

Elm Grove Residential Development

Halifax Regional Municipality

Traffic Impact Study Draft Final Report

Prepared by:

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Prepared for:

**DesignPoint Engineering &
Surveying**

November 2019

November 1, 2019

Mr. Andrew Forsythe, P.Eng.
Senior Civil Engineer
DesignPoint Engineering and Surveying
222 Waterfront Drive, Suite 104
Bedford, NS B4A 4J4

Dear Mr. Forsythe:

RE: A Traffic Impact Assessment of the proposed Elm Grove Residential Development

The GRIFFIN transportation group inc. is pleased to present the results of the enclosed traffic impact study carried out in support of the planning approval process for the proposed Elm Grove Residential development, located on the south side of St. Margaret's Bay Road corridor in the community of Timberlea, Halifax Regional Municipality (HRM). It is understood that a total of 47 detached (R1) and 20 townhome (R2) housing units are to be built on a group of land parcels generally located between the existing terminus of Elm Grove Avenue and Myra Road.

The results flowing from this study have identified that the site-generated traffic volumes will have an acceptable level of impact on the study area streets and intersections. Although new traffic associated with this development will be added to the study area streets and intersections, changes to the existing volumes on Parkdale Avenue and Myra Road are expected to be minimal and the future 2025 peak hour volumes are forecast to be well below the capacity of both streets.

It has been a pleasure working with the project team in completing this study. Feel free to contact the undersigned anytime to further discuss the details of this project.

Yours truly,

[Original to be Signed]

James J. Copeland, P.Eng.
Managing Principal
GRIFFIN transportation group inc.

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1. INTRODUCTION

1.1 Overview

At the request of *DesignPoint Engineering and Surveying (DesignPoint)*, the GRIFFIN transportation group inc. has completed a traffic impact study in support of the planning approval process for the proposed Elm Grove residential development, located on the south side of St. Margaret's Bay Road in the community of Timberlea, Halifax Regional Municipality (HRM). It is understood that a total of 47 detached (R1) and 20 townhome (R2) housing units are planned on a group of land parcels generally located between Elm Grove Avenue and Myra Road. A key map of the proposed site location is shown in *Figure 1*.

The proposed Elm Grove lands are predominantly located on PID #40143380 which is currently zoned R-1 (low density residential). These lands are located within the urban serviced area of the Timberlea/Lakeside/Beechville Land Use By-Law area. As such, the proposed development is consistent with the existing low-density housing units surrounding these undeveloped lands and appears to generally conform with the current zoning.

The two main vehicular access points explicitly assessed in this study connect to St. Margaret's Bay Road and include the intersections of Myra Road and Parkdale Avenue – as they are the most direct routes to and from the north. Although not explicitly evaluated as part of this study, it is anticipated that a small amount of new site-generated traffic will travel to/from the west via Maple Grove Avenue and the Timberlea Village Parkway and the details associated with the site-generated vehicle trip distribution assumptions are discussed later in the report.

1.2 Study Context and Scope

St. Margaret's Bay Road is under the jurisdiction of the Halifax Regional Municipality (HRM) and this impact study attempts to follow their policy and guidelines. In order to initiate this study, GRIFFIN met with representatives of HRM's Traffic Management on Thursday September 12th to identify the general TIS assumptions, intersections to be evaluated and other relevant assumptions to consider in the traffic assessment process. GRIFFIN has made every attempt to follow the scope parameters discussed in this meeting. Additional terms of reference applied to the study include the following:

- The HRM's *Guidelines for the Preparation of Transportation Impact Studies*;
- A conceptual site plan drawing provided by *DesignPoint* dated August 30th, 2019;
- A Traffic Impact Statement letter prepared by *DesignPoint* dated June 4th, 2019
- A meeting with representatives of HRM's Traffic Management department on September 12th, 2019 to establish the general scope of the TIS; and
- A site review carried out on September 18th and 20th, 2019.

The approach and technical findings of this traffic impact study are discussed in the following sections of this report.

Figure 1: Key Map and Site Location



2. EXISTING CONDITIONS

This chapter describes the roadway network, traffic volumes, operational analysis results and other notable characteristics under the baseline conditions.

2.1 The Roadway Network

2.1.1 Overview

The subject lands are located in the community of Timberlea generally south and east of the St. Margaret's Bay Road / Timberlea Village Parkway intersection. The proposed development will occur on undeveloped lands that are bounded by the existing St. Margaret's Bay Road to the north, the existing terminus of Elm Grove Avenue to the west and Myra Road to the east. The St. Margaret's Bay Road corridor is one of the main commuter routes for this established residential area of Timberlea with numerous individual property accesses as well as local residential street connections. It is important to note this roadway serves several travel modes including public transit, active transportation and commuter vehicles.

The main vehicular access to this new development is assumed to be via Myra Road and Parkdale Avenue – both of which connect directly to St. Margaret's Bay Road. Although some site-generated traffic will move to/from the west via Maple Grove and Timberlea Village Parkway, the study has taken a worst-case scenario approach and assumed the majority of new traffic will move in/out of the study area via Myra Road and Parkdale Avenue. Future traffic flow patterns were discussed with HRM at the early stages of this study and HRM confirmed the following two study area intersections should be explicitly evaluated in this assessment:

- St. Margaret's Bay Road / Parkdale Avenue (unsignalized);
- St. Margaret's Bay Road / Myra Road (unsignalized).

Driver views along Parkdale Avenue and Myra Road are provided in *Figure 2*.

2.1.3 Parkdale Avenue

Parkdale Avenue serves as one of the main access points to the existing residential neighbourhood south of St. Margaret's Bay Road. It is generally aligned in a north-south direction and appears to function as a local residential street. Parkdale Avenue has an asphalt surface with concrete curb and gutter along both sides, but a pedestrian sidewalk is not provided for active users. There are currently no auxiliary turn lanes or marked pedestrian crosswalks at the intersection with St. Margaret's Bay Road.

Figure 2: Existing Roadway Characteristics



Parkdale Avenue – Looking North



Myra Road – Looking North

2.1.4 Myra Road

Myra Road has a two-lane, two-way rural cross-section (i.e. gravel shoulders, no curb and gutter and open ditches) that measures about 155m in length and terminates at the HRM Lakeside Fire Station #58. The vehicle travel lanes appear to have minimal widths with limited width gravel shoulders. This local residential cul-de-sac is generally aligned in a north south direction and has a regulatory speed limit of 50 km/h. There are currently no auxiliary turn lanes or marked pedestrian crosswalks at the intersection with St. Margaret's Bay Road.

2.2 Traffic Data

In order to facilitate an assessment of the existing and future traffic operations there was a need to develop a set of representative baseline traffic volumes. As such, GRIFFIN carried out recent weekday peak period traffic counts at both study area intersections in order to obtain and apply current vehicle trends and patterns. A list of the traffic volume data gathered for this study is summarized in *Table 1*.

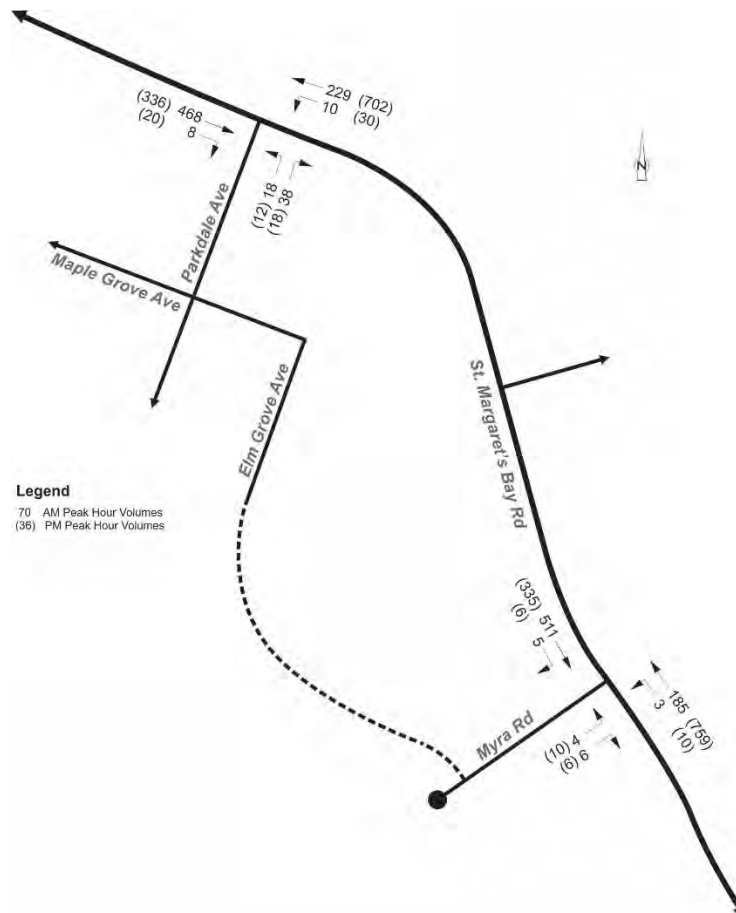
Table 1: Current Traffic Data Sources

Intersection	AM Peak	PM Peak	Source
1. St. Margaret's Bay Rd / Parkdale Avenue	September 20 th 2019	September 20 th 2019	GRIFFIN counts
2. St. Margaret's Bay Rd / Myra Rd	September 18 th 2019	September 18 th 2019	GRIFFIN counts

All of the intersection turning movement counts for both the weekday AM and PM peak hours were assembled. These data were reviewed and a validation/verification process was undertaken to ensure volumes between intersections were representative of the St. Margaret's Bay Road corridor. This process yielded a set of representative peak hour turning volumes at the key study area intersections and formed the basis of the traffic analysis discussed throughout the report.

Since the peak traffic generating periods for residential developments typically occur on weekday mornings and afternoons, these two peak periods were selected for analysis in this study. The specific peak hours were determined using the recently recorded hourly traffic counts at the study area intersections. A summary of the Existing 2019 peak hour traffic volumes applied to the analysis are illustrated in *Figure 3*.

Figure 3: Existing 2019 Peak Hour Volumes



2.3 Existing Conditions Operational Analysis

An intersection capacity analysis process was carried out using the Existing 2019 traffic volumes (*Figure 4*) as well as the existing lane configurations and traffic control at these study area intersections. The analysis process used Trafficware's *Synchro 10* software tool following the Transportation Research Board's *Highway Capacity Manual* (HCM) methodology for unsignalized intersections. The results of the existing conditions peak hour analysis are provided in *Table 2*.

Following HRM TIS guidelines, the measures of effectiveness used to describe the operational performance of the intersections included the average vehicle delay, volume-to-capacity ratio (v/c ratio) and 95th percentile queue length (metres) for each movement at each of the study area intersections. The results have been summarized in *Table 2*. An expanded summary of results contained within the detailed capacity analysis reports are contained in *Appendix II*.

Table 2: Existing Operational Analysis Results

1. St. Margaret's Bay Road / Parkdale Avenue						
	AM Peak Hour			PM Peak Hour		
	Critical Move: Delay	V/C	Queue^A	Critical Move: Delay	V/C	Queue^A
Existing 2019 (stop-control)	WB Th-Lt: n/a ^B	-	-	WB Th-Lt: n/a ^B	-	-
	EB Th-Rt: n/a ^B	-	-	EB Th-Rt: n/a ^B	-	-
	NB Lt--Rt: 13.9s	0.13	<10m	NB Lt--Rt: 17.1s	0.10	<10m

2. St. Margaret's Bay Road / Myra Road						
	AM Peak Hour			PM Peak Hour		
	Critical Move: Delay	V/C	Queue^A	Critical Move: Delay	V/C	Queue^A
Existing 2019 (stop-control)	WB Th-Lt: n/a ^B	-	-	WB Th-Lt: n/a ^B	-	-
	EB Th-Rt: n/a ^B	-	-	EB Th-Rt: n/a ^B	-	-
	NB Lt--Rt: 13.4s	0.03	<10m	NB Lt--Rt: 19.7s	0.07	<10m

A – Queue represents the calculated vehicle queue length in metres occurring 95% of the time (95th percentile).

B – No performance measures calculated as this is a first order priority movement at the intersection.

The analysis results contained in *Table 2* suggest the existing study area intersections operate during peak periods with average delays of 20 seconds per vehicle or less, volume to capacity ratios of 0.13 or less and negligible queue lengths at the stop bars. Generally, these results appeared to be consistent with the vehicle operations and queue lengths observed during the field review. The operational results indicate there is a notable amount of residual capacity for all movements at the study area intersections.

3. THE PROPOSED DEVELOPMENT

This chapter describes the existing site, proposed changes to the buildings/operations, and the changes to the site generated traffic.

3.1 Overview

Based on discussions with *DesignPoint Engineering*, it is understood that the subject lands will be designed in a manner that creates a total of 67 low density residential units. The units will be comprised of 47 single-family detached houses (R1) and 20 townhome units (R2). The general site layout is illustrated in *Figure 4 – Proposed Site Plan*.

The proposed development will connect to the existing public street system in two locations:

- The existing south terminus of Elm Grove Avenue, and
- The west side of Myra Road about 140m south of St. Margaret's Bay Road.

3.2 Site Trip Generation

Typically, traffic engineers estimate the volume of new traffic by using trip generation rates that are published by the Institute of Transportation Engineers (ITE), and contained in the latest *Trip Generation, 10th Edition* document. Upon reviewing this publication, it was determined that the vehicle trip generation rates for a low-density residential development contained in this document were appropriate for the development being proposed. Although both R1 and R2 units are expected to be built, the research literature suggests that these two land use / zoning types typically exhibit similar travel and socio-economic characteristics such as vehicles per household, vehicle use per day and so forth. As such, the site-generated trips were calculated based on an assumed low-density detached residential unit – the ITE's land use code 210. This approach is also consistent with other TIS reports for similar developments completed by the *GRIFFIN transportation group* in HRM.

The ITE regression formula was used to forecast the volume of traffic generated for a 67-unit development. A summary of the AM and PM peak hour site trip generation results are contained in *Table 3*.

Table 3: Forecast Site Trip Generation – AM & PM Peak Hours

Total No. of Units	AM Peak				PM Peak			
	Trip Rate ^A	In	Out	Total	Trip Rate ^A	In	Out	Total
Single Detached & Semi Detached Low Density Residential Units (ITE Code 210)								
67 units	0.78	13 (25%)	39 (75%)	52	1.03	43 (63%)	26 (37%)	69

A – Hourly site traffic calculated using ITE's regression formula for land use code 210.



Source: DesignPoint

Based on the site-generated trip forecasts in *Table 3*, the proposed development is forecast to generate new trips totaling 52 vehicles/hour (vph) and 69 vph during the weekday AM and PM peak hours, respectively.

3.3 Trip Distribution

A review of the observed September 2019 traffic volumes and travel patterns gathered at the two study area intersections was carried out to establish an estimate of the future distribution patterns of the new site-generated residential trips. It was assumed that the majority of the new residential trips would utilize the St. Margaret's Bay Road corridor to move in/out of the study area – yet a smaller amount of new trips would likely travel to/from the west via Maple Grove Avenue and the Timberlea Village Parkway. This was considered to be a worst-case scenario for the two study area intersections explicitly evaluated in this study.

The distribution percentages to/from each of the study area gateways are contained in *Table 4*.

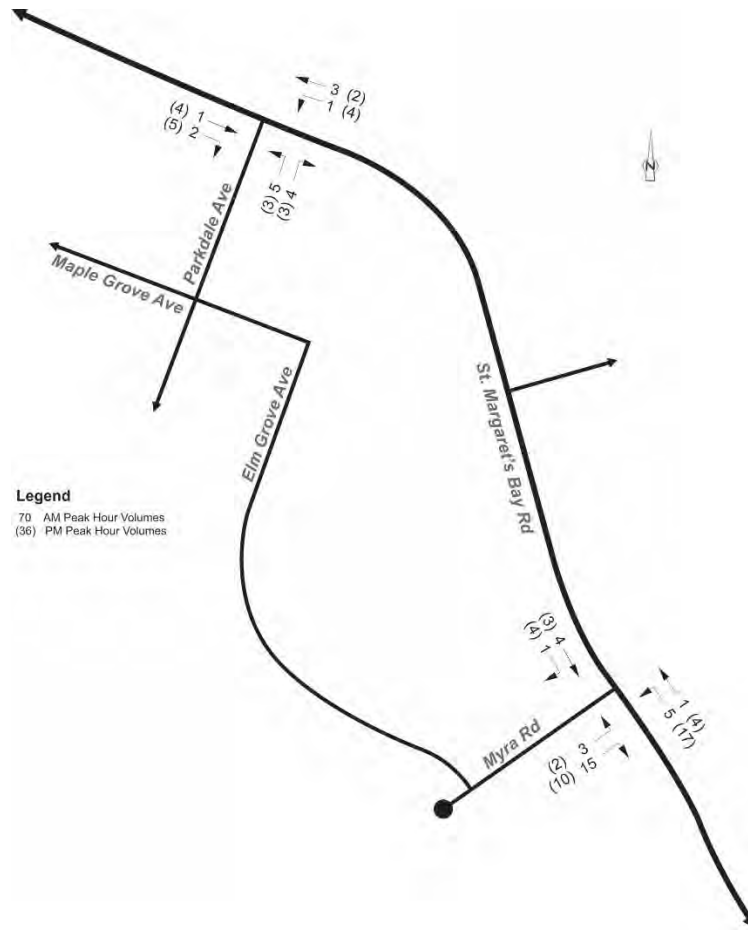
Table 4: Forecast Residential Trip Distribution

Direction	Via	AM & PM Peaks	
		Inbound	Outbound
East	St. Margaret's Bay Rd	50%	50%
West	St. Margaret's Bay Rd	20%	20%
South	Maple Grove / Timberlea Village Pkwy	30%	30%
North	n/a	-	-
Total		100%	100%

All of the site-generated trips associated with the proposed residential development were assigned to the study area roadways and intersections using the above percentages. The resulting peak hour site-generated volumes are illustrated in *Figure 5*.

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Figure 5: Site-generated Peak Hour Volumes



4. FUTURE CONDITIONS

This chapter summarizes the future year traffic conditions and assessment of the proposed development.

4.1 Overview

The future planning horizon chosen for a traffic impact study represents a milestone in the development process. Following HRM guidelines, the future planning horizon year used in the analysis for this type of development will occur 5 years beyond the full build-out/occupancy of the site. It is expected that the planning, design and construction of the proposed development will likely occur within one year (2020). This would mean a reasonable future planning horizon for analysis purposes would occur by 2025 (i.e. 2020 plus 5 years). A summary of the planning horizons and the associated development scenarios are provided in *Table 5*.

Table 5: Planning Horizons and Access Options

Planning Horizons	Development Scenario	Access Options
2019 Planning Horizon	2019 Existing Conditions (No Development)	No site access
2025 Planning Horizon	2025 Future Background Conditions (No Development)	No site access
	2025 Future Total Conditions (With Development)	Access via: - Elm Grove Avenue - Myra Road

Following traffic impact study best practices, the analysis process carried out for the future planning horizon includes two sets of assessments. The first is referred to as the future background traffic scenario which excludes the proposed site-generated traffic. The second is referred to as the future total traffic scenario which includes the proposed site-generated traffic. It is through this process that the practitioner can identify the impacts explicitly associated with the new site-generated traffic added to the roadway network by comparing the two sets of results. The assembly of both sets of future 2025 peak hour traffic conditions and the analysis process used to identify any future roadway infrastructure changes is discussed in the following Sections.

4.2 Traffic Volume Forecasting Process

4.2.1 Overview

Using information gleaned from the discussions with HRM representatives at the scope development meeting, in addition to the available background documentation, the future year volumes were development using the following steps identified in *Table 6*.

Table 6: Future Year Traffic Factors

Contributing Factor	Description
1. General Traffic Growth	- A review of historical NSTIR traffic volume data was undertaken to determine recent growth trends. Average Annual Daily Traffic (AADT) volumes recorded by NSTIR in Section 10 and 15 of Trunk 3 (St. Margaret's Bay Road) between 2009 and 2016 were reviewed. In one Section volumes increased at a rate of 0.63% per year and another experienced a reduction in volumes. Therefore, a higher-than-average compounding growth rate of 0.5% per year was applied to the 2019 baseline volumes to establish the background growth out to the year 2025.
2. Future Adjacent Development	- There are no known developments in the vicinity that could notably impact traffic volumes. The assumed general growth rate described above will account for any small developments, should they occur.
3. Road Network Changes	- Given the new street connection from Myra Road to the existing Elm Grove Avenue, there is expected to be a shift in travel route choice by the existing residents living along Elm Grove, Maple Grove, Parkdale, etc. With the new connection in place, some drivers traveling to/from the east along St. Margaret's Bay Road are expected to find it more convenient to enter/leave their neighbourhood via Myra Road – a route choice that is currently not available to them. For the purposes of this study, it was assumed that 20% of traffic currently turning to/from the east at Parkdale Avenue will shift to the Myra Road intersection.
4. New Site-generated Traffic	- The new traffic added to the study area streets and intersections explicitly associated with the proposed development.

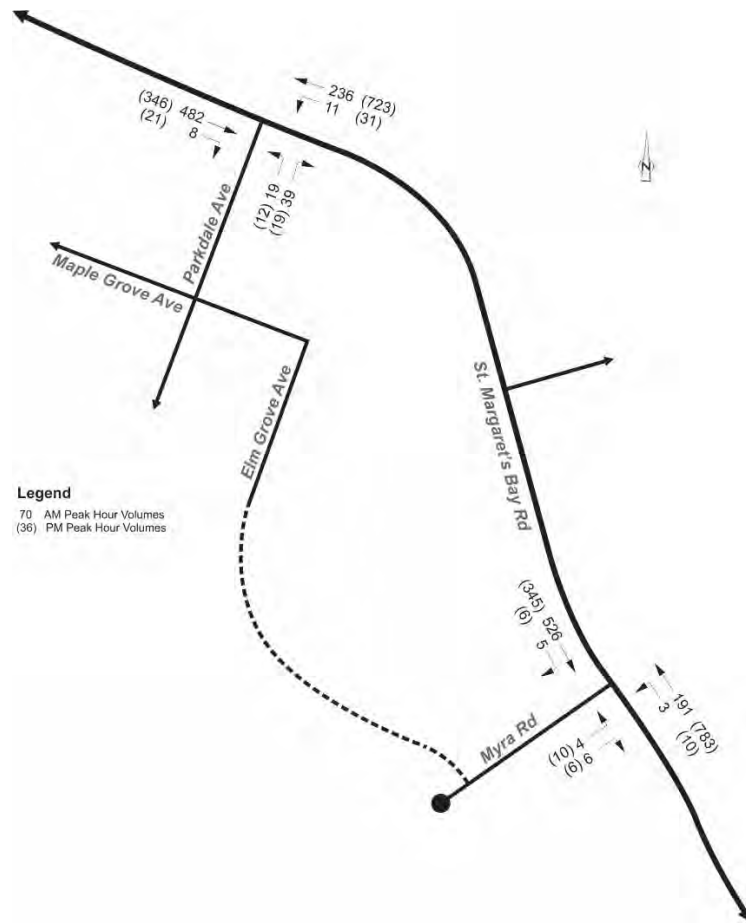
4.2.2 Future Background Traffic Volumes

A summary of the future Background 2025 peak hour traffic volumes used in the analysis are illustrated in *Figure 6*. These volumes were established using the following:

- Existing 2019 weekday peak hour traffic volumes; plus
- General traffic increases associated with population and employment growth were assumed to reflect historical trends and a 0.5% per year compounding growth rate was applied to the 2019 peak hour volumes; plus

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Figure 6: Future Background 2025 Peak Hour Traffic Volumes

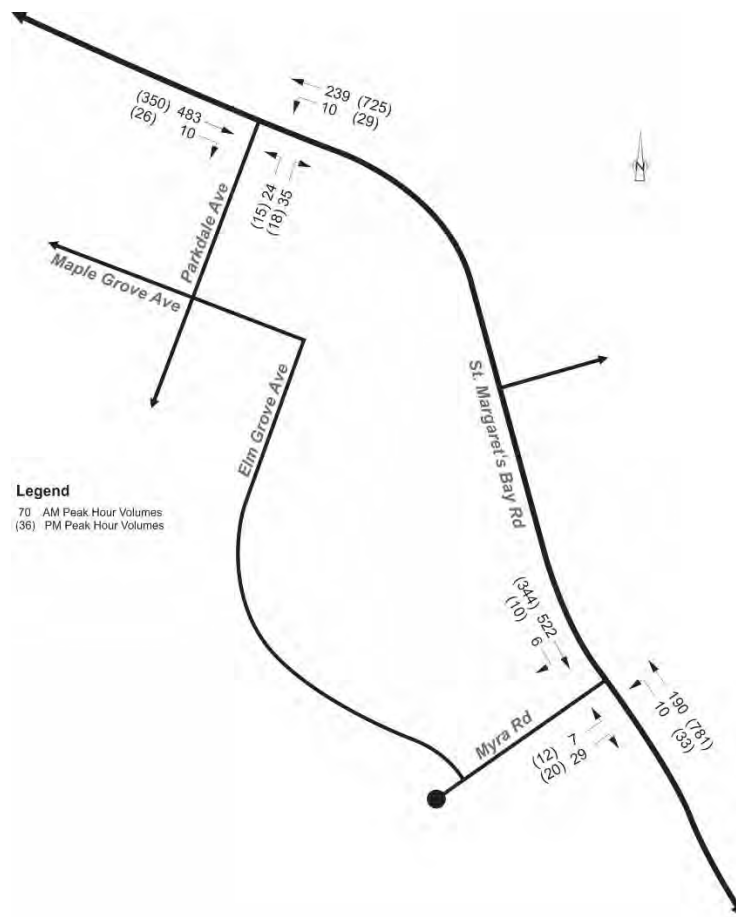


4.2.3 Future Total Traffic Volumes

The assembly of Future Total 2025 AM and PM peak hour traffic volumes is shown in *Figure 7* and was based on the following:

- Existing 2019 weekday peak hour traffic volumes; plus
- General traffic increases associated with population and employment growth were assumed to reflect historical trends and a 0.5% per year compounding growth rate was applied to the 2019 peak hour volumes; plus
- A 20% diversion and re-distribution of volumes away from the Parkdale Avenue intersection over to the Myra Road intersection; plus
- Site-generated traffic associated with the proposed 67-unit Elm Grove development.

Figure 7: Future Total 2025 Peak Hour Traffic Volumes



4.3 Future 2025 Operational Analysis

4.3.1 Auxiliary Turning Lane Review

The initial step in the analysis process included a review of the auxiliary turn lane warrants at the two study area intersections that would provide access to the proposed development: Parkdale Avenue and Myra Road. The left turn lane warrant review was undertaken following Ministry of Transportation of Ontario (MTO) procedures. The right turn lane warrant review followed the Ohio Department of Transportation (ODOT) methodology. A summary of the auxiliary turn lane assessment results are provided in *Table 7*. Detailed auxiliary turn lane warrant assessments are contained in *Appendix I*.

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Table 7: Summary of Auxiliary Turn Lane Assessment

Scenario	Turn Lane Location	1. Parkdale Ave	2. Myra Rd
Background 2025	Eastbound Right Turn Lane	Warrant not met	Warrant not met
	Westbound Left Turn Lane	Warrant met	Warrant not met ^A
Total 2025	Eastbound Right Turn Lane	Warrant not met	Warrant not met
	Westbound Left Turn Lane	Warrant met	Warrant met

A – The percent left turns is less than 2% and industry best practices suggest that under these conditions the warrant is not met.

Under the future 2025 Background traffic scenario it was determined that an auxiliary left turn lane warrant is met for westbound left-turning drivers at the Parkdale Avenue intersection. Under the 2025 Total traffic scenario, the warrant results suggest that an auxiliary left turn lane warrant is also met at the Myra Road intersection for westbound left-turning drivers.

It should be noted that the left turning demand at both study area intersections under a future full build-out scenario is only forecast to be about 30 vph. This equates to about one left-turning vehicle every two minutes and can be characterized as a small vehicle demand. Therefore, the decision to construct left turn lanes in this corridor should consider the fact that there are numerous left turns already being made throughout the corridor (i.e. at other driveways and local streets) in the absence of left turn auxiliary lanes. The current “status quo” situation without auxiliary turn lanes results in a speed-managed corridor that is accommodating multiple modes of travel.

Given the existing multi-modal roadway environment along the St. Margaret’s Bay Road, it is suggested that HRM give consideration to first establishing an overall “vision” and identify the intended purpose of this corridor. In taking this approach, HRM can then establish a corridor policy that manages the best interests of residents’ mobility needs. Potential outcomes could potentially be one of the following:

- *Multi-modal*: Maintain the status quo and continue providing a balanced approach that serves public transit, active transportation and commuter vehicles, or
- *Vehicle-centric*: Continue widening the street to accommodate vehicle growth via auxiliary turn lanes and additional through lanes.

4.3.3 Future 2025 Intersection Capacity Analysis

A capacity analysis effort was carried out for the study area intersections using both sets of future 2025 forecast traffic volumes. The analysis also included an assessment of future conditions, without and with, westbound left turn auxiliary lanes at the two study area intersections.

The analysis process used Trafficware’s *Synchro 10* software tool. The results for the critical movements at the study area intersections are contained in *Table 8* and the detailed capacity reports are contained in *Appendix II*.

Table 8: Future 2025 Operational Analysis Results

1. St. Margaret's Bay Road / Parkdale Avenue						
	AM Peak Hour			PM Peak Hour		
	Critical Move: Delay	V/C	Queue^A	Critical Move: Delay	V/C	Queue^A
Existing 2019 (existing lanes)	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 13.9s	- - 0.13	- - <10m	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 17.1s	- - 0.10	- - <10m
Background 2025 (existing lanes)	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 14.3s	- - 0.14	- - <10m	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 17.6s	- - 0.11	- - <10m
Background 2025^C (with left turn lane)	WB Thru: n/a ^B WB Left: 8.6s EB Th-Rt: n/a ^B NB Lt--Rt: 14.3s	- 0.01 - 0.14	- 0m - <10m	WB Thru: n/a ^B WB Left: 8.3s EB Th-Rt: n/a ^B NB Lt--Rt: 17.3s	- 0.03 - 0.10	- <10m - <10m
Total 2025^C (with left turn lane)	WB Thru: n/a ^B WB Left: 8.6s EB Th-Rt: n/a ^B NB Lt--Rt: 14.8s	- 0.01 - 0.15	- 0m - <10m	WB Thru: n/a ^B WB Left: 8.3s EB Th-Rt: n/a ^B NB Lt--Rt: 18.7s	- 0.03 - 0.12	- <10m - <10m

2. St. Margaret's Bay Road / Myra Road						
	AM Peak Hour			PM Peak Hour		
	Critical Move: Delay	V/C	Queue^A	Critical Move: Delay	V/C	Queue^A
Existing 2019 (existing lanes)	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 13.4s	- - 0.03	- - <10m	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 19.7s	- - 0.07	- - <10m
Background 2025 (existing lanes)	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 13.6s	- - 0.03	- - <10m	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 20.5s	- - 0.07	- - <10m
Total 2025 (existing lanes)	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 13.5s	- - 0.08	- - <10m	WB Th-Lt: n/a ^B EB Th-Rt: n/a ^B NB Lt--Rt: 18.2s	- - 0.11	- - <10m
Total 2025^C (with left turn lane)	WB Thru: n/a ^B WB Left: 8.7s EB Th-Rt: n/a ^B NB Lt--Rt: 13.5s	- 0.01 - 0.08	- 0m - <10m	WB Thru: n/a ^B WB Left: 8.2s EB Th-Rt: n/a ^B NB Lt--Rt: 17.9s	- 0.03 - 0.11	- <10m - <10m

A – Queue represents the calculated vehicle queue length in metres occurring 95% of the time (95th percentile).

B – No performance measures calculated as this is a first order priority movement at the intersection.

C – Evaluated with a westbound left turn auxiliary turn lane in place.

The results contained in *Table 8* suggest that the critical northbound stop-controlled movements at both intersections are expected to operate with acceptable performance measures during peak periods. Under future Total 2025 conditions the northbound shared left-right movements operate with 20.5 seconds/vehicle or less, v/c ratios of 0.15 or less and less than 10m queues.

When comparing the performance results with and without the left turn auxiliary turn lanes – the results show very little to no change in operational performance. This is likely due to the fact that there are only forecast to be about 30 vph making the westbound left turn during the PM peak hour under a full build-out scenario. This further supports the earlier conclusion that HRM should given consideration to reviewing the benefits/disbenefits of adding left turn lanes and consideration should be given to establishing an overall auxiliary turn lane plan for the entire St. Margaret's Bay Road corridor.

It should be noted that the northbound entry results at the Myra Road intersection actually improve when comparing the Background and Total 2025 results. Although counter-intuitive at first glance, the reason for the reduction in delay times and v/c ratios is due to the change in percentage of left turns versus right turns using a single northbound lane. Under current and future background conditions the larger percentage of drivers make a left turn onto St. Margaret's Bay Road. However, the addition of new site traffic and the expected diversion of existing trips will reverse that trend and the greater percentage of drivers will turn right. Since the delay calculations for a shared lane (eg. shared left-right turn lane) are based on a weighted average, the majority of right-turning drivers experience less delay relative to left-turning drivers and thus the delay times improve.

4.4 Expected Impacts to Existing Streets

A review was undertaken to understand the specific impacts to existing residents and drivers that regularly use both Parkdale Avenue and Myra Road. As with any new development the expectation of local residents is that volumes will increase and this review is intended to provide some context in that regard. As a starting point, GRIFFIN assembled the existing 2019 two-way volumes on both streets from the Figures presented earlier in this report and specifically reviewed the weekday afternoon peak hour volumes – as this time period exhibited the higher demand of the two peak hours assessed in this study. The results are contained in *Table 9*.

Table 9: Comparison of Existing Versus Future Street Volumes – PM Peak Vehicles per Hour

	2019 Existing Two-way Volume	2025 Total Two-way volume	Difference
1. Parkdale Ave	80 vph	88 vph	+ 8 vph
2. Myra Rd	32 vph	74 vph	+42 vph

Key findings flowing from this comparative review included the following:

- The existing 2019 two-way volumes are less than 100 vph, and well below the capacity of a local residential street which is typically in the 600-800 vph range. Parkdale Avenue experiences an average demand of slightly more than one vehicle every minute and Myra Road experiences an average demand of one vehicle every two minutes.
- Under future 2025 full build-out conditions, including the completion of the proposed Elm Grove development, it is expected to result in a negligible change on Parkdale Avenue (maintain the one vehicle/minute) and a marginal increase on Myra Road (increase to about one vehicle/minute).

In conclusion, the proposed Elm Grove development is expected to result in manageable increases in traffic for existing residents of Parkdale Avenue and Myra Road, with the greatest increase of about one vehicle/minute occurring on Myra Road.

5. CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the salient findings of the analysis process and identifies necessary infrastructure changes.

5.1 Conclusions

The following conclusions were gleaned from the traffic impact assessment:

- *The Proposed Development:* A total of 67 residential units comprised of 47 detached housing units (R1) and 20 townhome units (R2) are proposed on the Elm Grove development lands. The ITE's *Trip Generation, 10th Edition* document indicates that a development of this size will generate new trips on the study area roads totaling 52 vehicles/hour (vph) and 69 vph during the weekday AM and PM peak hours, respectively.
- *Existing Intersection Operations:* The majority of the new traffic generated by the proposed development is expected to use either Parkdale Avenue or Myra Road to move to/from the St. Margaret's Bay Road corridor. Currently, both of these intersections operate with acceptable performance measures during typical weekday peak periods. However, operations during the afternoon peak hour at the Parkdale Avenue intersection meet the warrant for a left turn auxiliary lane in the westbound direction – regardless if the proposed development is completed or not.
- *Future Traffic Diversion:* Myra Road is currently a cul-de-sac. The proposed new street layout will provide a new local street connection between Myra Road and the existing residents along Elm Grove, Maple Grove and Parkdale Avenues. As such, a shift in travel pattern is expected due to this new convenient connection and it was assumed in this study that some drivers moving to/from the east along St. Margaret's Bay Road would shift away from the Parkdale Avenue intersection, and choose to now use Myra Road to gain access to their neighbourhood.
- *Future Intersection Operations:* The operating conditions at the two study area intersections under future full build-out conditions – including the diversion of some background traffic to Myra Road – shows there will continue to be a notable amount of residual capacity for the critical stop-controlled movements.
- *The Need for Left Turn Lanes:* The auxiliary turn lane warrant procedure carried out for this study shows the warrants are met for westbound left turn lanes at the two study area intersections. However, given the relatively low left-turning volume of about 30 vph, the operational performance analysis suggests there will be very little to no change in performance should the left turn auxiliary turn lanes actually be installed. The decision to construct left turn lanes in this corridor should consider the fact that there are numerous left turns already being made throughout the corridor (i.e. at other driveways and local streets) in the absence of left turn auxiliary lanes. The current "status quo" situation without auxiliary turn lanes results in a speed-managed corridor that is accommodating multiple modes of travel.

- *Changes to Local Street Traffic:* A qualitative assessment of the changes in peak period traffic volumes was completed for Parkdale Avenue and Myra Road under a full build-out scenario. It was concluded there will only be small and negligible increases in the peak hour volume on both local streets. The future 2025 two-way volumes are forecast to be less than 100 vph and the capacity of a typical local residential street is about 600-800 vph.

In summary, the forecast site-generated volumes associated with the proposed 67-unit residential development is expected to have an acceptable operational impact on the study area streets and intersections out to the 2025 planning horizon.

5.2 Recommendations

The following recommendations were developed based on the findings flowing from this study:

- *Parkdale intersection:* That the existing stop-control remain at this intersection. Under future Background 2025 conditions the warrant for a westbound auxiliary left turn lane is met – in the absence of the proposed Elm Grove development.
- *Myra Road intersection:* That the existing stop-control remain at this intersection. Under Total 2025 conditions the warrant for a westbound auxiliary left turn lane is met.
- *Auxiliary turn lanes:* Prior to HRM's decision on the need to install westbound left turn auxiliary turn lanes, it is recommended that HRM give consideration to first establishing an overall "vision" and identify the intended purpose of this corridor. In taking this approach, HRM can then establish a corridor policy that manages the best interests of residents' mobility needs. Potential outcomes with respect to the need for auxiliary turn lanes could potentially be one of the following:
 - *Multi-modal Approach:* Maintain the status quo, with no provisions for auxiliary turn lanes and continue providing a balanced approach that serves public transit, active transportation and commuter vehicles, or
 - *Vehicle-centric Approach:* Continue widening the street to accommodate vehicle growth via auxiliary turn lanes and additional through lanes.
- That all new signage and pavement markings associated with any necessary roadway upgrades be installed in accordance with the latest version of the Transportation Association of Canada's (TAC) *Manual of Uniform Traffic Control Devices of Canada* (MUTCDC).
- That any geometric design changes to the roadway infrastructure follow the most recent HRM and TAC design guidelines, including the provision of driver sight distances and corner clearances that are appropriate for the site-specific roadway environment.

APPENDIX I

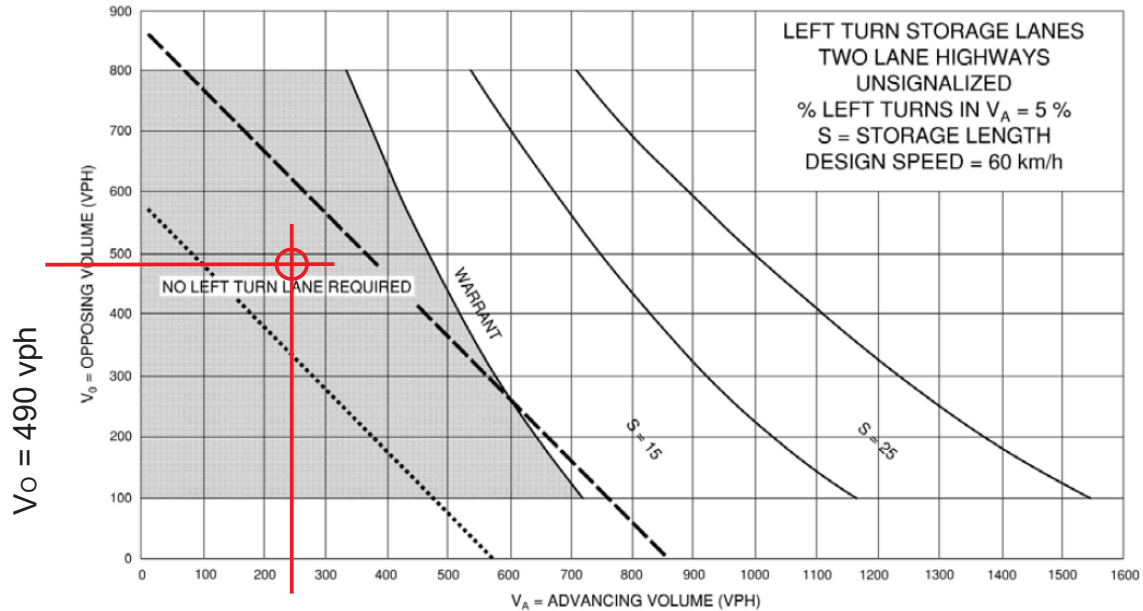
Auxiliary Turn Lane Warrants

Left Turn Lane Warrant Analysis

Background 2025 Traffic Volumes

Parkdale Ave - Westbound Left Turn

Weekday AM Peak Hour - MTO 2017 Design Supplement Exhibit 9A-6:



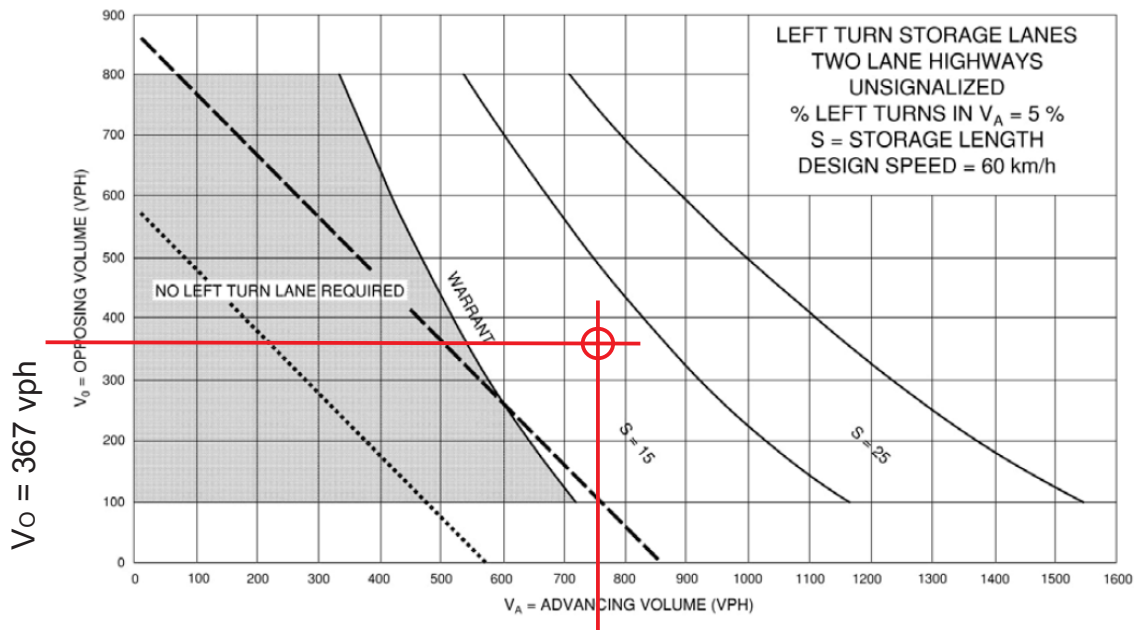
Advancing Traffic:

$V_A = 247 \text{ vph}$

$V_L = 11 \text{ vph}$

Left turns = 4.5%

Weekday PM Peak Hour - MTO 2017 Design Supplement Exhibit 9A-6:



Advancing Traffic:

$V_A = 754 \text{ vph}$

$V_L = 31 \text{ vph}$

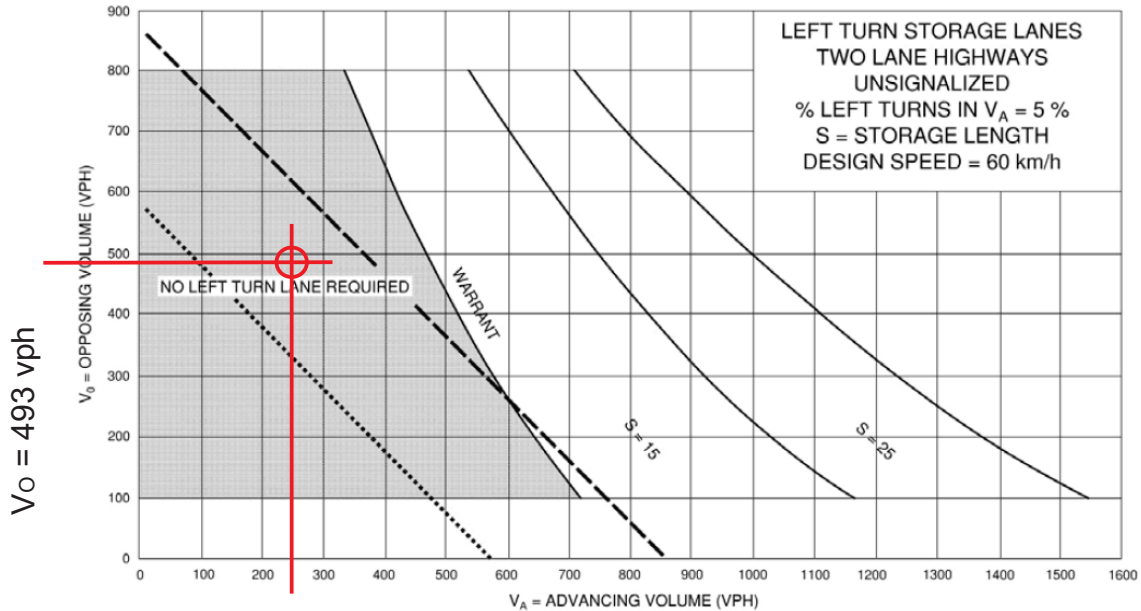
Left turns = 4.1%

Left Turn Lane Warrant Analysis

Total 2025 Traffic Volumes

Parkdale Ave - Westbound Left Turn

Weekday AM Peak Hour - MTO 2017 Design Supplement Exhibit 9A-6:



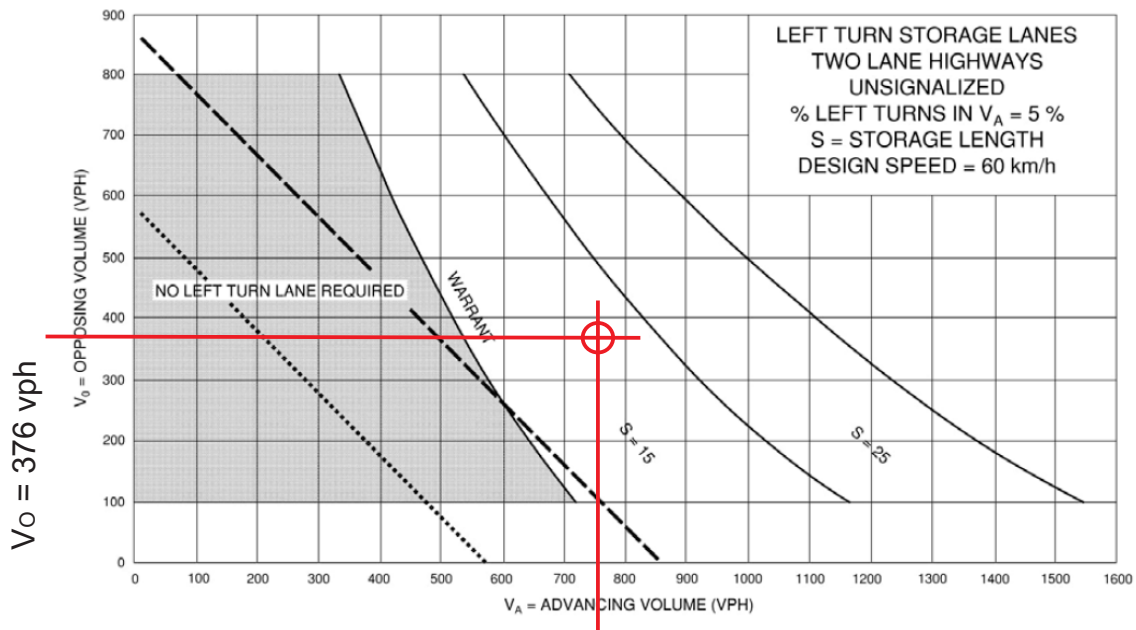
Advancing Traffic:

$V_A = 249$ vph

$V_L = 10$ vph

Left turns = 4.0%

Weekday PM Peak Hour - MTO 2017 Design Supplement Exhibit 9A-6:



Advancing Traffic:

$V_A = 754$ vph

$V_L = 29$ vph

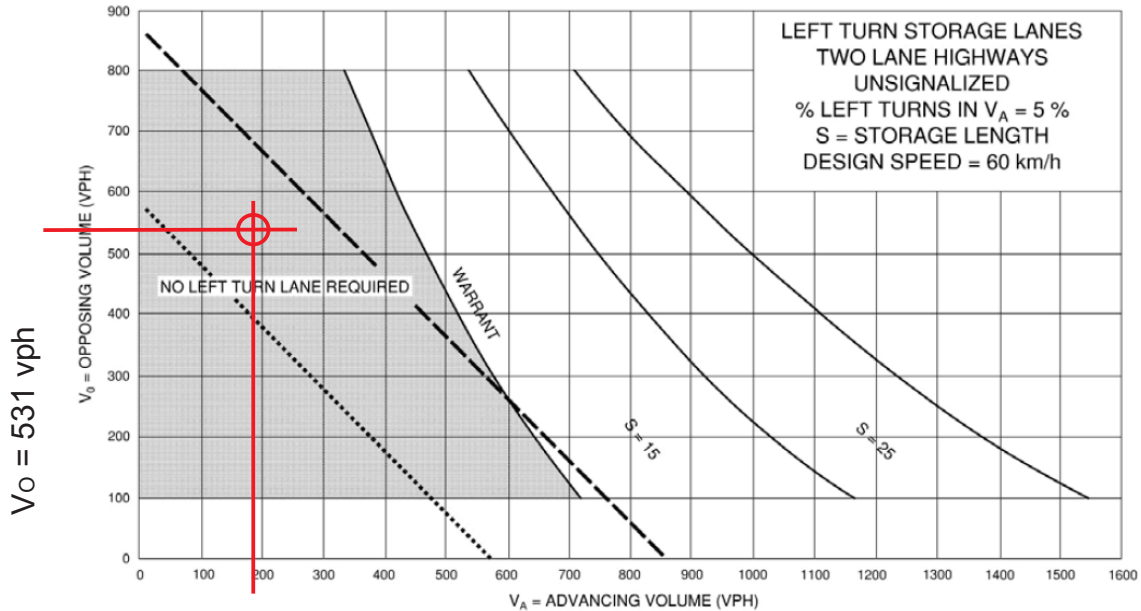
Left turns = 3.8%

Left Turn Lane Warrant Analysis

Background 2025 Traffic Volumes

Myra Rd - Westbound Left Turn

Weekday AM Peak Hour - MTO 2017 Design Supplement Exhibit 9A-6:



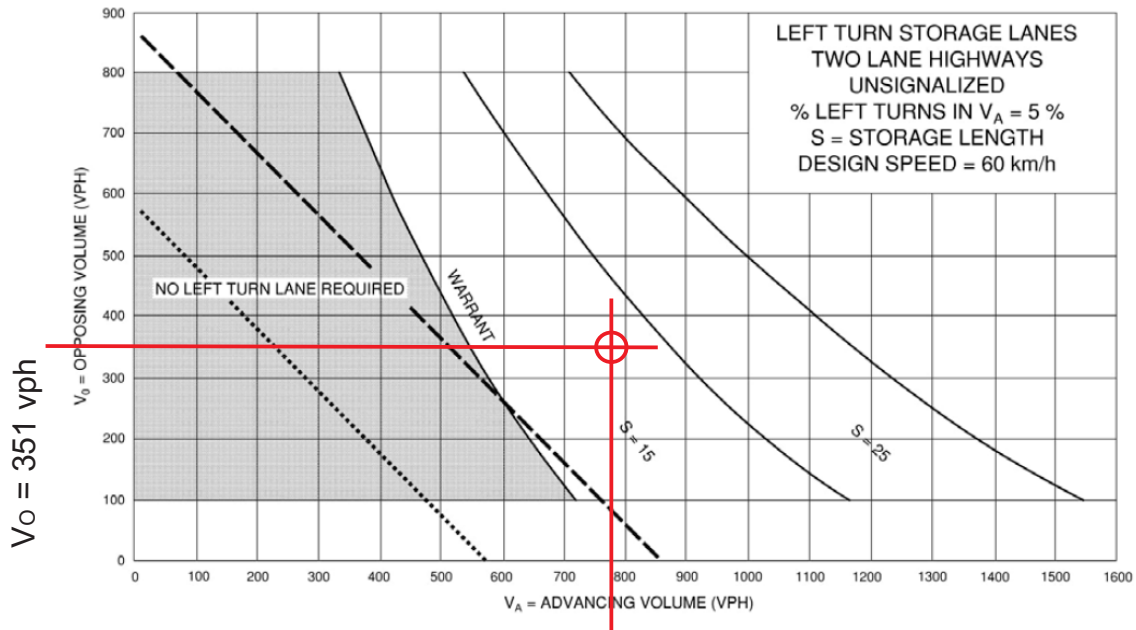
Advancing Traffic:

$V_A = 194$ vph

$V_L = 3$ vph

Left turns = 1.5% - **Less than 2%**

Weekday PM Peak Hour - MTO 2017 Design Supplement Exhibit 9A-6:



Advancing Traffic:

$V_A = 793$ vph

$V_L = 10$ vph

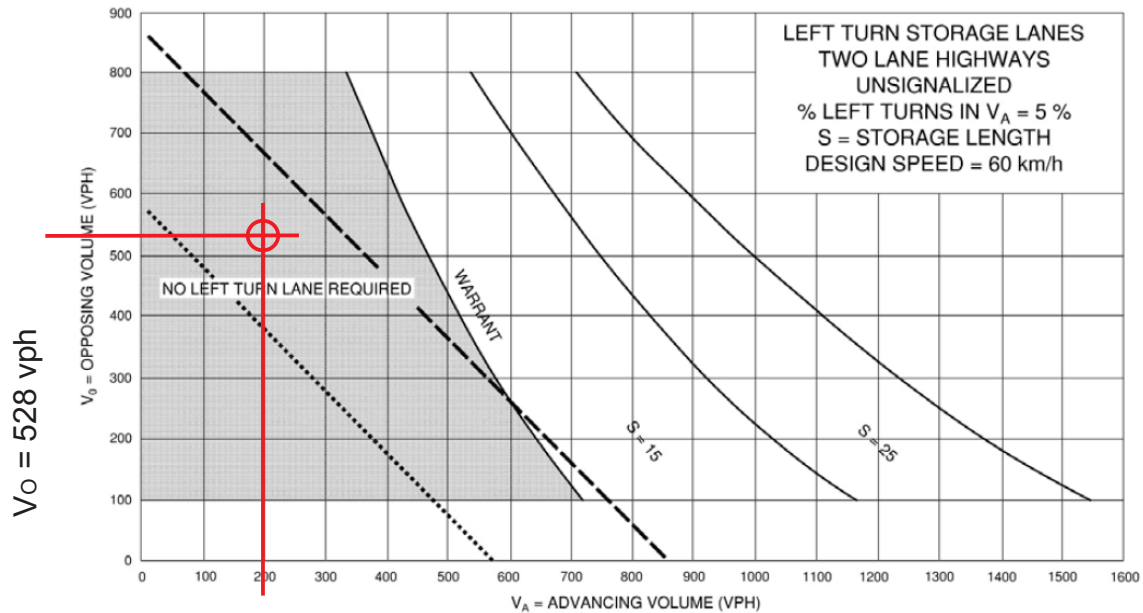
Left turns = 1.3% - **Less than 2%**

Left Turn Lane Warrant Analysis

Total 2025 Traffic Volumes

Myra Rd - Westbound Left Turn

Weekday AM Peak Hour - MTO 2017 Design Supplement Exhibit 9A-6:



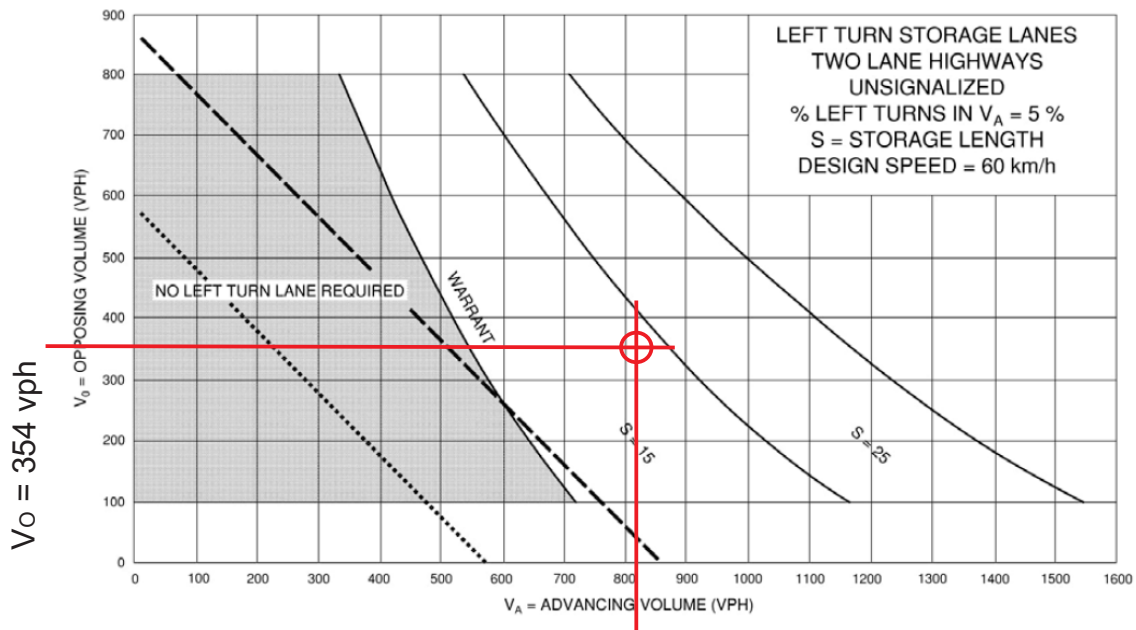
Advancing Traffic:

$V_A = 200$ vph

$V_L = 10$ vph

Left turns = 5.0%

Weekday PM Peak Hour - MTO 2017 Design Supplement Exhibit 9A-6:



Advancing Traffic:

$V_A = 814$ vph

$V_L = 33$ vph

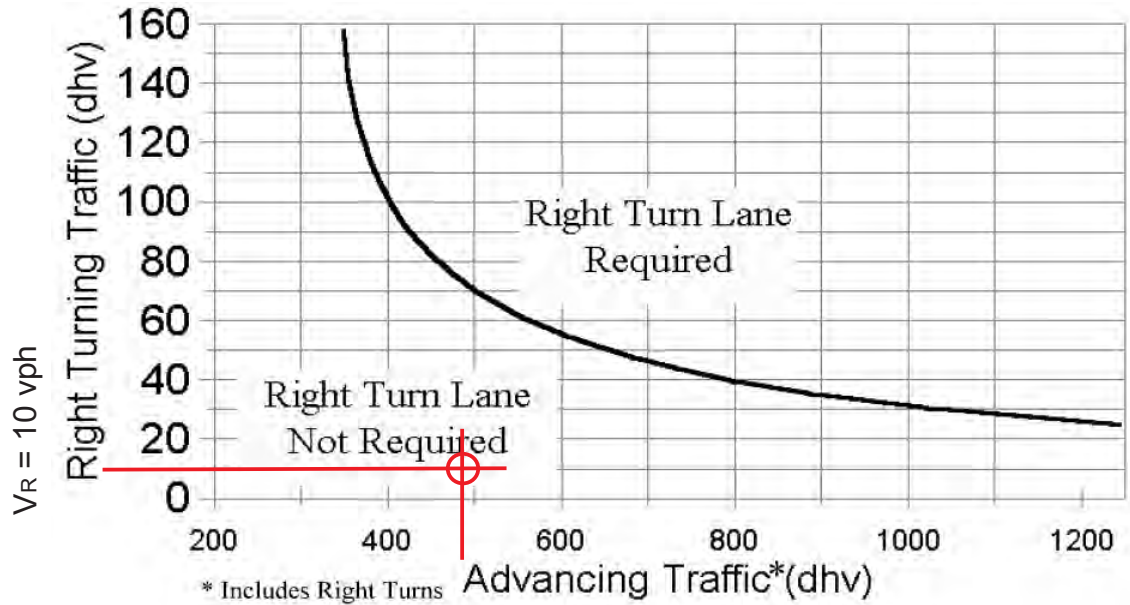
Left turns = 4.1%

Right Turn Lane Warrant Analysis

Total 2025 Traffic Volumes

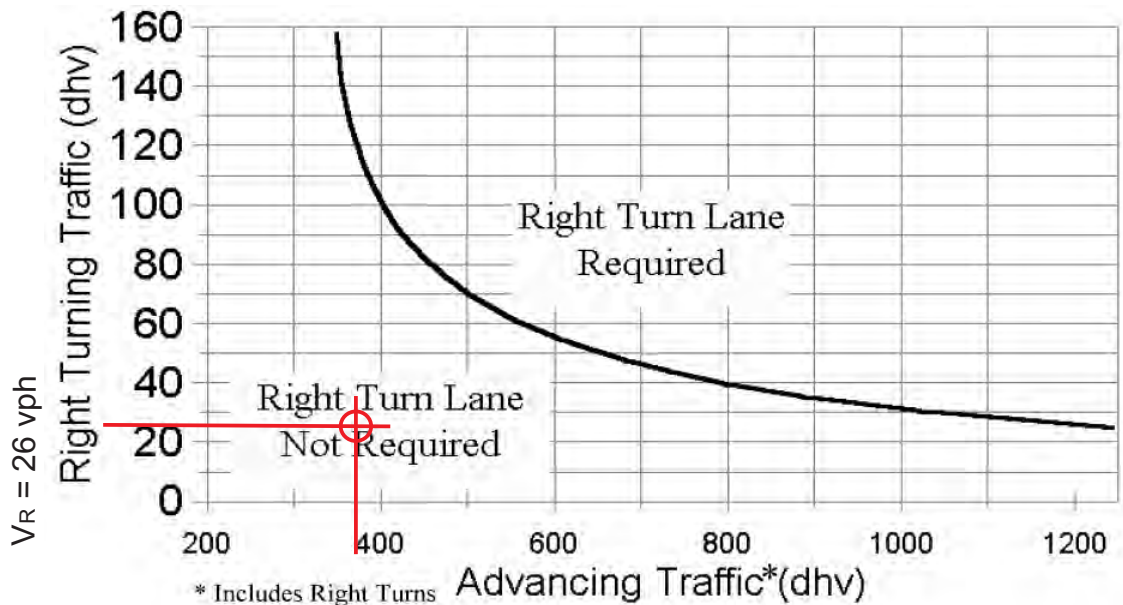
Parkdale Ave - Eastbound Right Turn

Weekday AM Peak Hour:



Advancing Traffic:
VA = 493 vph

Weekday PM Peak Hour:

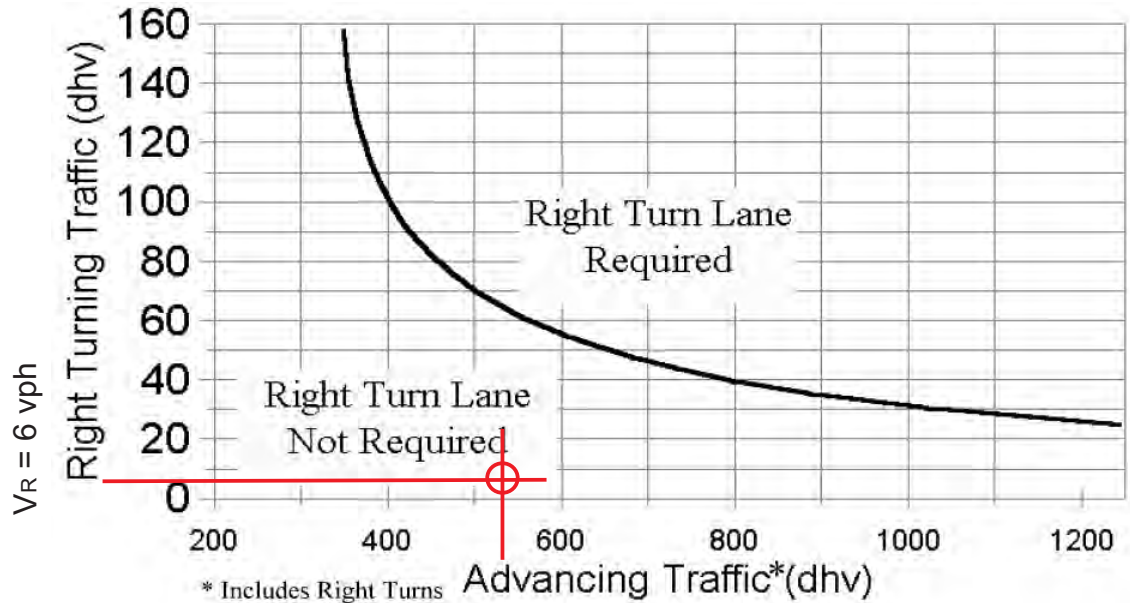


Advancing Traffic:
VA = 376 vph

Right Turn Lane Warrant Analysis

Total 2025 Traffic Volumes
Myra Rd - Eastbound Right Turn

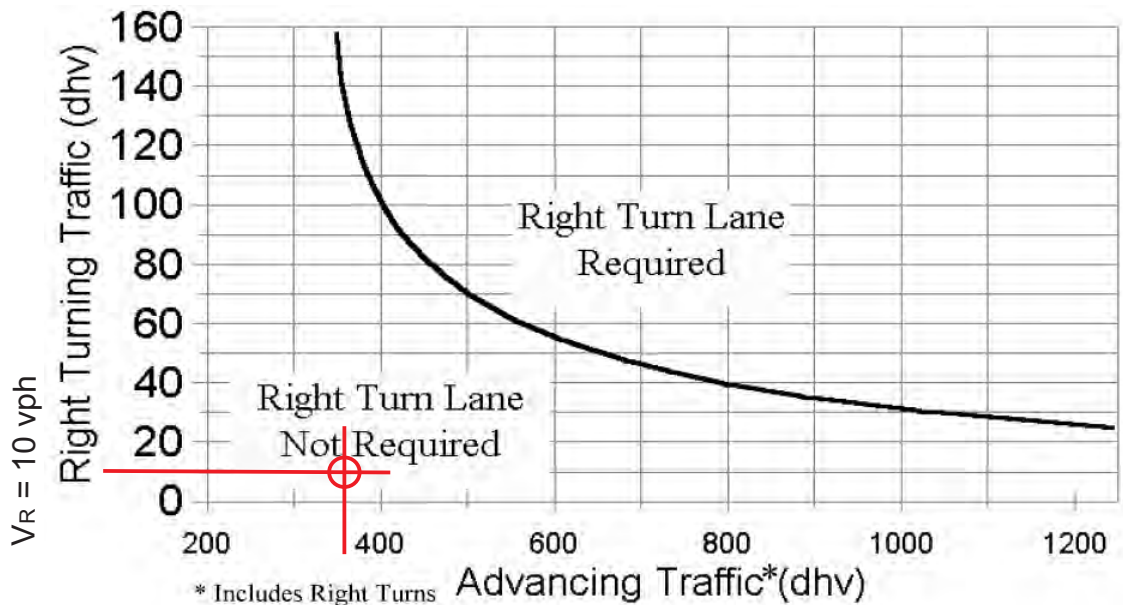
Weekday AM Peak Hour:



Advancing Traffic:

$V_A = 528$ vph

Weekday PM Peak Hour:



Advancing Traffic:

$V_A = 354$ vph

APPENDIX II

Intersection capacity analysis




Existing 2019 Results

HCM 6th TWSC
1: Parkdale & St. Marg. Bay Rd

Existing 2019 - AM Peak Hour

Intersection

Int Delay, s/veh 1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	468	8	10	229	18	38
Future Vol, veh/h	468	8	10	229	18	38
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	509	9	11	249	20	41




Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	523
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	1028
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1024
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	464	-	-	1024	-
HCM Lane V/C Ratio	0.131	-	-	0.011	-
HCM Control Delay (s)	13.9	-	-	8.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

HCM 6th TWSC
1: Parkdale & St. Marg. Bay Rd

Existing 2019 - PM Peak Hour




Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	336	20	30	702	12	18
Future Vol, veh/h	336	20	30	702	12	18
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	365	22	33	763	13	20
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	392	0	1210	381
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	829	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1150	-	199	660
Stage 1	-	-	-	-	684	-
Stage 2	-	-	-	-	424	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1145	-	188	657
Mov Cap-2 Maneuver	-	-	-	-	188	-
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	424	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		17.1	
HCM LOS	C					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	329	-	-	1145	-	
HCM Lane V/C Ratio	0.099	-	-	0.028	-	
HCM Control Delay (s)	17.1	-	-	8.2	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	

HCM 6th TWSC
2: Myra & St. Marg. Bay Rd

Existing 2019 - AM Peak Hour

Intersection

Int Delay, s/veh 0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	511	5	3	185	4	6
Future Vol, veh/h	511	5	3	185	4	6
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	555	5	3	201	4	7

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	565
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	992
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	988
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.4
HCM LOS			B




Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	442	-	-	988	-
HCM Lane V/C Ratio	0.025	-	-	0.003	-
HCM Control Delay (s)	13.4	-	-	8.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 6th TWSC
2: Myra & St. Marg. Bay Rd

Existing 2019 - PM Peak Hour

Intersection

Int Delay, s/veh 0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	335	6	10	759	10	6
Future Vol, veh/h	335	6	10	759	10	6
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	364	7	11	825	11	7

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	376
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	1166
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1161
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-




Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	19.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	262	-	-	1161	-
HCM Lane V/C Ratio	0.066	-	-	0.009	-
HCM Control Delay (s)	19.7	-	-	8.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Background 2025 Results




HCM 6th TWSC
1: Parkdale & St. Marg. Bay Rd

Background 2025 - AM Peak Hour (No LT lane)

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	482	8	11	236	19	39
Future Vol, veh/h	482	8	11	236	19	39
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	524	9	12	257	21	42
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	538	0	815	534
Stage 1	-	-	-	-	534	-
Stage 2	-	-	-	-	281	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1015	-	343	540
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	760	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1011	-	337	538
Mov Cap-2 Maneuver	-	-	-	-	337	-
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	760	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.4		14.3	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	450	-	-	1011	-	
HCM Lane V/C Ratio	0.14	-	-	0.012	-	
HCM Control Delay (s)	14.3	-	-	8.6	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.5	-	-	0	-	

HCM 6th TWSC
1: Parkdale & St. Marg. Bay Rd

Background 2025 - PM Peak Hour (No LT lane)





Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	346	21	31	723	12	19
Future Vol, veh/h	346	21	31	723	12	19
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	376	23	34	786	13	21
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	404	0	1247	393
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	854	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1139	-	189	649
Stage 1	-	-	-	-	676	-
Stage 2	-	-	-	-	412	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1134	-	178	646
Mov Cap-2 Maneuver	-	-	-	-	178	-
Stage 1	-	-	-	-	637	-
Stage 2	-	-	-	-	412	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		17.6	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	320	-	-	1134	-	
HCM Lane V/C Ratio	0.105	-	-	0.03	-	
HCM Control Delay (s)	17.6	-	-	8.3	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	

HCM 6th TWSC
1: Parkdale & St. Marg. Bay Rd

Background 2025 - AM Peak Hour (With LT lane)

Intersection

Int Delay, s/veh 1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	482	8	11	236	19	39
Future Vol, veh/h	482	8	11	236	19	39
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	524	9	12	257	21	42

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	538
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	1015
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1011
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	14.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	451	-	-	1011	-
HCM Lane V/C Ratio	0.14	-	-	0.012	-
HCM Control Delay (s)	14.3	-	-	8.6	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0	-





HCM 6th TWSC

1: Parkdale & St. Marg. Bay Rd

Background 2025 - PM Peak Hour (With LT lane)

Intersection

Int Delay, s/veh 0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	346	21	31	723	12	19
Future Vol, veh/h	346	21	31	723	12	19
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	376	23	34	786	13	21

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	404
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	1139
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1134
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-




Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	17.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	326	-	-	1134	-
HCM Lane V/C Ratio	0.103	-	-	0.03	-
HCM Control Delay (s)	17.3	-	-	8.3	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

HCM 6th TWSC




2: Myra & St. Marg. Bay Rd

Background 2025 - AM Peak Hour (No LT lane)

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	526	5	3	191	4	6
Future Vol, veh/h	526	5	3	191	4	6
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	572	5	3	208	4	7
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	582	0	794	580
Stage 1	-	-	-	-	580	-
Stage 2	-	-	-	-	214	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	978	-	353	509
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	815	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	974	-	351	507
Mov Cap-2 Maneuver	-	-	-	-	351	-
Stage 1	-	-	-	-	550	-
Stage 2	-	-	-	-	815	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		13.6	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	430	-	-	974	-	
HCM Lane V/C Ratio	0.025	-	-	0.003	-	
HCM Control Delay (s)	13.6	-	-	8.7	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

HCM 6th TWSC 2: Myra & St. Marg. Bay Rd

Background 2025 - PM Peak Hour (No LT lane)

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	345	6	10	783	10	6
Future Vol, veh/h	345	6	10	783	10	6
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	375	7	11	851	11	7
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	387	0	1257	384
Stage 1	-	-	-	-	384	-
Stage 2	-	-	-	-	873	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1155	-	186	657
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	404	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1150	-	182	654
Mov Cap-2 Maneuver	-	-	-	-	182	-
Stage 1	-	-	-	-	667	-
Stage 2	-	-	-	-	404	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		20.5	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	250	-	-	1150	-	
HCM Lane V/C Ratio	0.07	-	-	0.009	-	
HCM Control Delay (s)	20.5	-	-	8.2	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	0.2	-	-	0	-	

Total 2025 Results






HCM 6th TWSC

1: Parkdale & St. Marg. Bay Rd

Total 2025 - AM Peak Hour (With LT lane)

Intersection

Int Delay, s/veh 1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	483	10	10	239	24	35
Future Vol, veh/h	483	10	10	239	24	35
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	525	11	11	260	26	38

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	541
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	1013
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1009
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	14.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	433	-	-	1009	-
HCM Lane V/C Ratio	0.148	-	-	0.011	-
HCM Control Delay (s)	14.8	-	-	8.6	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0	-






HCM 6th TWSC

1: Parkdale & St. Marg. Bay Rd

Total 2025 - PM Peak Hour (With LT lane)

Intersection

Int Delay, s/veh 0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	350	26	29	725	15	18
Future Vol, veh/h	350	26	29	725	15	18
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	380	28	32	788	16	20




Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	413
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	1130
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1125
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	18.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	299	-	-	1125	-
HCM Lane V/C Ratio	0.12	-	-	0.028	-
HCM Control Delay (s)	18.7	-	-	8.3	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-




HCM 6th TWSC
2: Myra & St. Marg. Bay Rd

Total 2025 - AM Peak Hour (No LT lane)

Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	522	6	10	190	7	29
Future Vol, veh/h	522	6	10	190	7	29
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	567	7	11	207	8	32
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	579	0	805	576
Stage 1	-	-	-	-	576	-
Stage 2	-	-	-	-	229	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	980	-	348	511
Stage 1	-	-	-	-	556	-
Stage 2	-	-	-	-	802	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	976	-	342	509
Mov Cap-2 Maneuver	-	-	-	-	342	-
Stage 1	-	-	-	-	547	-
Stage 2	-	-	-	-	802	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.4		13.5	
HCM LOS	B					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	465	-	-	976	-	
HCM Lane V/C Ratio	0.084	-	-	0.011	-	
HCM Control Delay (s)	13.5	-	-	8.7	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.3	-	-	0	-	

HCM 6th TWSC
2: Myra & St. Marg. Bay Rd

Total 2025 - PM Peak Hour (No LT lane)






Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	344	10	33	781	12	20
Future Vol, veh/h	344	10	33	781	12	20
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	374	11	36	849	13	22
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	390	0	1306	385
Stage 1	-	-	-	-	385	-
Stage 2	-	-	-	-	921	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1152	-	174	656
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	383	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1147	-	163	653
Mov Cap-2 Maneuver	-	-	-	-	163	-
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	383	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		18.2	
HCM LOS	C					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	307	-	-	1147	-	
HCM Lane V/C Ratio	0.113	-	-	0.031	-	
HCM Control Delay (s)	18.2	-	-	8.2	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	

HCM 6th TWSC
2: Myra & St. Marg. Bay Rd

Total 2025 - AM Peak Hour (With LT lane)

Intersection

Int Delay, s/veh 0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	522	6	10	190	7	29
Future Vol, veh/h	522	6	10	190	7	29
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	567	7	11	207	8	32





Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	579
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	980
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	976
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	13.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	465	-	-	976	-
HCM Lane V/C Ratio	0.084	-	-	0.011	-
HCM Control Delay (s)	13.5	-	-	8.7	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0	-

HCM 6th TWSC
2: Myra & St. Marg. Bay Rd

Total 2025 - PM Peak Hour (With LT lane)

Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	344	10	33	781	12	20
Future Vol, veh/h	344	10	33	781	12	20
Conflicting Peds, #/hr	0	5	5	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	374	11	36	849	13	22
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	390	0	1306	385
Stage 1	-	-	-	-	385	-
Stage 2	-	-	-	-	921	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1152	-	174	656
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	383	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1147	-	168	653
Mov Cap-2 Maneuver	-	-	-	-	168	-
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	383	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		17.9	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	314	-	-	1147	-	
HCM Lane V/C Ratio	0.111	-	-	0.031	-	
HCM Control Delay (s)	17.9	-	-	8.2	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	