	61	5	1	43	365	1	97
Future Volume (vph)	62	1871	2	15	795	61	5	1	43	365	1	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	5092	1601	1789	4768	1555	1789	1607		1807	1573	
Flt Permitted	0.31	1.00	1.00	0.05	1.00	1.00	0.69	1.00		0.48	1.00	
Satd. Flow (perm)	561	5092	1601	95	4768	1555	1292	1607		920	1573	
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.89	0.89	0.92	0.92	0.92	0.89	0.92	0.89
Adj. Flow (vph)	70	2102	2	16	893	69	5	1	47	410	1	109
RTOR Reduction (vph)	0	0	1	0	0	24	0	44	0	0	63	0
Lane Group Flow (vph)	70	2102	1	16	893	45	5	4	0	410	47	0
Heavy Vehicles (%)	5%	3%	2%	2%	10%	5%	2%	2%	2%	1%	2%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Effective Green, g (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Actuated g/C Ratio	0.57	0.57	0.57	0.63	0.63	0.63	0.06	0.06		0.27	0.27	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	321	2914	916	93	2989	974	79	98		412	430	
v/s Ratio Prot		c0.41		0.00	c0.19			0.00		c0.18	0.03	
v/s Ratio Perm	0.12		0.00	0.10		0.03	0.00			c0.09		
v/c Ratio	0.22	0.72	0.00	0.17	0.30	0.05	0.06	0.04		1.00	0.11	
Uniform Delay, d1	13.6	20.2	11.9	15.8	11.1	9.3	57.5	57.4		45.1	35.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	1.6	0.0	0.9	0.1	0.0	0.3	0.2		42.8	0.1	
Delay (s)	15.1	21.8	11.9	16.6	11.2	9.3	57.8	57.6		87.9	35.4	
Level of Service	B	C	B	B	B	A	E	E		F	D	
Approach Delay (s)		21.6			11.1			57.6			76.8	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



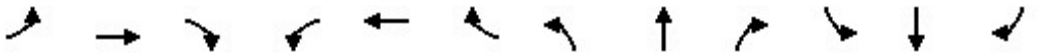
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	1668	492	363	748	134	92	41	91	36	48	62
Future Volume (vph)	141	1668	492	363	748	134	92	41	91	36	48	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1369		1772	1921	1601
Flt Permitted	0.34	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.53	1.00	1.00
Satd. Flow (perm)	639	5092	1601	1426	4768	1601	1311	1369		996	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	152	1794	529	390	804	144	99	44	98	39	52	67
RTOR Reduction (vph)	0	0	54	0	0	33	0	74	0	0	0	59
Lane Group Flow (vph)	152	1794	475	390	804	111	99	68	0	39	52	8
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	64.9	56.7	56.7	54.3	102.8	102.8	16.6	16.6		16.6	16.6	16.6
Effective Green, g (s)	64.9	56.7	56.7	54.3	102.8	102.8	16.6	16.6		16.6	16.6	16.6
Actuated g/C Ratio	0.45	0.39	0.39	0.37	0.71	0.71	0.11	0.11		0.11	0.11	0.11
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	352	1991	626	534	3380	1135	150	156		114	219	183
v/s Ratio Prot	0.02	c0.35		c0.27	0.17			0.05			0.03	
v/s Ratio Perm	0.17		0.30			0.07	c0.08			0.04		0.00
v/c Ratio	0.43	0.90	0.76	0.73	0.24	0.10	0.66	0.43		0.34	0.24	0.04
Uniform Delay, d1	29.0	41.5	38.2	39.0	7.4	6.6	61.5	59.8		59.2	58.4	57.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.9	7.1	8.4	5.1	0.0	0.0	10.4	1.9		1.8	0.6	0.1
Delay (s)	29.9	48.6	46.7	44.1	7.4	6.6	71.9	61.7		61.0	59.0	57.2
Level of Service	C	D	D	D	A	A	E	E		E	E	E
Approach Delay (s)		47.0			18.0			65.9			58.7	
Approach LOS		D			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	39.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	90.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1820	22	0	900	0	37
Future Volume (Veh/h)	1820	22	0	900	0	37
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1978	24	0	978	0	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	255			255		
pX, platoon unblocked			0.72		0.75	0.72
vC, conflicting volume			2002		2316	671
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1046		1070	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	95
cM capacity (veh/h)			478		162	784

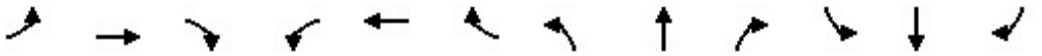
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	791	791	420	326	326	326	40
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	24	0	0	0	40
cSH	1700	1700	1700	1700	1700	1700	784
Volume to Capacity	0.47	0.47	0.25	0.19	0.19	0.19	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	9.8
Lane LOS							A
Approach Delay (s)	0.0			0.0			9.8
Approach LOS							A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		



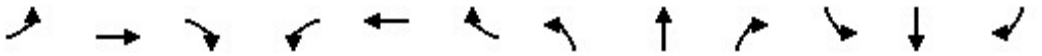
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	201	780	100	204	1462	406	229	1159	100	175	724	144
Future Volume (vph)	201	780	100	204	1462	406	229	1159	100	175	724	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.09	1.00	1.00	0.26	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	180	4856	1633	499	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	207	804	103	210	1507	419	236	1195	103	180	746	148
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	67	0	0	99
Lane Group Flow (vph)	207	804	103	210	1507	419	236	1195	36	180	746	49
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	53.1	42.6	125.0	52.7	42.4	125.0	9.0	43.1	43.1	7.0	41.1	41.1
Effective Green, g (s)	53.1	42.6	125.0	52.7	42.4	125.0	9.0	43.1	43.1	7.0	41.1	41.1
Actuated g/C Ratio	0.42	0.34	1.00	0.42	0.34	1.00	0.07	0.34	0.34	0.06	0.33	0.33
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	214	1654	1633	318	1727	1617	254	1246	557	190	1188	536
v/s Ratio Prot	c0.08	0.17		0.05	0.30		c0.07	c0.33		0.05	0.21	
v/s Ratio Perm	c0.33		0.06	0.22		c0.26			0.02			0.03
v/c Ratio	0.97	0.49	0.06	0.66	0.87	0.26	0.93	0.96	0.06	0.95	0.63	0.09
Uniform Delay, d1	32.3	32.6	0.0	24.2	38.8	0.0	57.7	40.1	27.4	58.8	35.5	29.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.6	1.0	0.1	5.1	6.4	0.4	37.3	16.5	0.0	49.7	1.0	0.1
Delay (s)	83.9	33.6	0.1	29.2	45.2	0.4	95.0	56.5	27.5	108.5	36.5	29.1
Level of Service	F	C	A	C	D	A	F	E	C	F	D	C
Approach Delay (s)		39.8			34.8			60.5			47.6	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	44.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	96.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



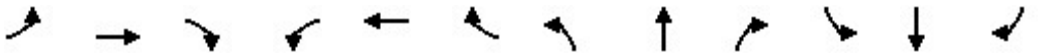
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	14	41	24	5	23	66	1472	18	24	1015	47
Future Volume (vph)	43	14	41	24	5	23	66	1472	18	24	1015	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1670		1825	1683		1789	3608		1825	3558	
Flt Permitted	0.74	1.00		0.72	1.00		0.22	1.00		0.16	1.00	
Satd. Flow (perm)	1418	1670		1382	1683		423	3608		306	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	45	15	43	25	5	24	69	1549	19	25	1068	49
RTOR Reduction (vph)	0	40	0	0	22	0	0	0	0	0	1	0
Lane Group Flow (vph)	45	18	0	25	7	0	69	1568	0	25	1116	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Effective Green, g (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Actuated g/C Ratio	0.07	0.07		0.07	0.07		0.85	0.85		0.78	0.78	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	93	109		90	110		415	3078		239	2781	
v/s Ratio Prot		0.01			0.00		0.01	c0.43			0.31	
v/s Ratio Perm	c0.03			0.02			0.13			0.08		
v/c Ratio	0.48	0.16		0.28	0.06		0.17	0.51		0.10	0.40	
Uniform Delay, d1	72.1	70.6		71.1	70.1		2.7	3.1		4.1	5.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.7		1.7	0.2		0.2	0.6		0.9	0.4	
Delay (s)	76.1	71.3		72.8	70.3		2.9	3.7		5.0	6.0	
Level of Service	E	E		E	E		A	A		A	A	
Approach Delay (s)		73.4			71.5			3.6			6.0	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	70.7%	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)	97	978	5	30	1992	341	4	1	25	105	1	44
Future Volume (vph)	97	978	5	30	1992	341	4	1	25	105	1	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4902	1601	1789	5092	1633	1789	1611		1722	1638	
Flt Permitted	0.05	1.00	1.00	0.26	1.00	1.00	0.73	1.00		0.95	1.00	
Satd. Flow (perm)	89	4902	1601	483	5092	1633	1367	1611		1722	1638	
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94
Adj. Flow (vph)	103	1040	5	33	2119	363	4	1	27	112	1	47
RTOR Reduction (vph)	0	0	2	0	0	43	0	26	0	0	37	0
Lane Group Flow (vph)	103	1040	3	33	2119	320	4	2	0	112	11	0
Heavy Vehicles (%)	4%	7%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	108.3	98.6	98.6	98.6	93.4	93.4	6.0	6.0		15.2	30.9	
Effective Green, g (s)	108.3	98.6	98.6	98.6	93.4	93.4	6.0	6.0		15.2	30.9	
Actuated g/C Ratio	0.72	0.66	0.66	0.66	0.62	0.62	0.04	0.04		0.10	0.21	
Clearance Time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	179	3222	1052	362	3170	1016	54	64		174	337	
v/s Ratio Prot	c0.04	0.21		0.00	c0.42			0.00		c0.07	0.01	
v/s Ratio Perm	0.37		0.00	0.06		0.20	c0.00					
v/c Ratio	0.58	0.32	0.00	0.09	0.67	0.31	0.07	0.03		0.64	0.03	
Uniform Delay, d1	26.0	11.2	8.8	9.0	18.3	13.3	69.3	69.2		64.8	47.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.3	0.0	0.1	0.5	0.2	0.6	0.2		7.9	0.0	
Delay (s)	30.4	11.4	8.8	9.1	18.8	13.5	69.9	69.4		72.7	47.6	
Level of Service	C	B	A	A	B	B	E	E		E	D	
Approach Delay (s)		13.1			17.9			69.5			65.2	
Approach LOS		B			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	69.1%	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)	47	908	175	144	1519	14	558	118	195	2	17	10
Future Volume (vph)	47	908	175	144	1519	14	558	118	195	2	17	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1669		1825	1921	1617
Flt Permitted	0.07	1.00	1.00	0.28	1.00	1.00	0.50	1.00		0.89	1.00	1.00
Satd. Flow (perm)	133	4902	1512	487	5142	1512	933	1669		1708	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	966	186	153	1616	15	594	126	207	2	18	11
RTOR Reduction (vph)	0	0	38	0	0	8	0	30	0	0	0	11
Lane Group Flow (vph)	50	966	148	153	1616	7	594	303	0	2	18	0
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	63.9	63.9	63.9	54.3	54.3	54.3	47.2	47.2		4.5	4.5	4.5
Effective Green, g (s)	63.9	63.9	63.9	54.3	54.3	54.3	47.2	47.2		4.5	4.5	4.5
Actuated g/C Ratio	0.51	0.51	0.51	0.43	0.43	0.43	0.38	0.38		0.04	0.04	0.04
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	150	2505	772	211	2233	656	615	630		61	69	58
v/s Ratio Prot	0.02	c0.20			c0.31		c0.30	0.18			0.01	
v/s Ratio Perm	0.15		0.10	0.31		0.00	c0.06			0.00		0.00
v/c Ratio	0.33	0.39	0.19	0.73	0.72	0.01	0.97	0.48		0.03	0.26	0.01
Uniform Delay, d1	20.3	18.6	16.6	29.2	29.2	20.1	36.5	29.6		58.1	58.6	58.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.3	0.5	0.6	11.7	1.2	0.0	27.7	0.6		0.2	2.0	0.0
Delay (s)	21.6	19.0	17.1	40.9	30.3	20.1	64.2	30.2		58.4	60.6	58.1
Level of Service	C	B	B	D	C	C	E	C		E	E	E
Approach Delay (s)		18.9			31.2			52.0			59.6	
Approach LOS		B			C			D			E	

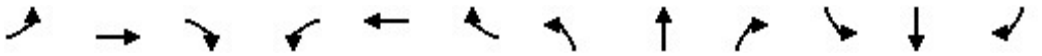
Intersection Summary					
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.84				
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	20.9		
Intersection Capacity Utilization	86.0%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1025	38	0	2044	0	32
Future Volume (Veh/h)	1025	38	0	2044	0	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1114	41	0	2222	0	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	255			255		
pX, platoon unblocked			0.89		0.78	0.89
vC, conflicting volume			1155		1875	392
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			729		133	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	96
cM capacity (veh/h)			772		657	962

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	446	446	264	741	741	741	35
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	41	0	0	0	35
cSH	1700	1700	1700	1700	1700	1700	962
Volume to Capacity	0.26	0.26	0.16	0.44	0.44	0.44	0.04
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	8.9
Lane LOS							A
Approach Delay (s)	0.0			0.0			8.9
Approach LOS							A

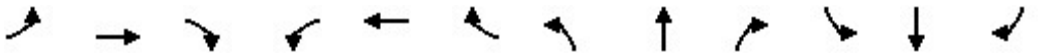
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix K:
Traffic Operations
Future Total Conditions
Sensitivity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	248	943	110	224	1800	406	252	1275	109	175	724	179
Future Volume (vph)	248	943	110	224	1800	406	252	1275	109	175	724	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.09	1.00	1.00	0.17	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	172	4856	1633	332	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	256	972	113	231	1856	419	260	1314	112	180	746	185
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	74	0	0	129
Lane Group Flow (vph)	256	972	113	231	1856	419	260	1314	38	180	746	56
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	58.0	44.7	135.0	62.6	47.0	135.0	11.9	45.7	45.7	7.0	40.8	40.8
Effective Green, g (s)	58.0	44.7	135.0	62.6	47.0	135.0	11.9	45.7	45.7	7.0	40.8	40.8
Actuated g/C Ratio	0.43	0.33	1.00	0.46	0.35	1.00	0.09	0.34	0.34	0.05	0.30	0.30
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	236	1607	1633	324	1772	1617	312	1223	547	176	1092	493
v/s Ratio Prot	c0.11	0.20		c0.08	c0.36		c0.07	c0.36		0.05	0.21	
v/s Ratio Perm	0.36		0.07	0.25		0.26			0.02			0.03
v/c Ratio	1.08	0.60	0.07	0.71	1.05	0.26	0.83	1.07	0.07	1.02	0.68	0.11
Uniform Delay, d1	40.2	37.8	0.0	24.4	44.0	0.0	60.6	44.6	30.2	64.0	41.4	34.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	83.0	1.7	0.1	7.2	35.0	0.4	17.1	48.2	0.1	73.9	1.8	0.1
Delay (s)	123.2	39.5	0.1	31.6	79.0	0.4	77.7	92.9	30.3	137.9	43.2	34.1
Level of Service	F	D	A	C	E	A	E	F	C	F	D	C
Approach Delay (s)		52.1			61.5			86.4			57.0	
Approach LOS		D			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	65.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	108.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

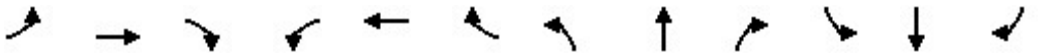


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	14	41	24	5	23	66	1616	18	24	1015	47
Future Volume (vph)	43	14	41	24	5	23	66	1616	18	24	1015	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1670		1825	1683		1789	3608		1825	3558	
Flt Permitted	0.74	1.00		0.72	1.00		0.22	1.00		0.13	1.00	
Satd. Flow (perm)	1418	1670		1382	1683		423	3608		254	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	45	15	43	25	5	24	69	1701	19	25	1068	49
RTOR Reduction (vph)	0	40	0	0	22	0	0	0	0	0	1	0
Lane Group Flow (vph)	45	18	0	25	7	0	69	1720	0	25	1116	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Effective Green, g (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Actuated g/C Ratio	0.07	0.07		0.07	0.07		0.85	0.85		0.78	0.78	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	93	109		90	110		415	3078		198	2781	
v/s Ratio Prot		0.01			0.00		0.01	c0.48			0.31	
v/s Ratio Perm	c0.03			0.02			0.13			0.10		
v/c Ratio	0.48	0.16		0.28	0.06		0.17	0.56		0.13	0.40	
Uniform Delay, d1	72.1	70.6		71.1	70.1		2.7	3.3		4.2	5.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.7		1.7	0.2		0.2	0.7		1.3	0.4	
Delay (s)	76.1	71.3		72.8	70.3		2.9	4.0		5.5	6.0	
Level of Service	E	E		E	E		A	A		A	A	
Approach Delay (s)		73.4			71.5			4.0			6.0	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

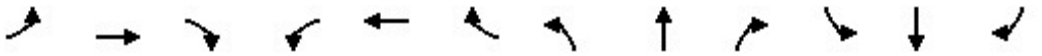
HCM Signalized Intersection Capacity Analysis
3: Mclaughlin Road & Derry Road West

07/24/2023



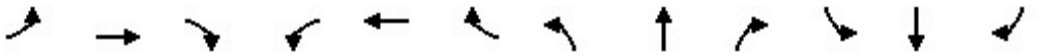
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	1440	303	187	639	99	139	619	162	225	1352	84
Future Volume (vph)	139	1440	303	187	639	99	139	619	162	225	1352	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.33	1.00	1.00	0.11	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	606	5043	1617	194	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	142	1469	309	191	652	101	142	632	165	230	1380	86
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	97	0	0	52
Lane Group Flow (vph)	142	1469	309	191	652	101	142	632	68	230	1380	34
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	43.4	43.4	12.7	49.1	49.1
Effective Green, g (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	43.4	43.4	12.7	49.1	49.1
Actuated g/C Ratio	0.37	0.30	1.00	0.38	0.30	1.00	0.06	0.35	0.35	0.10	0.39	0.39
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	311	1508	1617	190	1438	1526	194	1230	555	352	1405	610
v/s Ratio Prot	0.03	0.29		c0.08	0.14		0.04	0.18		c0.07	c0.39	
v/s Ratio Perm	0.14		c0.19	c0.30		0.07			0.04			0.02
v/c Ratio	0.46	0.97	0.19	1.01	0.45	0.07	0.73	0.51	0.12	0.65	0.98	0.06
Uniform Delay, d1	26.9	43.3	0.0	32.0	35.3	0.0	58.1	32.4	27.8	54.0	37.5	23.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	17.8	0.3	66.7	1.0	0.1	13.3	0.4	0.1	4.3	19.7	0.0
Delay (s)	28.0	61.1	0.3	98.6	36.3	0.1	71.4	32.8	27.9	58.3	57.3	23.6
Level of Service	C	E	A	F	D	A	E	C	C	E	E	C
Approach Delay (s)		48.9			45.1			37.8			55.7	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	48.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	100.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



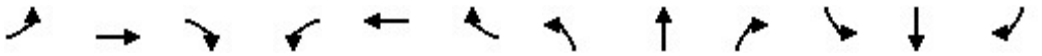
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	20	130	40	23	42	76	842	11	17	1772	36
Future Volume (vph)	59	20	130	40	23	42	76	842	11	17	1772	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.90		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1681		1772	3572		1690	3563	
Flt Permitted	0.71	1.00		0.30	1.00		0.06	1.00		0.31	1.00	
Satd. Flow (perm)	1365	1622		557	1681		115	3572		548	3563	
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)	64	22	141	43	25	46	83	915	12	18	1926	39
RTOR Reduction (vph)	0	89	0	0	42	0	0	0	0	0	1	0
Lane Group Flow (vph)	64	74	0	43	29	0	83	927	0	18	1964	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	13.4	13.4		13.4	13.4		133.6	133.6		119.4	119.4	
Effective Green, g (s)	13.4	13.4		13.4	13.4		133.6	133.6		119.4	119.4	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.83	0.83		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	114	135		46	140		191	2982		408	2658	
v/s Ratio Prot		0.05			0.02		c0.02	0.26			c0.55	
v/s Ratio Perm	0.05			c0.08			0.34			0.03		
v/c Ratio	0.56	0.55		0.93	0.21		0.43	0.31		0.04	0.74	
Uniform Delay, d1	70.5	70.4		72.9	68.3		17.4	2.9		5.3	11.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	4.5		107.1	0.7		1.6	0.3		0.2	1.9	
Delay (s)	76.7	74.9		180.0	69.1		19.0	3.2		5.5	13.4	
Level of Service	E	E		F	E		B	A		A	B	
Approach Delay (s)		75.4			110.9			4.5			13.3	
Approach LOS		E			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	1857	4	26	795	61	31	1	56	365	1	97
Future Volume (vph)	48	1857	4	26	795	61	31	1	56	365	1	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	5092	1601	1789	4768	1555	1789	1605		1807	1573	
Flt Permitted	0.31	1.00	1.00	0.05	1.00	1.00	0.69	1.00		0.49	1.00	
Satd. Flow (perm)	561	5092	1601	98	4768	1555	1292	1605		930	1573	
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.89	0.89	0.92	0.92	0.92	0.89	0.92	0.89
Adj. Flow (vph)	54	2087	4	28	893	69	34	1	61	410	1	109
RTOR Reduction (vph)	0	0	2	0	0	24	0	57	0	0	63	0
Lane Group Flow (vph)	54	2087	2	28	893	45	34	5	0	410	47	0
Heavy Vehicles (%)	5%	3%	2%	2%	10%	5%	2%	2%	2%	1%	2%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	72.3	72.3	72.3	80.9	80.9	80.9	8.6	8.6		36.2	36.2	
Effective Green, g (s)	72.3	72.3	72.3	80.9	80.9	80.9	8.6	8.6		36.2	36.2	
Actuated g/C Ratio	0.56	0.56	0.56	0.62	0.62	0.62	0.07	0.07		0.28	0.28	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	312	2831	890	114	2967	967	85	106		418	438	
v/s Ratio Prot		c0.41		0.01	c0.19			0.00		c0.18	0.03	
v/s Ratio Perm	0.10		0.00	0.14		0.03	0.03			c0.09		
v/c Ratio	0.17	0.74	0.00	0.25	0.30	0.05	0.40	0.05		0.98	0.11	
Uniform Delay, d1	14.2	21.7	12.8	16.8	11.4	9.5	58.2	56.9		44.5	34.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	1.8	0.0	1.1	0.1	0.0	3.1	0.2		38.8	0.1	
Delay (s)	15.4	23.5	12.8	17.9	11.5	9.6	61.3	57.0		83.3	35.0	
Level of Service	B	C	B	B	B	A	E	E		F	C	
Approach Delay (s)		23.2			11.5			58.6			73.1	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



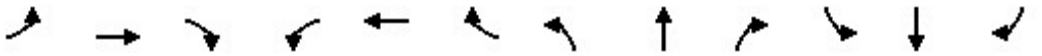
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	1671	487	363	759	134	92	41	91	36	48	62
Future Volume (vph)	141	1671	487	363	759	134	92	41	91	36	48	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1369		1772	1921	1601
Flt Permitted	0.33	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.53	1.00	1.00
Satd. Flow (perm)	631	5092	1601	1426	4768	1601	1311	1369		996	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	152	1797	524	390	816	144	99	44	98	39	52	67
RTOR Reduction (vph)	0	0	54	0	0	32	0	74	0	0	0	59
Lane Group Flow (vph)	152	1797	470	390	816	112	99	68	0	39	52	8
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	64.9	56.7	56.7	54.3	102.8	102.8	16.6	16.6		16.6	16.6	16.6
Effective Green, g (s)	64.9	56.7	56.7	54.3	102.8	102.8	16.6	16.6		16.6	16.6	16.6
Actuated g/C Ratio	0.45	0.39	0.39	0.37	0.71	0.71	0.11	0.11		0.11	0.11	0.11
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	348	1991	626	534	3380	1135	150	156		114	219	183
v/s Ratio Prot	0.02	c0.35		c0.27	0.17			0.05			0.03	
v/s Ratio Perm	0.17		0.29			0.07	c0.08			0.04		0.00
v/c Ratio	0.44	0.90	0.75	0.73	0.24	0.10	0.66	0.43		0.34	0.24	0.04
Uniform Delay, d1	29.1	41.6	38.1	39.0	7.4	6.6	61.5	59.8		59.2	58.4	57.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.9	7.2	8.1	5.1	0.0	0.0	10.4	1.9		1.8	0.6	0.1
Delay (s)	30.0	48.7	46.2	44.1	7.4	6.6	71.9	61.7		61.0	59.0	57.2
Level of Service	C	D	D	D	A	A	E	E		E	E	E
Approach Delay (s)		47.0			18.0			65.9			58.7	
Approach LOS		D			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1820	12	0	906	0	9
Future Volume (Veh/h)	1820	12	0	906	0	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1978	13	0	985	0	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	255			255		
pX, platoon unblocked			0.73		0.75	0.73
vC, conflicting volume			1991		2313	666
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1040		1086	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			482		159	786

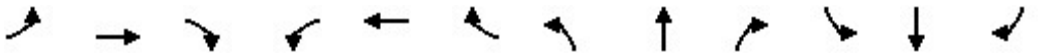
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	791	791	409	328	328	328	10
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	13	0	0	0	10
cSH	1700	1700	1700	1700	1700	1700	786
Volume to Capacity	0.47	0.47	0.24	0.19	0.19	0.19	0.01
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	9.6
Lane LOS							A
Approach Delay (s)	0.0			0.0			9.6
Approach LOS							A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	45.4%	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)	201	765	101	217	1469	408	230	1159	103	176	720	144
Future Volume (vph)	201	765	101	217	1469	408	230	1159	103	176	720	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1825	4856	1633	1807	5092	1617	3541	3614	1617	3404	3614	1633
Flt Permitted	0.09	1.00	1.00	0.27	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	181	4856	1633	510	5092	1617	3541	3614	1617	3404	3614	1633
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	207	789	104	224	1514	421	237	1195	106	181	742	148
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	69	0	0	99
Lane Group Flow (vph)	207	789	104	224	1514	421	237	1195	37	181	742	49
Heavy Vehicles (%)	0%	8%	0%	1%	3%	1%	0%	1%	1%	4%	1%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	53.0	42.5	125.0	52.8	42.4	125.0	9.0	43.1	43.1	7.0	41.1	41.1
Effective Green, g (s)	53.0	42.5	125.0	52.8	42.4	125.0	9.0	43.1	43.1	7.0	41.1	41.1
Actuated g/C Ratio	0.42	0.34	1.00	0.42	0.34	1.00	0.07	0.34	0.34	0.06	0.33	0.33
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	214	1651	1633	323	1727	1617	254	1246	557	190	1188	536
v/s Ratio Prot	c0.08	0.16		0.06	0.30		c0.07	c0.33		0.05	0.21	
v/s Ratio Perm	c0.33		0.06	0.23		c0.26			0.02			0.03
v/c Ratio	0.97	0.48	0.06	0.69	0.88	0.26	0.93	0.96	0.07	0.95	0.62	0.09
Uniform Delay, d1	32.3	32.5	0.0	24.3	38.8	0.0	57.7	40.1	27.5	58.8	35.4	29.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.6	1.0	0.1	6.3	6.6	0.4	38.5	16.5	0.0	51.4	1.0	0.1
Delay (s)	83.9	33.5	0.1	30.6	45.5	0.4	96.2	56.5	27.5	110.2	36.5	29.1
Level of Service	F	C	A	C	D	A	F	E	C	F	D	C
Approach Delay (s)		39.8			35.1			60.6			47.9	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	45.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

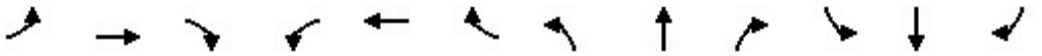


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	14	41	24	5	23	66	1475	18	24	1024	47
Future Volume (vph)	43	14	41	24	5	23	66	1475	18	24	1024	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1670		1825	1683		1789	3608		1825	3558	
Flt Permitted	0.74	1.00		0.72	1.00		0.22	1.00		0.16	1.00	
Satd. Flow (perm)	1418	1670		1382	1683		418	3608		304	3558	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	45	15	43	25	5	24	69	1553	19	25	1078	49
RTOR Reduction (vph)	0	40	0	0	22	0	0	0	0	0	1	0
Lane Group Flow (vph)	45	18	0	25	7	0	69	1572	0	25	1126	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	2%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Effective Green, g (s)	10.5	10.5		10.5	10.5		136.5	136.5		125.1	125.1	
Actuated g/C Ratio	0.07	0.07		0.07	0.07		0.85	0.85		0.78	0.78	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	93	109		90	110		411	3078		237	2781	
v/s Ratio Prot		0.01			0.00		0.01	c0.44			0.32	
v/s Ratio Perm	c0.03			0.02			0.14			0.08		
v/c Ratio	0.48	0.16		0.28	0.06		0.17	0.51		0.11	0.40	
Uniform Delay, d1	72.1	70.6		71.1	70.1		2.7	3.1		4.1	5.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.7		1.7	0.2		0.2	0.6		0.9	0.4	
Delay (s)	76.1	71.3		72.8	70.3		2.9	3.7		5.0	6.0	
Level of Service	E	E		E	E		A	A		A	A	
Approach Delay (s)		73.4			71.5			3.6			6.0	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	70.8%	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)	85	965	11	52	1992	341	26	1	35	105	1	44
Future Volume (vph)	85	965	11	52	1992	341	26	1	35	105	1	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4902	1601	1789	5092	1633	1789	1608		1722	1638	
Flt Permitted	0.05	1.00	1.00	0.25	1.00	1.00	0.73	1.00		0.95	1.00	
Satd. Flow (perm)	88	4902	1601	477	5092	1633	1367	1608		1722	1638	
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94
Adj. Flow (vph)	90	1027	12	57	2119	363	28	1	38	112	1	47
RTOR Reduction (vph)	0	0	4	0	0	44	0	36	0	0	37	0
Lane Group Flow (vph)	90	1027	8	57	2119	319	28	3	0	112	11	0
Heavy Vehicles (%)	4%	7%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	104.8	95.5	95.5	98.0	92.1	92.1	8.4	8.4		15.2	33.3	
Effective Green, g (s)	104.8	95.5	95.5	98.0	92.1	92.1	8.4	8.4		15.2	33.3	
Actuated g/C Ratio	0.70	0.64	0.64	0.65	0.61	0.61	0.06	0.06		0.10	0.22	
Clearance Time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	164	3120	1019	363	3126	1002	76	90		174	363	
v/s Ratio Prot	c0.03	0.21		0.01	c0.42			0.00		c0.07	0.01	
v/s Ratio Perm	0.35		0.00	0.10		0.20	c0.02					
v/c Ratio	0.55	0.33	0.01	0.16	0.68	0.32	0.37	0.03		0.64	0.03	
Uniform Delay, d1	21.4	12.5	9.9	9.4	19.1	13.9	68.2	67.0		64.8	45.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.7	0.3	0.0	0.2	0.6	0.2	3.0	0.2		7.9	0.0	
Delay (s)	25.1	12.8	10.0	9.6	19.7	14.1	71.3	67.1		72.7	45.8	
Level of Service	C	B	A	A	B	B	E	E		E	D	
Approach Delay (s)		13.8			18.7			68.8			64.6	
Approach LOS		B			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



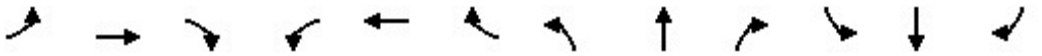
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	910	170	144	1541	14	558	118	195	2	17	10
Future Volume (vph)	47	910	170	144	1541	14	558	118	195	2	17	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1669		1825	1921	1617
Flt Permitted	0.07	1.00	1.00	0.28	1.00	1.00	0.50	1.00		0.89	1.00	1.00
Satd. Flow (perm)	129	4902	1512	486	5142	1512	933	1669		1708	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	968	181	153	1639	15	594	126	207	2	18	11
RTOR Reduction (vph)	0	0	37	0	0	8	0	34	0	0	0	11
Lane Group Flow (vph)	50	968	144	153	1639	7	594	299	0	2	18	0
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	65.6	65.6	65.6	56.1	56.1	56.1	45.5	45.5		4.5	4.5	4.5
Effective Green, g (s)	65.6	65.6	65.6	56.1	56.1	56.1	45.5	45.5		4.5	4.5	4.5
Actuated g/C Ratio	0.52	0.52	0.52	0.45	0.45	0.45	0.36	0.36		0.04	0.04	0.04
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	149	2572	793	218	2307	678	591	607		61	69	58
v/s Ratio Prot	0.02	c0.20			c0.32		c0.30	0.18			0.01	
v/s Ratio Perm	0.16		0.10	0.31		0.00	c0.06			0.00		0.00
v/c Ratio	0.34	0.38	0.18	0.70	0.71	0.01	1.01	0.49		0.03	0.26	0.01
Uniform Delay, d1	19.4	17.6	15.6	27.7	27.9	19.1	38.2	30.8		58.1	58.6	58.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.3	0.4	0.5	9.8	1.1	0.0	38.3	0.6		0.2	2.0	0.0
Delay (s)	20.8	18.0	16.1	37.5	28.9	19.1	76.5	31.4		58.4	60.6	58.1
Level of Service	C	B	B	D	C	B	E	C		E	E	E
Approach Delay (s)		17.8			29.6			60.3			59.6	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	33.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	20.9
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1031	21	0	2048	0	7
Future Volume (Veh/h)	1031	21	0	2048	0	7
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1121	23	0	2226	0	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)	255			255		
pX, platoon unblocked			0.89		0.77	0.89
vC, conflicting volume			1144		1874	385
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			730		116	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			774		667	965

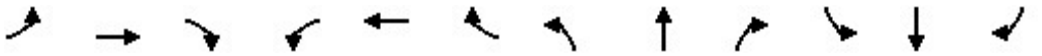
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	448	448	247	742	742	742	8
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	23	0	0	0	8
cSH	1700	1700	1700	1700	1700	1700	965
Volume to Capacity	0.26	0.26	0.15	0.44	0.44	0.44	0.01
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	8.8
Lane LOS							A
Approach Delay (s)	0.0			0.0			8.8
Approach LOS							A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		



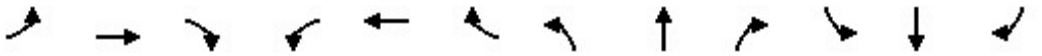
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	1748	333	197	774	96	138	681	178	279	1492	105
Future Volume (vph)	139	1748	333	197	774	96	138	681	178	279	1492	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.6	4.0	3.5	6.6	4.0	5.0	6.9	6.9	5.0	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1617	1738	4768	1526	3471	3544	1601	3471	3579	1555
Flt Permitted	0.25	1.00	1.00	0.11	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	469	5043	1617	194	4768	1526	3471	3544	1601	3471	3579	1555
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	142	1784	340	201	790	98	141	695	182	285	1522	107
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	98	0	0	64
Lane Group Flow (vph)	142	1784	340	201	790	98	141	695	84	285	1522	43
Heavy Vehicles (%)	3%	4%	1%	5%	10%	7%	2%	3%	2%	2%	2%	5%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		Free	6		Free			4			8
Actuated Green, G (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	42.6	42.6	13.5	49.1	49.1
Effective Green, g (s)	46.6	37.4	125.0	47.2	37.7	125.0	7.0	42.6	42.6	13.5	49.1	49.1
Actuated g/C Ratio	0.37	0.30	1.00	0.38	0.30	1.00	0.06	0.34	0.34	0.11	0.39	0.39
Clearance Time (s)	3.5	6.6		3.5	6.6		5.0	6.9	6.9	5.0	6.9	6.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	270	1508	1617	190	1438	1526	194	1207	545	374	1405	610
v/s Ratio Prot	0.04	c0.35		c0.08	0.17		0.04	0.20		c0.08	c0.43	
v/s Ratio Perm	0.16		c0.21	0.32		0.06			0.05			0.03
v/c Ratio	0.53	1.18	0.21	1.06	0.55	0.06	0.73	0.58	0.15	0.76	1.08	0.07
Uniform Delay, d1	27.2	43.8	0.0	32.4	36.5	0.0	58.1	33.8	28.7	54.2	38.0	23.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	89.5	0.3	81.4	1.5	0.1	12.7	0.7	0.1	8.9	50.0	0.0
Delay (s)	29.1	133.3	0.3	113.8	38.1	0.1	70.8	34.5	28.8	63.1	87.9	23.7
Level of Service	C	F	A	F	D	A	E	C	C	E	F	C
Approach Delay (s)		106.8			48.6			38.5			80.6	
Approach LOS		F			D			D			F	

Intersection Summary			
HCM 2000 Control Delay	77.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	110.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



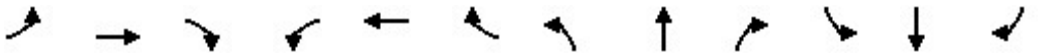
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	20	130	40	24	41	76	841	11	15	1938	36
Future Volume (vph)	59	20	130	40	24	41	76	841	11	15	1938	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.87		1.00	0.90		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	1622		1772	1683		1772	3572		1690	3564	
Flt Permitted	0.71	1.00		0.29	1.00		0.04	1.00		0.31	1.00	
Satd. Flow (perm)	1365	1622		549	1683		78	3572		549	3564	
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)	64	22	141	43	26	45	83	914	12	16	2107	39
RTOR Reduction (vph)	0	84	0	0	41	0	0	0	0	0	1	0
Lane Group Flow (vph)	64	79	0	43	30	0	83	926	0	16	2145	0
Heavy Vehicles (%)	0%	10%	2%	3%	9%	0%	3%	2%	0%	8%	2%	9%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	13.6	13.6		13.6	13.6		133.4	133.4		119.7	119.7	
Effective Green, g (s)	13.6	13.6		13.6	13.6		133.4	133.4		119.7	119.7	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.83	0.83		0.75	0.75	
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	116	137		46	143		157	2978		410	2666	
v/s Ratio Prot		0.05			0.02		c0.03	0.26			c0.60	
v/s Ratio Perm	0.05			c0.08			0.41			0.03		
v/c Ratio	0.55	0.58		0.93	0.21		0.53	0.31		0.04	0.80	
Uniform Delay, d1	70.3	70.4		72.8	68.2		31.0	3.0		5.2	12.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.6	5.7		107.1	0.7		3.2	0.3		0.2	2.7	
Delay (s)	75.8	76.2		179.9	68.9		34.2	3.3		5.4	15.5	
Level of Service	E	E		F	E		C	A		A	B	
Approach Delay (s)		76.1			110.8			5.8			15.4	
Approach LOS		E			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	2273	2	15	980	61	5	1	43	452	1	120
Future Volume (vph)	62	2273	2	15	980	61	5	1	43	452	1	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	5092	1601	1789	4768	1555	1789	1607		1807	1572	
Flt Permitted	0.24	1.00	1.00	0.05	1.00	1.00	0.67	1.00		0.48	1.00	
Satd. Flow (perm)	448	5092	1601	95	4768	1555	1262	1607		920	1572	
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.89	0.89	0.92	0.92	0.92	0.89	0.92	0.89
Adj. Flow (vph)	70	2554	2	16	1101	69	5	1	47	508	1	135
RTOR Reduction (vph)	0	0	1	0	0	24	0	44	0	0	34	0
Lane Group Flow (vph)	70	2554	1	16	1101	45	5	4	0	508	102	0
Heavy Vehicles (%)	5%	3%	2%	2%	10%	5%	2%	2%	2%	1%	2%	4%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Effective Green, g (s)	74.4	74.4	74.4	81.5	81.5	81.5	8.0	8.0		35.6	35.6	
Actuated g/C Ratio	0.57	0.57	0.57	0.63	0.63	0.63	0.06	0.06		0.27	0.27	
Clearance Time (s)	6.3	6.3	6.3	4.5	6.3	6.3	6.6	6.6		4.0	6.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	256	2914	916	93	2989	974	77	98		412	430	
v/s Ratio Prot		c0.50		0.00	c0.23			0.00		c0.22	0.06	
v/s Ratio Perm	0.16		0.00	0.10		0.03	0.00			c0.11		
v/c Ratio	0.27	0.88	0.00	0.17	0.37	0.05	0.06	0.04		1.23	0.24	
Uniform Delay, d1	14.1	23.9	11.9	22.8	11.8	9.3	57.5	57.4		45.2	36.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	4.1	0.0	0.9	0.1	0.0	0.4	0.2		124.3	0.3	
Delay (s)	16.7	27.9	11.9	23.7	11.8	9.3	57.8	57.6		169.6	36.9	
Level of Service	B	C	B	C	B	A	E	E		F	D	
Approach Delay (s)		27.6			11.9			57.6			141.6	
Approach LOS		C			B			E			F	

Intersection Summary			
HCM 2000 Control Delay	40.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	94.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



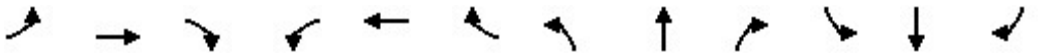
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	174	2060	561	379	926	134	92	41	91	36	48	62
Future Volume (vph)	174	2060	561	379	926	134	92	41	91	36	48	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1807	5092	1601	1426	4768	1601	1722	1369		1772	1921	1601
Flt Permitted	0.28	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.53	1.00	1.00
Satd. Flow (perm)	524	5092	1601	1426	4768	1601	1311	1369		996	1921	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	187	2215	603	408	996	144	99	44	98	39	52	67
RTOR Reduction (vph)	0	0	55	0	0	26	0	74	0	0	0	59
Lane Group Flow (vph)	187	2215	548	408	996	118	99	68	0	39	52	8
Heavy Vehicles (%)	1%	3%	2%	28%	10%	2%	6%	3%	36%	3%	0%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2			6	4			8		8
Actuated Green, G (s)	72.8	63.8	63.8	47.2	102.0	102.0	16.6	16.6		16.6	16.6	16.6
Effective Green, g (s)	72.8	63.8	63.8	47.2	102.0	102.0	16.6	16.6		16.6	16.6	16.6
Actuated g/C Ratio	0.50	0.44	0.44	0.33	0.70	0.70	0.11	0.11		0.11	0.11	0.11
Clearance Time (s)	3.5	6.2	6.2	3.5	6.2	6.2	7.7	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	342	2240	704	464	3354	1126	150	156		114	219	183
v/s Ratio Prot	0.03	c0.44		c0.29	0.21			0.05			0.03	
v/s Ratio Perm	0.24		0.34			0.07	c0.08			0.04		0.00
v/c Ratio	0.55	0.99	0.78	0.88	0.30	0.10	0.66	0.43		0.34	0.24	0.04
Uniform Delay, d1	28.0	40.2	34.6	46.2	8.1	6.9	61.5	59.8		59.2	58.4	57.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.8	16.6	8.3	17.0	0.0	0.0	10.4	1.9		1.8	0.6	0.1
Delay (s)	29.7	56.8	42.9	63.2	8.1	6.9	71.9	61.7		61.0	59.0	57.2
Level of Service	C	E	D	E	A	A	E	E		E	E	E
Approach Delay (s)		52.3			22.5			65.9			58.7	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	43.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2190	22	0	1107	0	37
Future Volume (Veh/h)	2190	22	0	1107	0	37
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2380	24	0	1203	0	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	255			255		
pX, platoon unblocked			0.72		0.76	0.72
vC, conflicting volume			2404		2793	805
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1579		1466	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	95
cM capacity (veh/h)			296		91	778

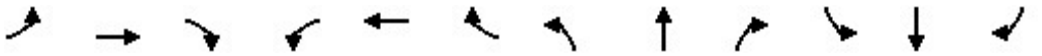
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	952	952	500	401	401	401	40
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	24	0	0	0	40
cSH	1700	1700	1700	1700	1700	1700	778
Volume to Capacity	0.56	0.56	0.29	0.24	0.24	0.24	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	9.9
Lane LOS							A
Approach Delay (s)	0.0			0.0			9.9
Approach LOS							A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	52.8%	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)	97	1191	5	30	2460	423	4	1	25	105	1	44
Future Volume (vph)	97	1191	5	30	2460	423	4	1	25	105	1	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	4902	1601	1789	5092	1633	1789	1611		1722	1638	
Flt Permitted	0.04	1.00	1.00	0.19	1.00	1.00	0.73	1.00		0.95	1.00	
Satd. Flow (perm)	76	4902	1601	366	5092	1633	1367	1611		1722	1638	
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.94	0.94	0.92	0.92	0.92	0.94	0.92	0.94
Adj. Flow (vph)	103	1267	5	33	2617	450	4	1	27	112	1	47
RTOR Reduction (vph)	0	0	2	0	0	43	0	26	0	0	37	0
Lane Group Flow (vph)	103	1267	3	33	2617	407	4	2	0	112	11	0
Heavy Vehicles (%)	4%	7%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	108.3	98.6	98.6	98.2	93.0	93.0	6.0	6.0		15.2	30.9	
Effective Green, g (s)	108.3	98.6	98.6	98.2	93.0	93.0	6.0	6.0		15.2	30.9	
Actuated g/C Ratio	0.72	0.66	0.66	0.65	0.62	0.62	0.04	0.04		0.10	0.21	
Clearance Time (s)	4.5	6.3	6.3	4.5	6.3	6.3	7.1	7.1		7.1	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	175	3222	1052	288	3157	1012	54	64		174	337	
v/s Ratio Prot	c0.04	0.26		0.00	c0.51			0.00		c0.07	0.01	
v/s Ratio Perm	0.38		0.00	0.07		0.25	c0.00					
v/c Ratio	0.59	0.39	0.00	0.11	0.83	0.40	0.07	0.03		0.64	0.03	
Uniform Delay, d1	37.4	11.9	8.8	9.2	22.3	14.4	69.3	69.2		64.8	47.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.0	0.4	0.0	0.2	1.9	0.3	0.6	0.2		7.9	0.0	
Delay (s)	42.4	12.2	8.8	9.4	24.2	14.7	69.9	69.4		72.7	47.6	
Level of Service	D	B	A	A	C	B	E	E		E	D	
Approach Delay (s)		14.5			22.7			69.5			65.2	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	78.1%	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)	47	1118	175	144	1881	14	677	147	220	3	21	17
Future Volume (vph)	47	1118	175	144	1881	14	677	147	220	3	21	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1825	4902	1512	1630	5142	1512	1772	1678		1825	1921	1617
Flt Permitted	0.06	1.00	1.00	0.19	1.00	1.00	0.48	1.00		0.63	1.00	1.00
Satd. Flow (perm)	108	4902	1512	330	5142	1512	891	1678		1220	1921	1617
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	1189	186	153	2001	15	720	156	234	3	22	18
RTOR Reduction (vph)	0	0	29	0	0	9	0	14	0	0	0	17
Lane Group Flow (vph)	50	1189	157	153	2001	6	720	376	0	3	22	1
Heavy Vehicles (%)	0%	7%	8%	12%	2%	8%	3%	0%	7%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	5	2			6		7	4			8	
Permitted Phases	2		2	6		6	4			8		8
Actuated Green, G (s)	77.8	77.8	77.8	67.7	67.7	67.7	68.3	68.3		6.3	6.3	6.3
Effective Green, g (s)	77.8	77.8	77.8	67.7	67.7	67.7	68.3	68.3		6.3	6.3	6.3
Actuated g/C Ratio	0.49	0.49	0.49	0.42	0.42	0.42	0.43	0.43		0.04	0.04	0.04
Clearance Time (s)	3.5	6.2	6.2	6.2	6.2	6.2	3.5	7.7		7.7	7.7	7.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	123	2383	735	139	2175	639	702	716		48	75	63
v/s Ratio Prot	0.02	c0.24			0.39		c0.37	0.22			0.01	
v/s Ratio Perm	0.18		0.10	c0.46		0.00	c0.06			0.00		0.00
v/c Ratio	0.41	0.50	0.21	1.10	0.92	0.01	1.03	0.53		0.06	0.29	0.01
Uniform Delay, d1	34.1	27.9	23.6	46.1	43.6	26.7	43.7	33.9		74.0	74.7	73.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.2	0.7	0.7	105.9	7.0	0.0	40.7	0.7		0.5	2.2	0.1
Delay (s)	36.3	28.6	24.2	152.0	50.5	26.7	84.4	34.6		74.6	76.9	73.9
Level of Service	D	C	C	F	D	C	F	C		E	E	E
Approach Delay (s)		28.3			57.5			66.9			75.5	
Approach LOS		C			E			E			E	

Intersection Summary			
HCM 2000 Control Delay	51.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	20.9
Intersection Capacity Utilization	99.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1196	38	0	2512	0	32
Future Volume (Veh/h)	1196	38	0	2512	0	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1300	41	0	2730	0	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	255			255		
pX, platoon unblocked			0.85		0.64	0.85
vC, conflicting volume			1341		2230	454
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			766		0	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	96
cM capacity (veh/h)			713		654	917

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	520	520	301	910	910	910	35
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	41	0	0	0	35
cSH	1700	1700	1700	1700	1700	1700	917
Volume to Capacity	0.31	0.31	0.18	0.54	0.54	0.54	0.04
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	9.1
Lane LOS							A
Approach Delay (s)	0.0			0.0			9.1
Approach LOS							A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		