

Lormel Joint Venture Inc. (Mayfield West)

Town of Caledon

Draft Plan of Subdivision

**TRANSPORTATION IMPACT
STUDY**

17162/200

October 2016



LEA Consulting Ltd.

Consulting Engineers & Planners

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October 14, 2016

Our Ref.: 17162/200

Mr. Paulo Da Silva
Lormel Joint Venture Inc.
c/o Melrose Investments Inc.
145 Reynolds Street, Suite 400
Oakville, ON
L6J 0A7

Dear Mr. Da Silva:

**Re: Transportation Impact Study
Draft Plan of Subdivision, Lormel Joint Venture (Mayfield West)
2650 Mayfield Road, Town of Caledon**

LEA Consulting Ltd. is pleased to present the findings of our Transportation Impact Study for the proposed draft plan of subdivision for the Lormel Joint Venture Inc. Property in the Mayfield West area of the Town of Caledon. This report concludes that the traffic associated with the proposed development will have minimal traffic impact to surrounding road network.

Should you have any question regarding this Transportation Impact Study, please do not hesitate to contact the undersigned.

Yours very truly,

LEA Consulting Ltd.

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Encl.: Transportation Impact Study – Lormel Joint Venture Inc. (Mayfield West)

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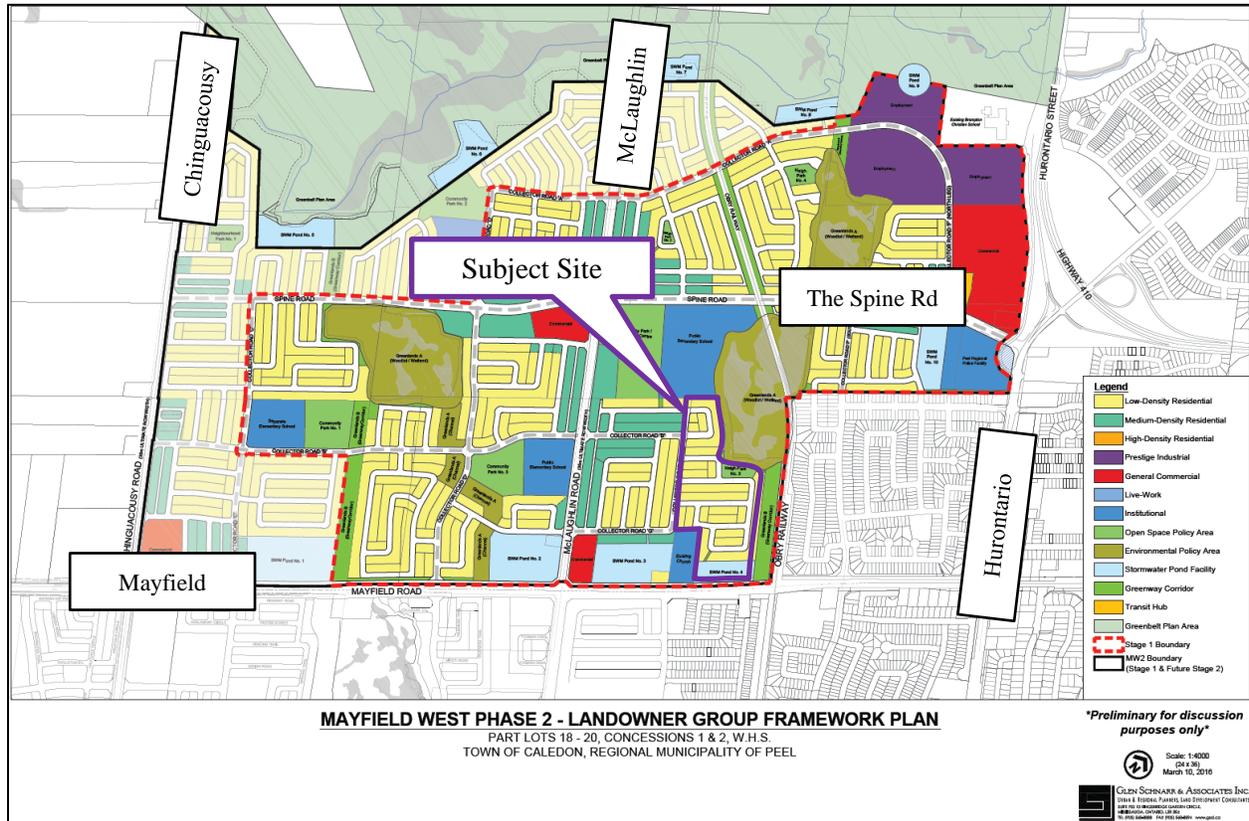
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1.0 INTRODUCTION

LEA Consulting Ltd. (LEA) has been retained by Lormel Joint Venture Inc. to prepare a Transportation Impact Study (TIS) in support of a Draft Plan of Subdivision application for the property known as Lormel JV (Mayfield West) in the Mayfield West Phase 2 (MW2) Secondary Plan Area. **Figure 1.1** illustrates the Landowner Group Framework Plan (compiled draft plans) for MW2 with roads intersecting at right angles, which is good roadway design. The development is to occur within the approved Stage 1 area of the MW 2 Secondary Plan.



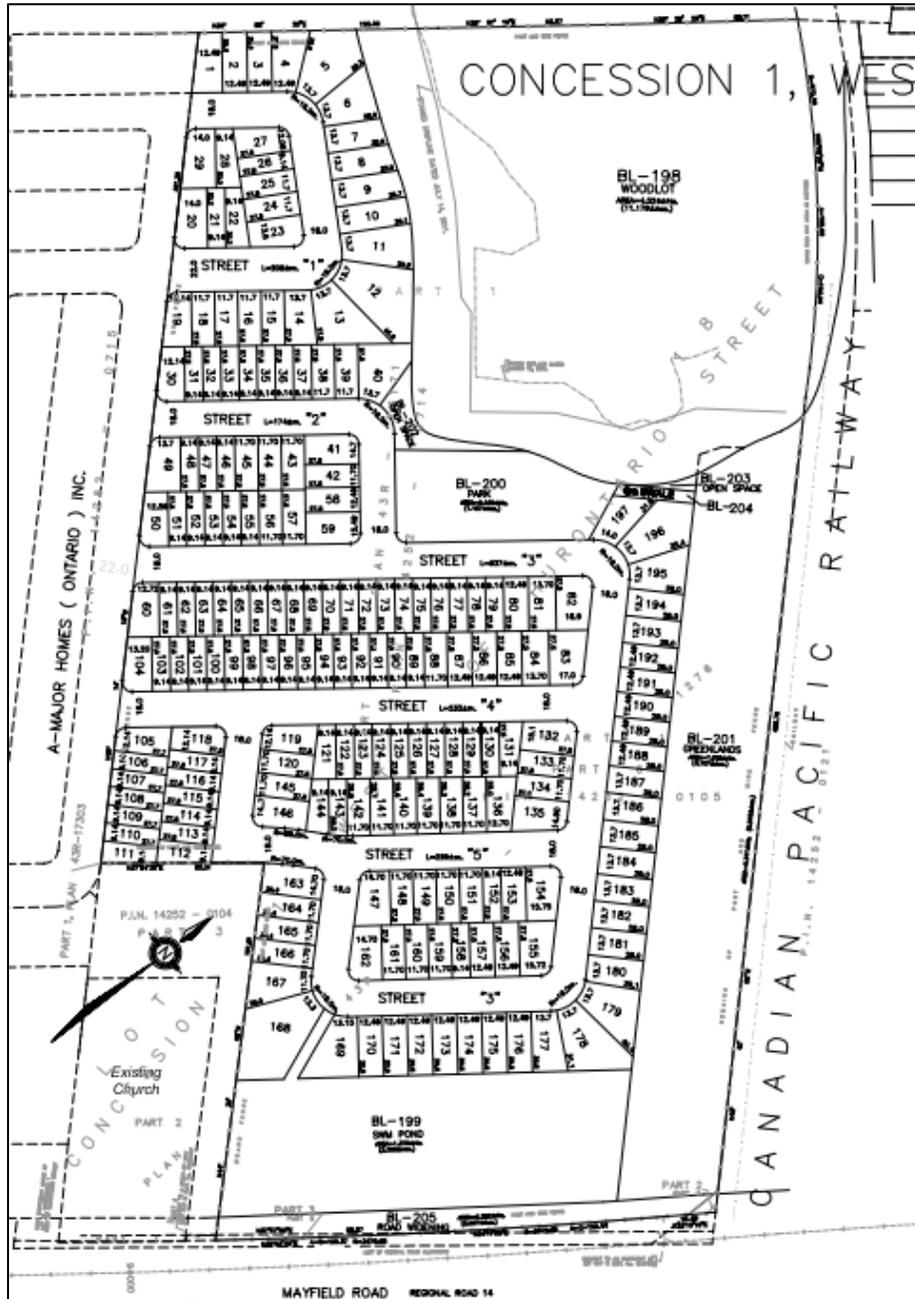
Source: Glen Schnarr, March 10, 2016

Figure 1.1: Subject Site

LEA completed the development of a mesoscopic transportation model in the Aimsun traffic modeling software in March 2015, for the purposes of assessing the impacts of the MW2 Secondary Area Plan development on the surrounding road network and the Hwy10/Hwy410 interchange. The results of that analysis have been utilized as a supplement to the MW2 Transportation Master Plan (MW2 TMP), recently presented to the Town of Caledon Council. This supplemental work demonstrated that MW2 Stage 1 could proceed without the need for any additional road network improvements beyond those planned for 2031 in the MW2 TMP. The road network improvements prescribed in the MW2 TMP includes the planned widening of Mayfield Road from two to four lanes. The analysis showed that further development could also occur beyond Stage 1, with critical movements remaining within the planned capacity of the road network, and with a future connection from The Spine Road to the Hwy10/Hwy410 interchange operating well.

Since the March 2015 analysis supplement to the MW2 TMP demonstrated that all key intersections in the study area surrounding MW2 operated well, the purpose of the present study is to assess in further detail the operations of existing and future intersections directly affected by the development of the Lormel JV (Mayfield West) property. This detailed assessment will therefore focus on McLaughlin Road, north of Mayfield Road, and Mayfield Road east of Chinguacousy Road.

The proposed development, as illustrated in **Figure 1.2**, will include an approximate total of 200 single-detached residential units.



Source: KLM Planning Partners Inc., September 9, 2016

Figure 1.2: Proposed Draft Plan

2.0 EXISTING TRAFFIC CONDITIONS

2.1 ROAD NETWORK

The MW2 Secondary Plan Area is bounded by Chinguacousy Road, Mayfield Road, Hurontario Road/Hwy 10, and the Etobicoke Creek. These roads and the future MW2 internal road network will form the basis of this analysis. They are described as follows:

- Mayfield Road is a regional road which has a two-lane cross-section west of Heart Lake Road with a posted speed of 60 km/h, and has a four-lane cross-section east of Heart Lake Road with a posted speed of 70 km/h;
- McLaughlin Road, is a major arterial road under the jurisdiction of the Town of Caledon with a two-lane cross-section and a posted speed of 60 km/h; and
- Chinguacousy Road is an arterial road under the jurisdiction of the Town of Caledon with a two-lane cross-section and a posted speed of 70 km/h. South of Wanless Drive, the road widens to a four-lane cross-section.

The study area includes the following existing intersections, with the existing lane configurations illustrated in **Figure 2.1**:

- Old School Road and McLaughlin Road;
- Mayfield Road and Chinguacousy Road; and
- Mayfield Road and McLaughlin Road.

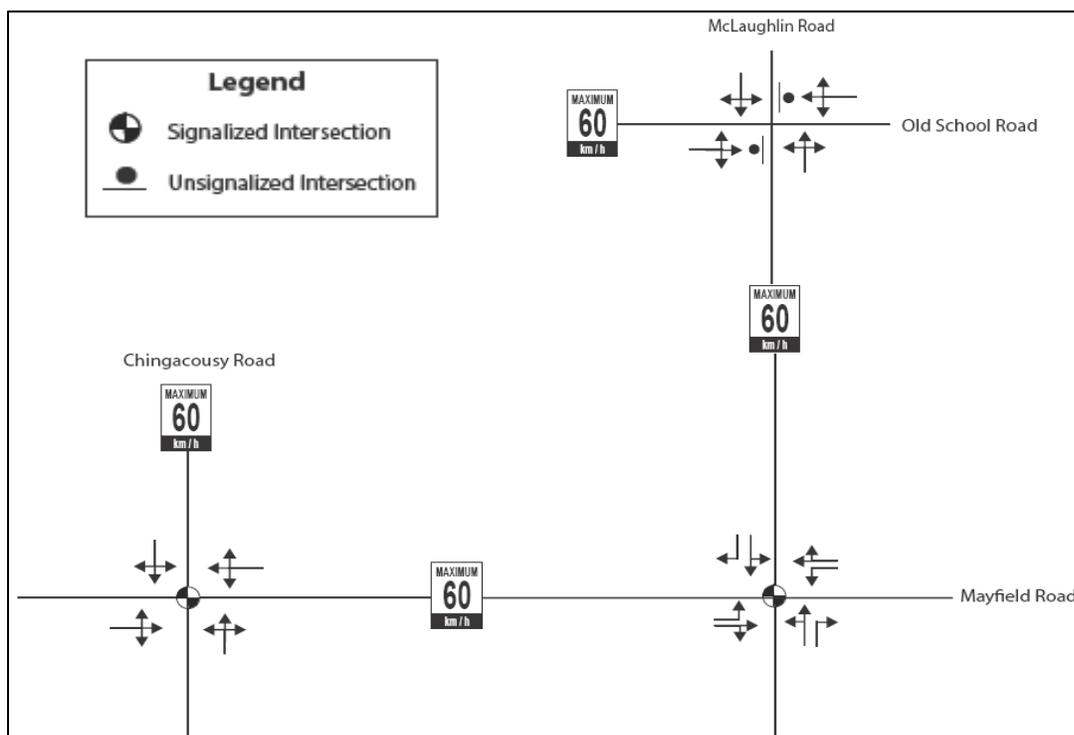


Figure 2.1: Existing Lane Configurations

2.2 TRANSIT

The study area is currently serviced by the Brampton Transit route 24, which extends north of Mayfield Road on Robertson Davies Drive, and loops back south on Hurontario Street via Collingwood Avenue. Additionally, GO Transit operates the Orangeville-Brampton GO Bus along Hurontario Street/Hwy 10, with a stop at Heart Lake Town Centre. The extent of this coverage is illustrated in **Figure 2.2**.

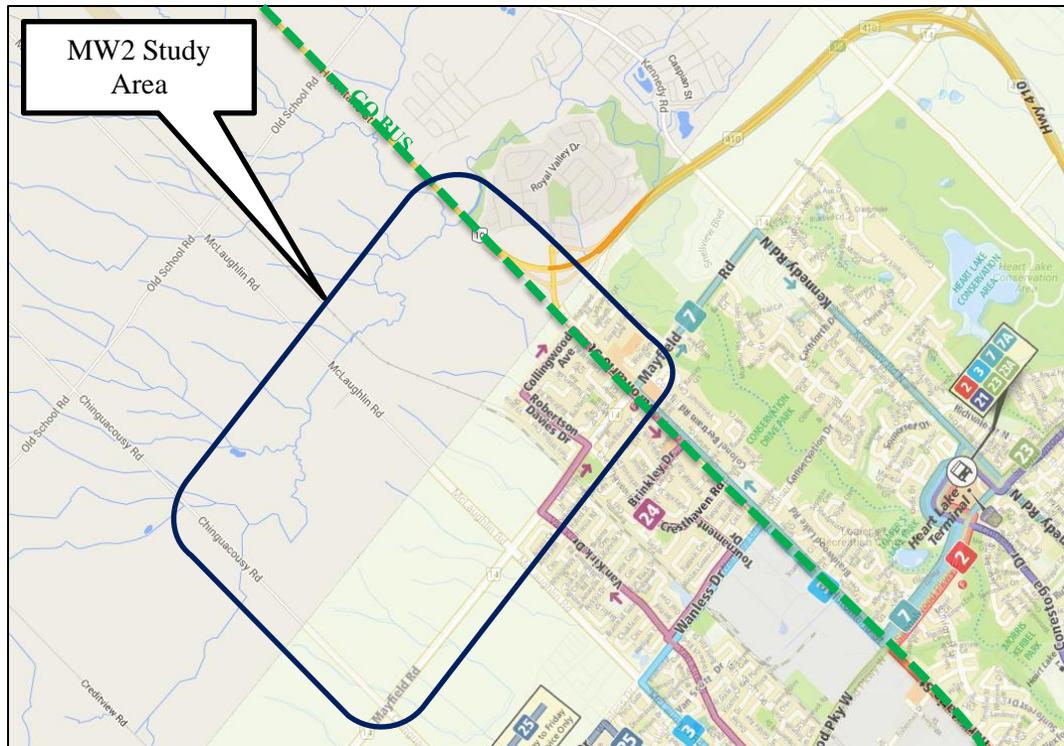


Figure 2.2: Existing Transit Services

2.3 INTERSECTION CAPACITY ANALYSIS

As part of the supplemental work to the MW2 TMP, LEA collected updated turning movement counts (TMC) and produced a comprehensive analysis of existing travel patterns in the extended study area of that study. Intersection capacity analyses at the signalized intersections within the extended study area of that work had demonstrated that there is some residual capacity in the study area road network around MW2.

The 2016 traffic volumes at the intersections within the existing study area of this study are presented in **Figure 2.3**.

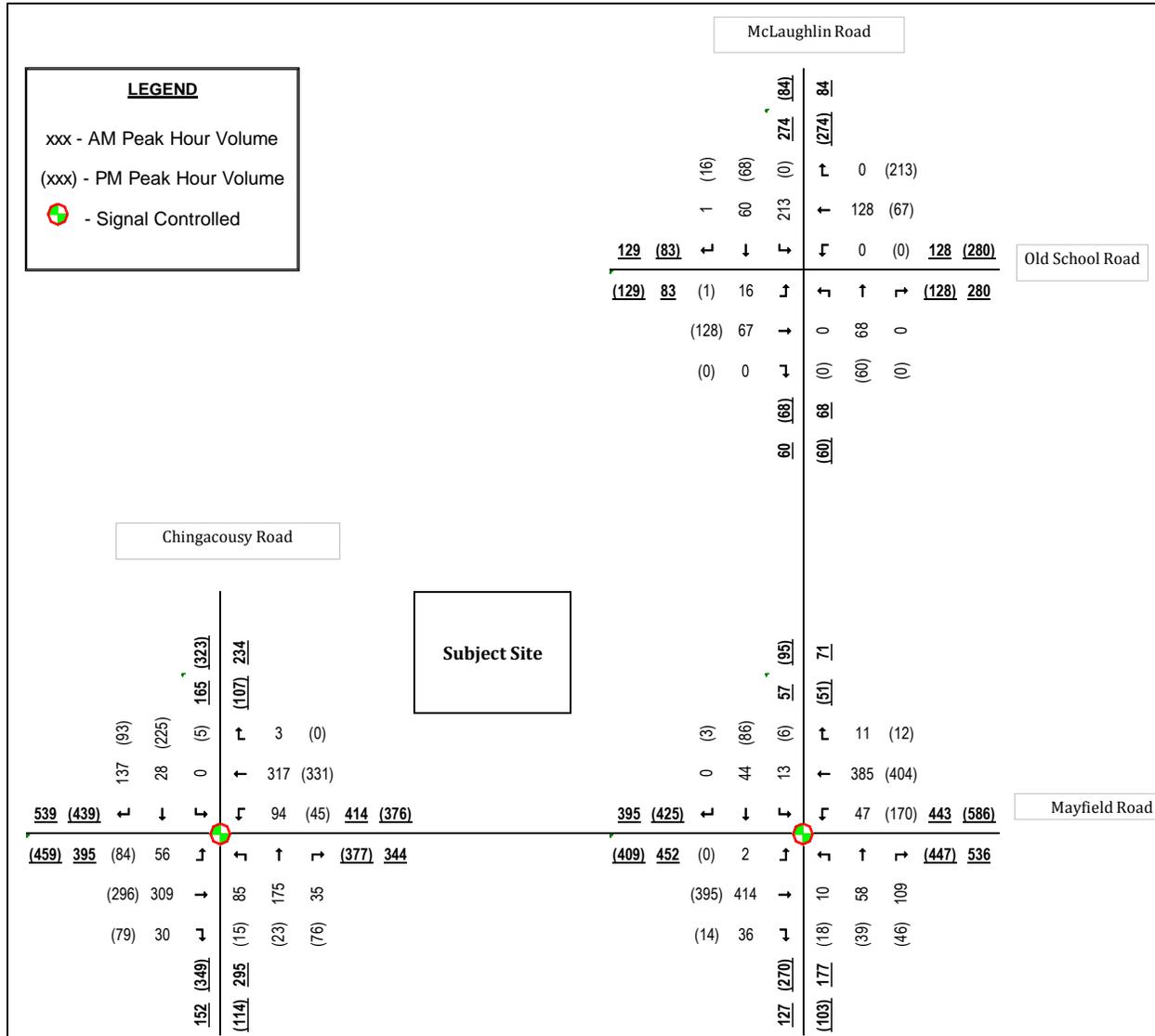


Figure 2.3: Existing Traffic Volumes

Intersection capacity analyses were undertaken for the signalized Chinguacousy/Mayfield and McLaughlin/Mayfield intersections, as the two intersections most likely to be affected by development of the Lormel JV Lands, with the movements of interest (movements with either a volume-to-capacity (v/c) ratio of 0.85 and higher or a level of service (LOS) of D and higher) summarized in **Table 2.1**. Detailed capacity analysis outputs are provided in **Appendix A**.

Intersection	AM Peak Hour								
	Overall			Movement	V/C	Delay (s)	LOS	Queue (m)	
	V/C	Delay (s)	LOS					50th	95th
Chinguacousy Rd & Mayfield Rd	0.57	38	D	WBLTR	0.86	60	E	70	96
McLaughlin Rd & Mayfield Rd	0.32	18	B	-	-	-	-	-	-
Intersection	PM Peak Hour								
	Overall			Movement	V/C	Delay (s)	LOS	Queue (m)	
	V/C	Delay (s)	LOS					50th	95th
Chinguacousy Rd & Mayfield Rd	0.56	37	D	-	-	-	-	-	-
McLaughlin Rd & Mayfield Rd	0.34	18	B	-	-	-	-	-	-

Table 2.1: Existing Signalized Intersection LOS Summary

During both the AM and PM peak hours, the Chinguacousy / Mayfield intersection operates with very good overall level of service (LOS) and with reserve capacity (v/c ratios of below 1.0). We note that the westbound approach may occasionally queue to approximately 70 meters, which is equivalent to approximately 10 vehicles, but these queues clear within one signal cycle. The McLaughlin / Mayfield intersection is observed to operate similarly, with very short overall delays.

These results underscore the significant east-west movement on Mayfield Road through the study area as an established regional travel pattern.

3.0 FUTURE TRAFFIC CONDITIONS

3.1 METHODOLOGICAL APPROACH

In order to ascertain the impacts of developing the subject property, LEA investigated the operation of the MW2 road network under two future total development scenarios:

- 2017 Opening Day: corresponding with the opening day of the Lormel JV (Mayfield West) property before development of the rest of MW2 Stage 1; and
- 2021 Full Build-Out of MW2 Stage 1.

This study generally follows the methodology set out by LEA in its March 2015 *Transportation Assessment Study: Proposed Interchange Modifications & Responses to MTO/Peel Region Comments*, which developed a mesoscopic Aimsun traffic model to test the proposed road network under Stage 1 and Stage 2 development of the MW2 community, and modifications of the Hwy10/Hwy410 interchange. The present methodology refines the MW2 zonal system used in the earlier model, and expands on the trip generation assumptions.

Subsequent to the Aimsun mesoscopic modeling, the key intersections most likely to be affected by the Lormel JV (Mayfield West) development were analyzed in the Synchro 8 intersection capacity analysis software. This analysis follows the methodology of the Highway Capacity Manual 2000, and provides microscopic assessment of operations at signalized and unsignalized intersections. This analysis forms the basis of our assessment of the impacts associated with the development of the Lormel JV (Mayfield West) property.

3.2 ROAD IMPROVEMENTS

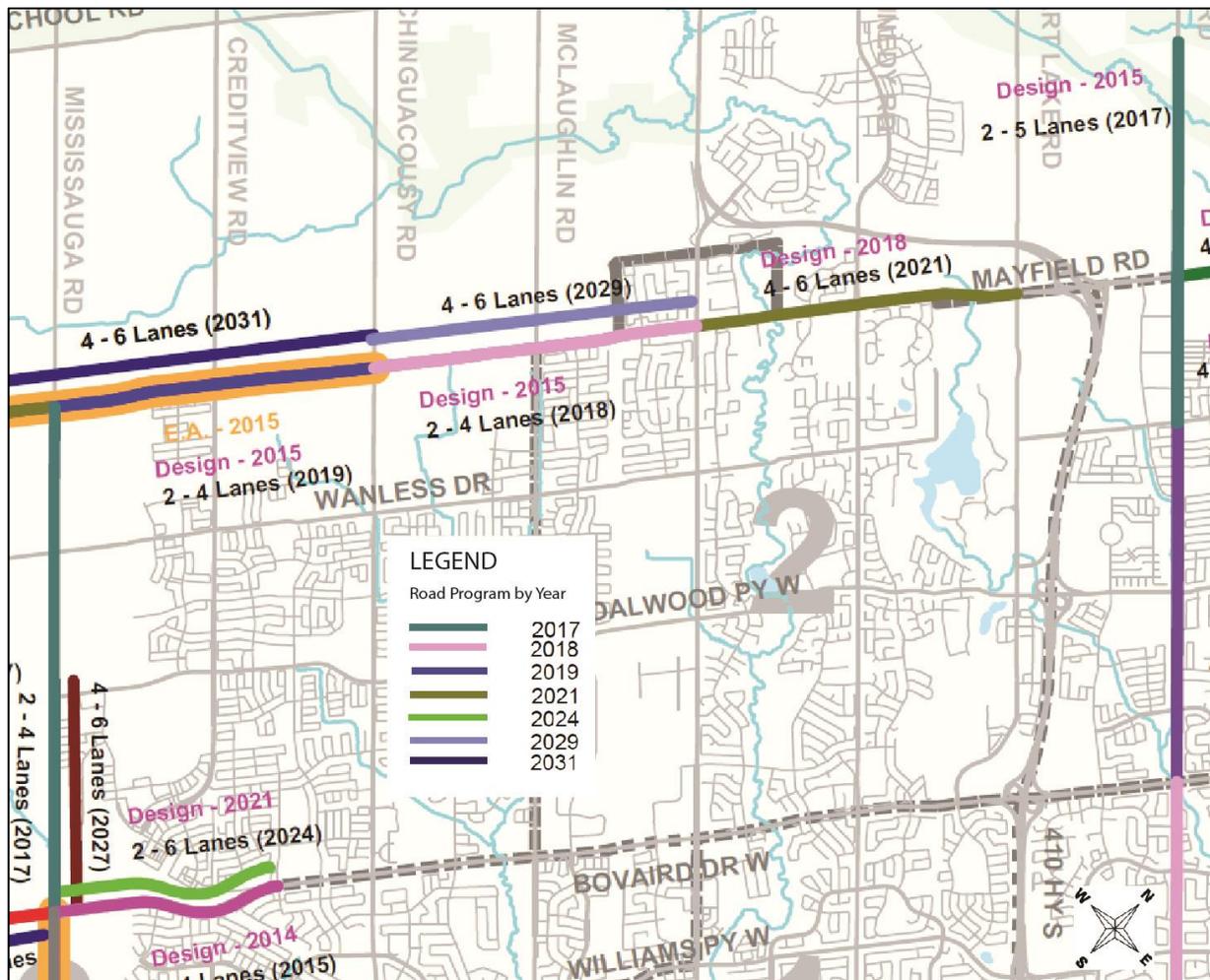
3.2.1 2017 Opening Day

Mayfield Road is currently being widened from two to four lanes between Hurontario Street and McLaughlin Road, and is expected to be completed by 2017.

Currently, the intersection of Chinguacousy Road and Mayfield Road does not have turning lanes. While the intersection capacity analysis may reveal capacity constraints on left and right-turning movements with this existing configuration, it is expected that the introduction of any auxiliary turning lanes would only be carried out as part of the completion of the planned widening of Mayfield Road from Mississauga Road to McLaughlin Road by 2019.

3.2.2 2021 Full Build-Out of MW2 Stage 1

Review of planned road improvements suggests that by 2021 Mayfield Road is planned for widening from four to six lanes east of Hurontario Street. At the same time, widening from two to four lanes will continue west of McLaughlin Road to Chinguacousy Road (see **Figure 3.1**).



Source: Region of Peel Funding Program, January 2015

Figure 3.1: Planned Road Improvements

The timing of an additional widening planned for *Chinguacousy Road* from two to four lanes between Wanless Drive and Mayfield Road is unknown at this time but has been assumed to be completed by 2021. While an Environmental Assessment (EA) process has been recommended for the future widening of Chinguacousy Road north of Mayfield Road to The Spine Road, no timeline for that study has been put forth to-date, due to uncertainty of future development on the west side of the road. This present analysis has therefore left out future widening of Chinguacousy Road north of Mayfield Road.

LEA's March 2015 supplemental work to the MW2 TMP assumed that the proposed east-west The Spine Road through the MW2 community would terminate at an intersection with Hurontario Street/Hwy 10 and the Highway 410 interchange. A design concept for that intersection was produced (see **Figure 3.2**). The present analysis has been carried out under the assumption that this intersection would be completed by the 2021 horizon year.

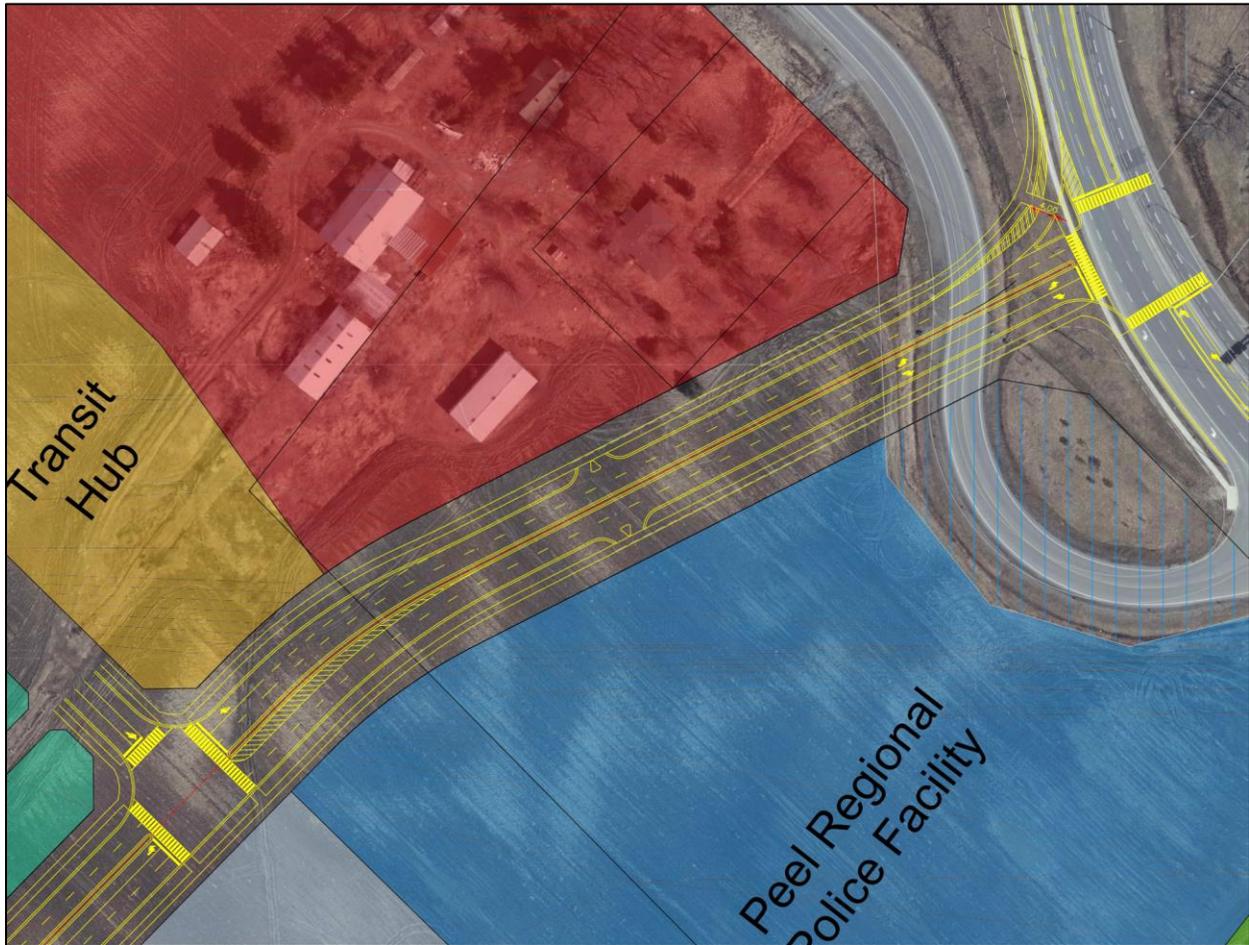


Figure 3.2: Conceptual Spine Road Intersection (2021)

3.3 SITE TRIP GENERATION

3.3.1 Residential Trip Generation

While consistent with LEA's March 2015 supplemental modeling work, this present study deviates from the earlier methodology in that the trip generation is consistent with the trip forecasts presented by Paradigm Consulting in their MW2 TMP.

LEA's March 2015 analysis was based on Peel Region's Regional EMME transportation model. That model uses population and employment forecasts to estimate existing and future travel demand across the Greater Toronto Area (GTA). The model is calibrated to the 2011 Transportation Tomorrow Survey (TTS) travel information data, and its replication of existing travel patterns throughout the GTA is well accepted by Peel Region and other public sector authorities like the Ontario Ministry of Transportation (MTO). It was therefore considered to be the most applicable model for regional transportation analysis.

Paradigm's approach to the MW2 TMP relied on trip generation rates for different land uses, as published by the Institute of Transportation Engineers (ITE) Trip Generation Manual. Those trip generation rates are based on a series of surveys conducted regularly across the United States, which report the number of trips generated to the size of the surveyed land use in terms of units, square footage, or number of employees. While they cover a broad range of different land uses and provide an accepted estimate of their trip generation, the ITE rates are subject to travel patterns and behaviour in parts of the United States with a more suburban, auto-centric character. The results of those surveys cover a very wide range, occasionally with very high standard deviations and relatively poor correlations between the size of the land use and its trip generation.

In comparing the two trip forecasting methods, we found that Paradigm's ITE approach overestimates the number of trips generated by MW2, when compared to LEA's regionally-calibrated model. Specifically, the average ITE auto trip generation rates for residential uses are higher than LEA's auto trip production based on population. The trip forecasting produced for the MW2 TMP may therefore be an overestimation of the actual number of trips likely to be produced in the context of Caledon. Nonetheless, for the purposes of this analysis, we have used Paradigm's ITE trip generation approach, as it represents a worst-case scenario. Furthermore, compliance with the MW2 TMP trip generation method will ensure closer correspondence with past and future studies undertaken in the MW2 context.

At the same time, the Aimsun model developed by LEA is a weekday AM peak period model. In order to review operations in a future weekday PM peak hour, the "mirror effect" was assumed for the new trips generated in the afternoon compared to the morning, i.e. where the afternoon traffic takes the opposite route of the morning traffic.

As per Paradigm's methodology in the MW2 TMP, the trip rate from ITE Land Use Code 210 (Single Family Detached) was used. A 5% modal split reduction was also applied, accounting for the typically lower auto mode split observed in Ontario. The trip generation for the Lormel JV property is summarized in **Table 3.1** below.

Land Use		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Detached (200 units)	Trip Rate	0.20	0.60	0.80	0.66	0.39	1.05
	New Trips	40	120	160	131	77	208
	Modal Split (5%)	-2	-6	-8	-6	-4	-10
TOTAL NEW TRIPS		-	38	114	152	125	73

Table 3.1: Trip Forecasts for Lormel JV (Mayfield West)

The proposed development is expected to produce a total of 152 new trips (38 in, 114 out) during the weekday AM peak hour, and 198 new trips (125 in, 73 out) during the weekday PM peak hour.

3.3.2 Commercial Trip Generation for 2021 Full Build-Out Horizon

Since a large commercial development (661,000 ft²) is planned under full build-out of Stage 1, additional volumes were added in the 2021 horizon to the volumes initially forecasted. It is assumed that the “mirror effect” assumption described previously underestimates travel demand in an area with significant commercial activities. The added trips consist of the residual trips between the weekday PM peak hour trip generation produced by Paradigm, and the mirrored weekday AM peak hour trips. These added trips are summarized in **Table 3.2**. They were distributed on the road network under the 2021 scenario according to existing turning movement volumes during the weekday PM peak hour.

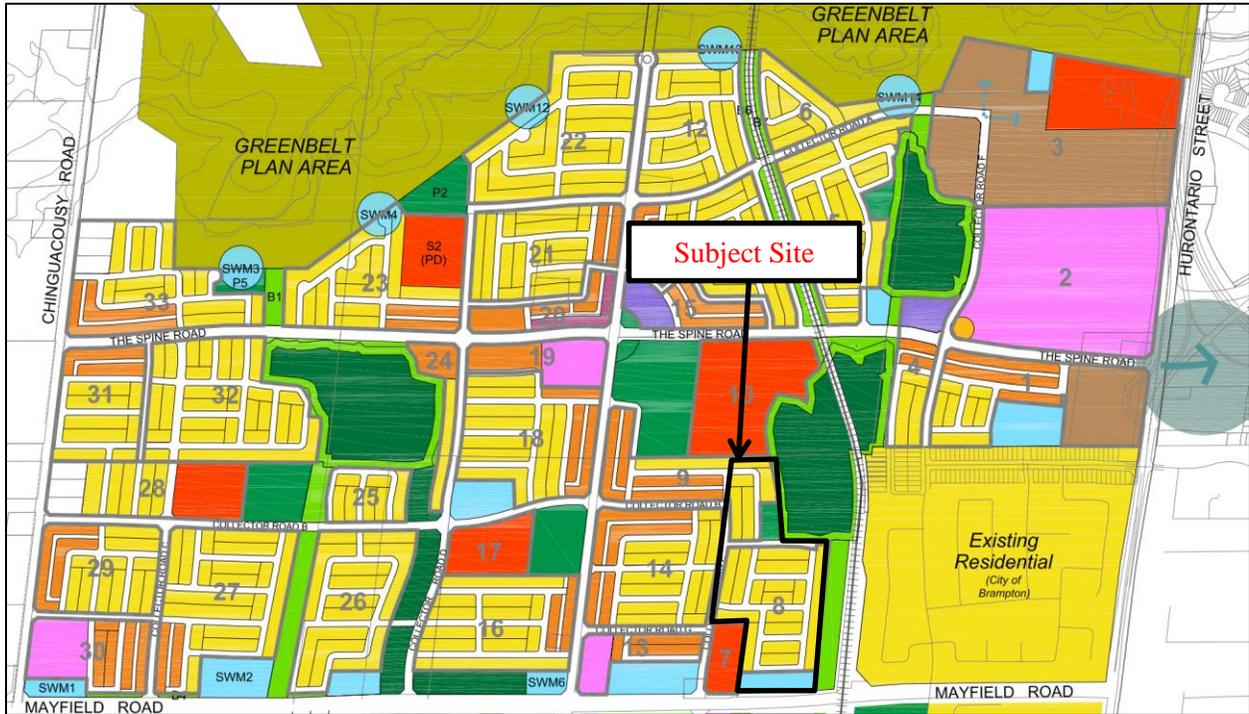
Generator	In	Out	Total
Shopping Centre	401	310	710

Table 3.2: 2021 Commercial Vehicular Trips Generated – PM Peak Hour

The assumptions presented above are considered to be conservative, as the trip generation may overestimate the forecasted travel demand, particularly during the weekday PM peak hour. This overestimation is nonetheless considered acceptable, as it implies assessment of a worst-case scenario.

3.3.3 Zonal System

The model iteration refined for this analysis was developed to assess different development scenarios for MW2. The model’s MW2 area was refined to 33 zones, as per Nak Design’s community plan (see **Figure 3.3**). These zones correspond to the major development blocks, as outlined by the area’s proposed major road network and natural features. The Lormel JV (Mayfield West) subject property is herein represented by zone 8 and a portion of zone 9.



Source: Nak Design, August 29, 2013

Figure 3.3: MW2 Traffic Analysis Zone System

The zonal map illustrated in **Figure 3.3** was prepared on August 29, 2013 utilizing the endorsed Framework Plan. Since then, the Framework Plan and individual draft plans have changed. However, the traffic zones remain consistent with that illustrated in **Figure 3.3**.

3.4 FUTURE TOTAL TRAFFIC CONDITIONS

3.4.1 2017 Opening Day Intersection Capacity Analysis

The Aimsun mesoscopic analysis of the 2017 Opening Day scenario demonstrates that site traffic associated with the development of the Lormel JV (Mayfield West) property will distribute roughly north and south on McLaughlin Road, ultimately destined east on Mayfield Road and south on Hwy 410 (see **Figure 3.4**). This pattern underscores the draw of regional employment centres in Bolton, Brampton, and Mississauga.

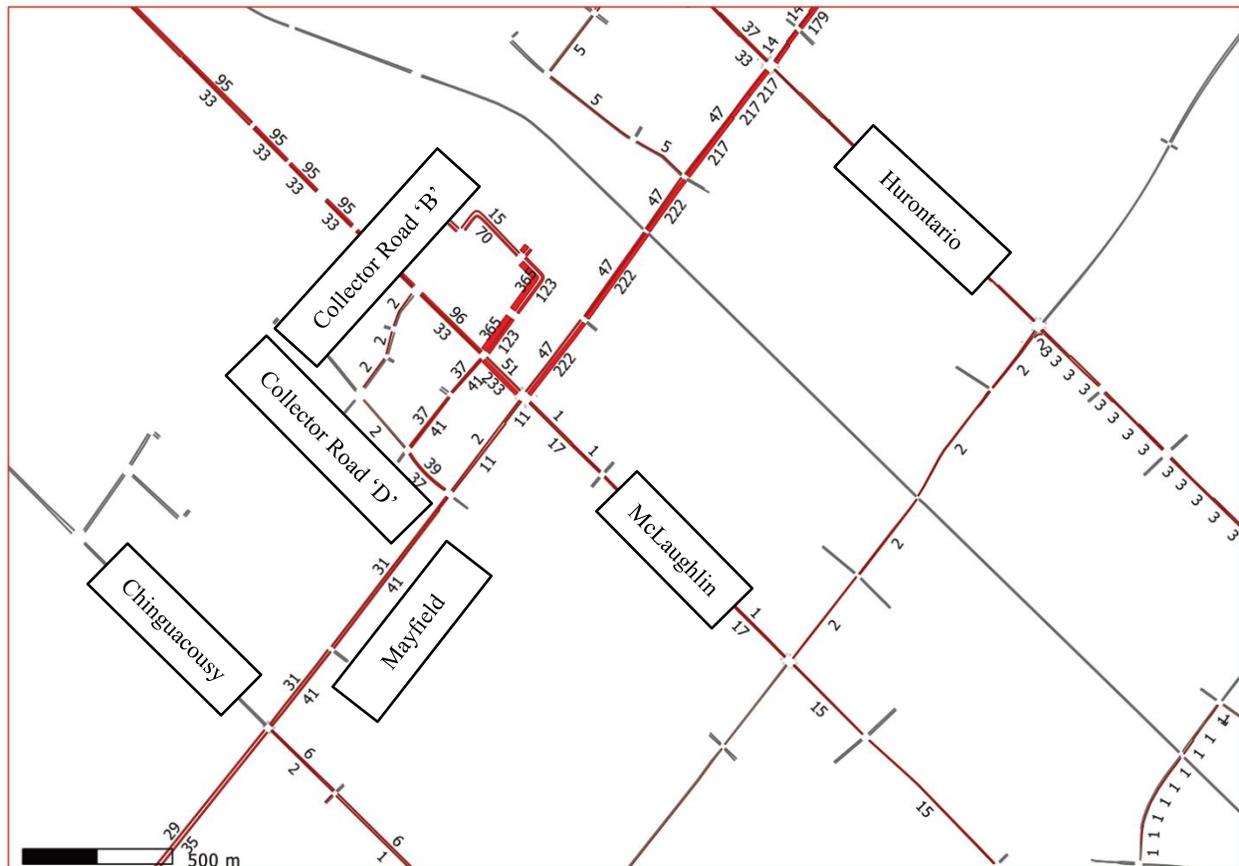


Figure 3.4: Site Trip Assignment – 2017 Opening Day Scenario – Weekday AM Three-Hour Volumes

The trip assignment resulting from the Aimsun Mesoscopic model suggests that impacts associated with the development of Lormel JV (Mayfield West) will be localized along McLaughlin Road and Mayfield Road, with accesses provided via Collector Road 'G'. Synchro capacity analysis will therefore focus on the following intersections:

- Old School Road and McLaughlin Road;
- Mayfield Road and Chinguacousy Road;
- Mayfield Road and McLaughlin Road; and
- McLaughlin Road and Collector Road 'G'.

The lane configurations and traffic volumes at the above-noted intersections under opening day conditions are illustrated in **Figure 3.5** and **Figure 3.6**, respectively.

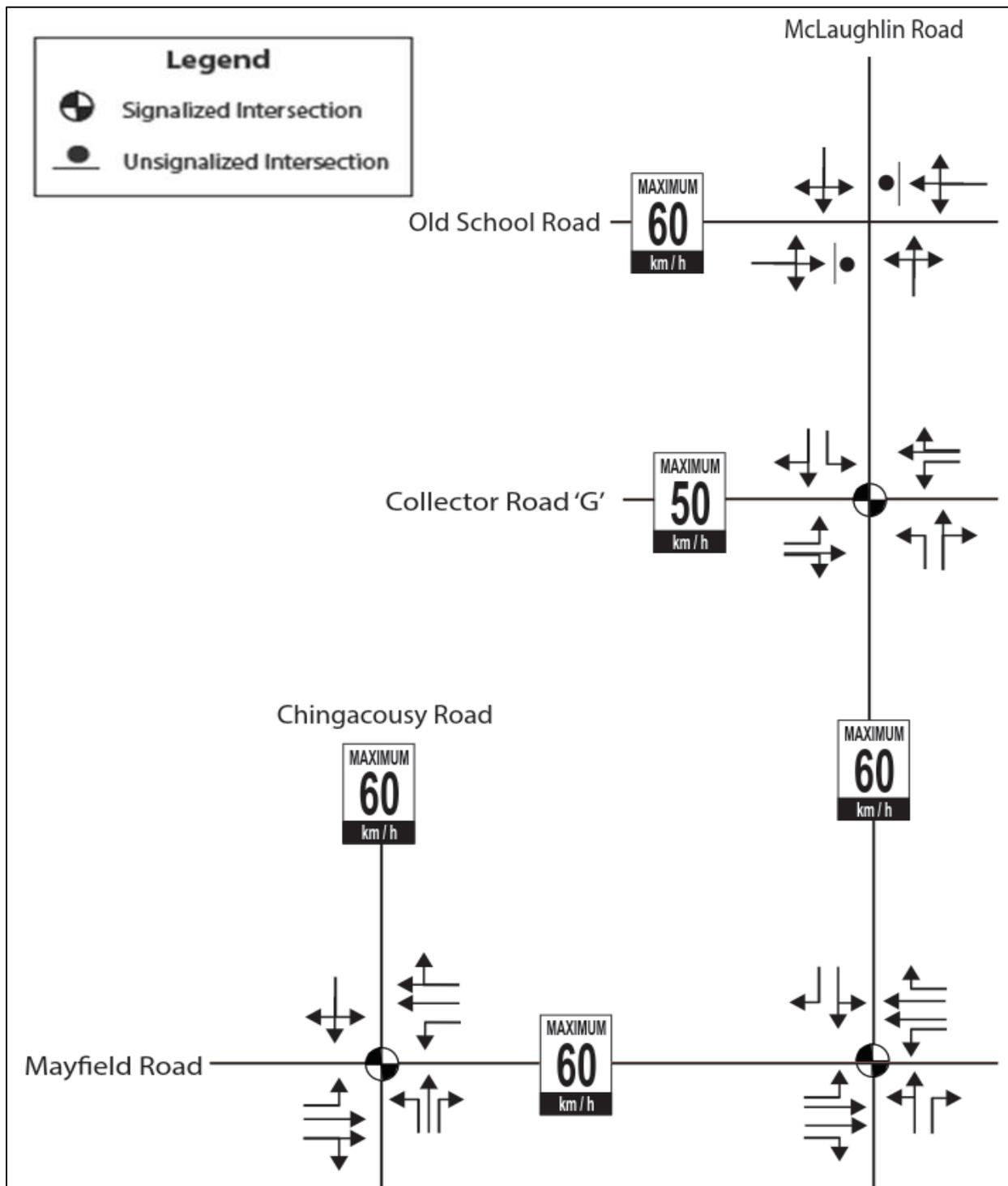


Figure 3.5: 2017 Opening Day Lane Configuration

An intersection capacity analysis was completed for future traffic conditions under the 2017 Opening Day scenario for the AM and PM peak hours, with the movements of interest (movements with either a v/c ratio of 0.85 and higher or a LOS of D and higher) for the signalized and unsignalized intersections summarized in **Table 3.3** and **Table 3.4**, respectively. Detailed outputs are provided in **Appendix B**.

Intersection	Weekday AM Peak Hour								
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Chinguacousy Rd & Mayfield	0.69	34	C	WBLTR	0.84	39	D	85	158
McLaughlin Rd & Mayfield	0.59	93	F	SBTL	1.61	335	F	~159	#222
McLaughlin Rd & Collector Road G	0.35	9	A	-	-	-	-	-	-
Intersection	Weekday PM Peak Hour								
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Chinguacousy Rd & Mayfield	0.68	34	C	-	-	-	-	-	-
McLaughlin Rd & Mayfield	0.44	26	C	WBR	0.24	61	E	29	50
				SBT	0.77	64	E	39	#68
McLaughlin Rd & Collector Road G	0.31	7	A	-	-	-	-	-	-

Table 3.3: 2017 Opening Day Signalized Intersection LOS Summary

Intersection	Movement of Interest	AM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	95th Queue (m)	V/C	LOS
McLaughlin Rd & Old School Rd	EBLTR	184	245	54	41	0.75	F
	WBLTR	120	264	29	17	0.45	D

Table 3.4: 2017 Opening Day Unsignalized Intersection LOS Summary

The analysis demonstrates that all signalized intersections are expected to operate at good to acceptable LOS under the opening day traffic conditions during the AM and PM peak hours with minimal delays with the exception of the southbound through-left movement at the Mayfield/McLaughlin intersection in the AM peak hour.

All unsignalized intersections are also expected to operate at good to acceptable LOS under the opening day traffic conditions during the AM and PM peak hours with minimal delays with the exception of the eastbound approach at the Old School Road/McLaughlin intersection in the AM peak hour. The eastbound approach is expected to experience slightly longer delays.

3.4.2 2017 Opening Day Recommended Intersection Improvements

In order to improve operations at the Mayfield/McLaughlin signalized intersection in the AM peak hour, we recommend optimizing the signal timing plan, which will significantly enhance future operations as shown in **Table 3.6**. Detailed outputs are provided in **Appendix C**.

Intersection	Weekday AM Peak Hour								
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
McLaughlin Rd & Mayfield	0.59	29	C	WBR	0.11	74	E	22	39

Table 3.5: 2017 Signalized Intersection LOS Summary – With Improvements

3.4.3 2017 Opening Day Sensitivity Analysis Intersection Capacity Analysis

According to the Region’s capital works program, Mayfield Road is scheduled to be widened from two to four lanes by 2017 and from four to six lanes by 2021. However, the Region is considering moving directly from two to six lanes by 2021, as discussed during the August 3, 2016 meeting, of which minutes are provided in **Appendix D**.

In light of this information, a sensitivity analysis was conducted to examine the impact of delaying the Mayfield Road lane widening project to 2021, with the reassigned traffic volumes provided in **Figure 3.7**.

The results of the intersection capacity analysis for the signalized and unsignalized intersections are provided in **Table 3.6** and **Table 3.7**, respectively, with the movements of interest (movements with either a v/c ratio of 0.85 and higher or a LOS of D and higher). Detailed outputs are provided in **Appendix E**.

Intersection	Weekday AM Peak Hour								
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Chinguacousy Rd & Mayfield	0.70	35	C	WBLTR	0.84	41	D	95	115
McLaughlin Rd & Mayfield	0.55	91	F	SBTL	1.54	308	F	~151	#214
McLaughlin Rd & Collector Road G	0.34	10	A	-	-	-	-	-	-
Intersection	Weekday PM Peak Hour								
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Chinguacousy Rd & Mayfield	0.72	34	C	-	-	-	-	-	-
McLaughlin Rd & Mayfield	0.36	28	C	WBR	0.23	65	E	31	52
				SBTL	0.77	64	E	37	#63
McLaughlin Rd & Collector Road G	0.10	6	A	-	-	-	-	-	-

Table 3.6: 2017 Opening Day Sensitivity Analysis Signalized Intersection LOS Summary

Intersection	Movement of Interest	AM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	95th Queue (m)	V/C	LOS
McLaughlin Rd & Old School Rd	EBLTR	215	231	87	61	0.93	F
	WBLTR	154	252	39	28	0.61	E

Table 3.7: 2017 Opening Day Sensitivity Analysis Unsignalized Intersection LOS Summary

The analysis demonstrates that the delay in widening Mayfield Road will have minimal impact on the traffic operations for the intersections within the study area as compared to the operations in **Section 3.4.1**. The southbound through movement at the Mayfield/McLaughlin intersection will continue to operate over capacity; however, the recommended improvements provided in **Section 3.4.2** will alleviate capacity issues at this intersection.

		Old School Road						Collector Road 'G'						Chingacousy Road						Mayfield Road						McLaughin Road													
LEGEND xxx - AM Peak Hour Volume (xxx) - PM Peak Hour Volume - Signal Controlled																																							

Figure 3.7: 2017 Opening Day Sensitivity Analysis Traffic Volumes

3.4.4 2021 Full Build-Out of MW2 Stage 1 Intersection Capacity Analysis

Under the 2021 Full Build-Out scenario, Aimsun mesoscopic traffic modeling demonstrates that the travel patterns observed under the 2017 scenario will persist, with some redistribution through MW2. Specifically, a higher proportion of trips destined to Hwy 410 will increasingly use The Spine Road through MW2, where previously they routed north via Old School Road (see **Figure 3.8**).

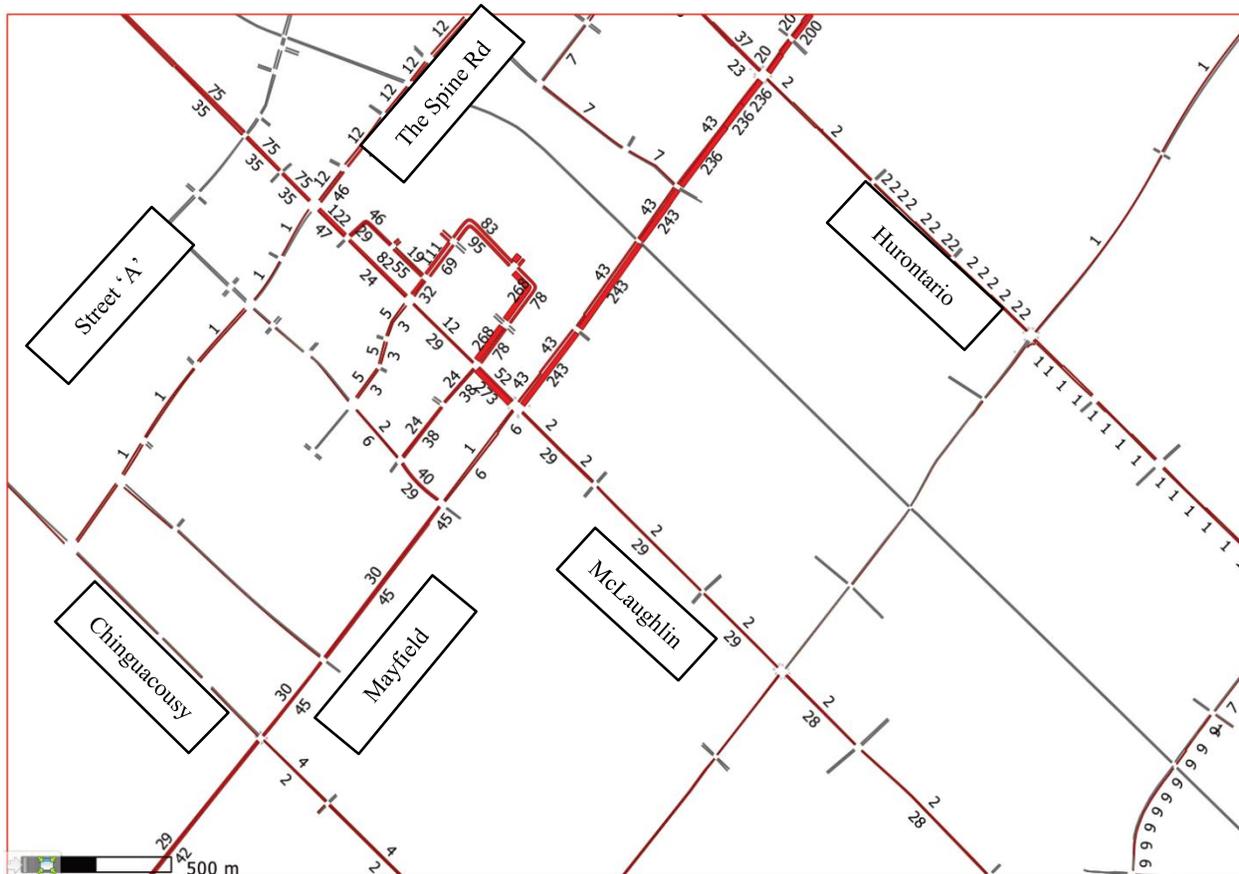


Figure 3.8: Site Trip Assignment – 2021 Full Build-Out Scenario – Weekday AM Three-Hour Volumes

Based on the trip assignment illustrated above, the Synchro intersection capacity analysis for this scenario will assess operations at the following intersections:

- Old School Road and McLaughlin Road;
- Mayfield Road and Chinguacousy Road;
- Mayfield Road and McLaughlin Road;
- Mayfield Road and Hurontario Street;
- Mayfield Road and Robertson Davies Drive;
- McLaughlin Road and Collector Road 'B'; and
- McLaughlin Road and Collector Road 'G'.

The lane configurations and traffic volumes at the above-noted intersections under full build-out conditions are illustrated in **Figure 3.9** and **Figure 3.10**, respectively.

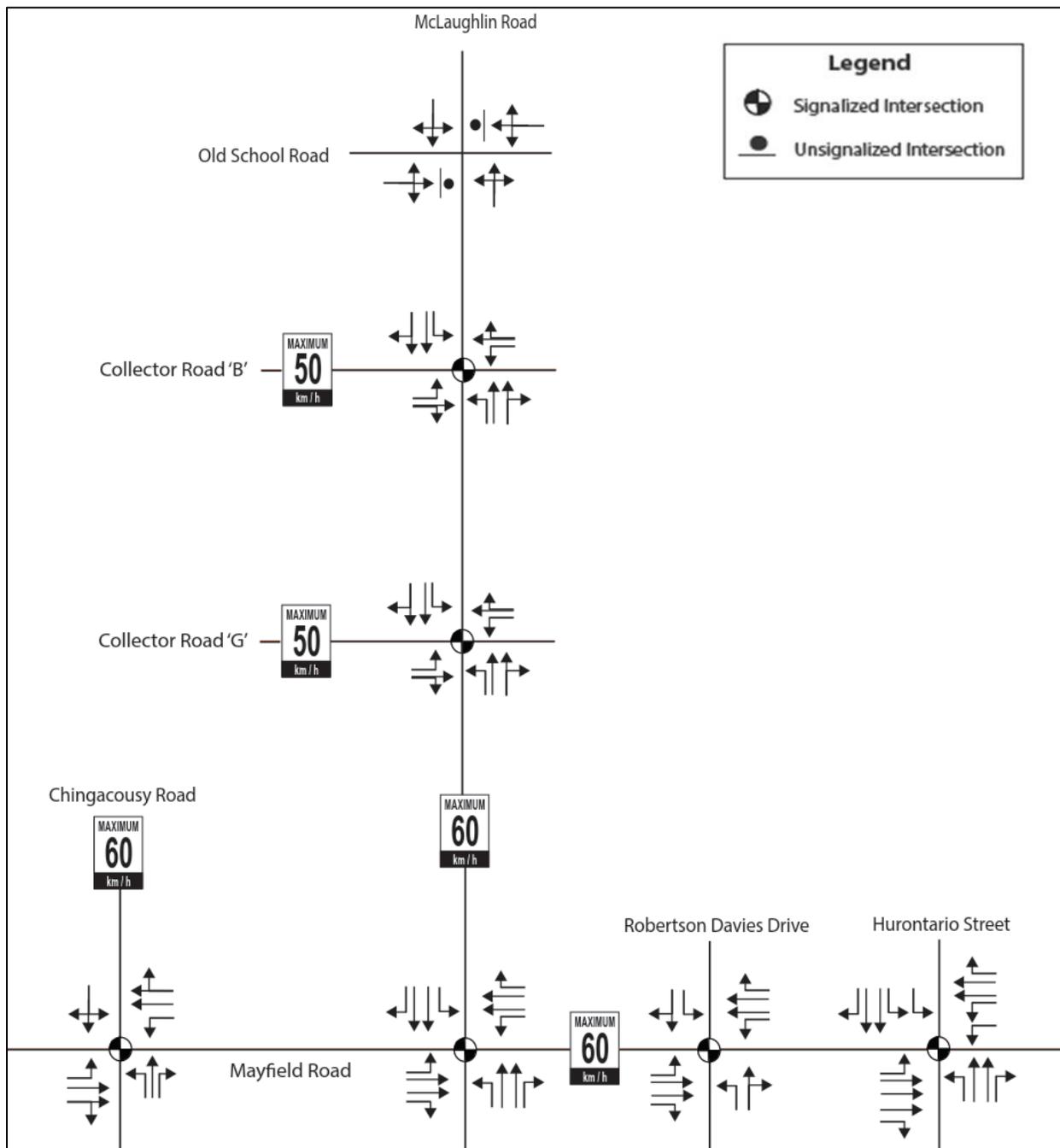


Figure 3.9: 2021 Full Build-Out Lane Configurations

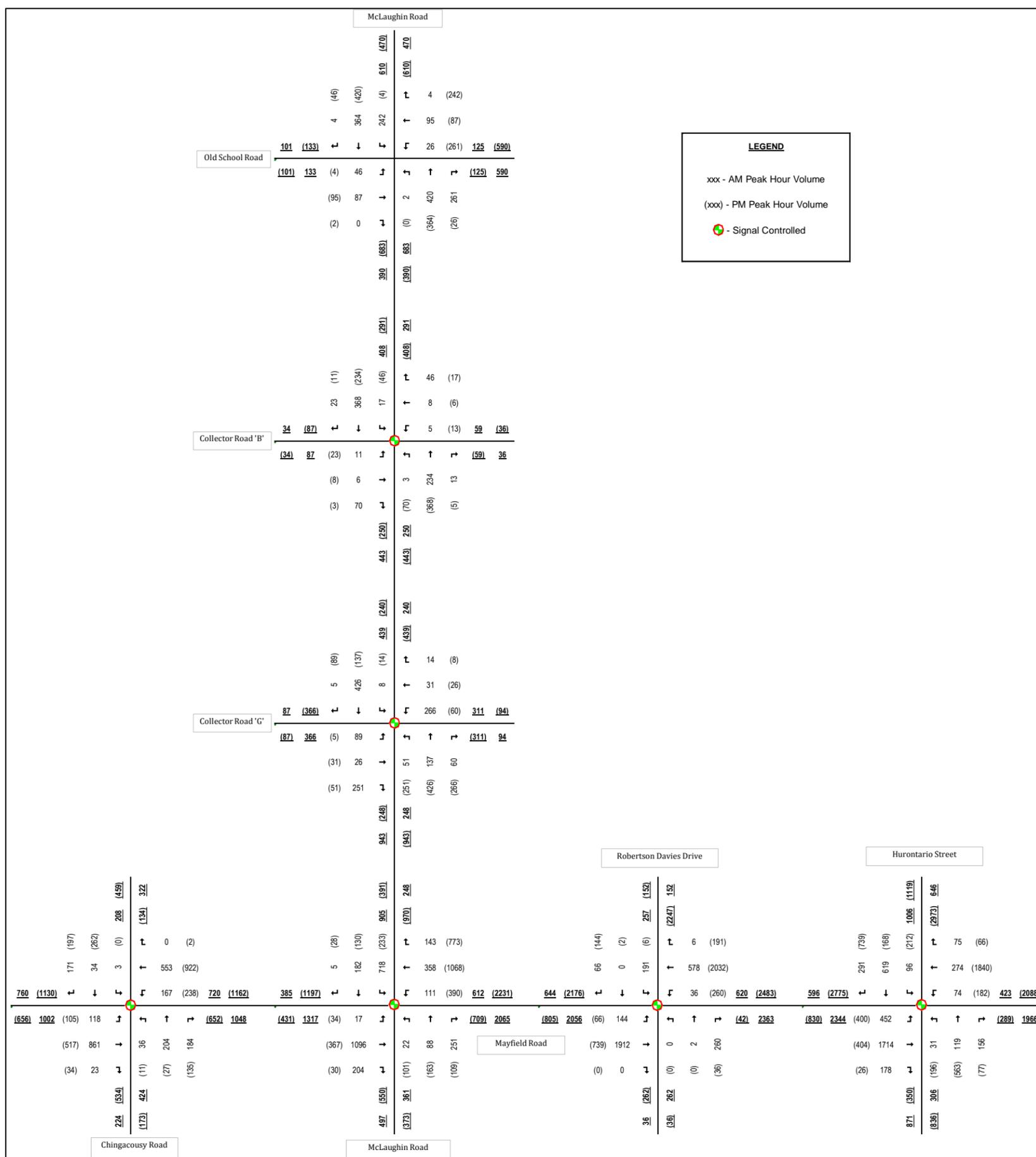


Figure 3.10: 2021 Full Build-Out Traffic Volumes

An intersection capacity analysis was completed for future traffic conditions under the Full Build-Out scenario for the AM and PM peak hours, with the movements of interest (movements with either a v/c ratio of 0.85 and higher or a LOS of D and higher) for the signalized and unsignalized intersections summarized in **Table 3.8** and **Table 3.9**, respectively. Detailed capacity analysis outputs can be found in **Appendix F**.

Intersection	Weekday AM Peak Hour								
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Chinguacousy Rd & Mayfield	0.51	26	C	-	-	-	-	-	-
McLaughlin Rd & Mayfield	0.97	46	D	EBT	0.94	43	D	135	#173
				NBR	0.62	58	E	19	47
				SBL	1.09	94	F	~168	#201
Hurontario St & Mayfield	0.71	26	C	SBL	0.41	69	E	12	21
McLaughlin Rd & Collector Road B	0.13	7	A	-	-	-	-	-	-
Robertson Davies Dr & Mayfield	0.87	23	C	EBT	0.88	18	B	222	m230
				NBT	0.83	67	E	52	#91
McLaughlin Rd & Collector Road G	0.47	11	B	-	-	-	-	-	-
Intersection	Weekday PM Peak Hour								
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Chinguacousy Rd & Mayfield	0.71	32	C	SBLTR	0.86	53	D	94	#133
McLaughlin Rd & Mayfield	0.60	21	C	-	-	-	-	-	-
Hurontario St & Mayfield	1.41	202	F	EBL	1.37	211	F	~112	#179
				WBT	1.75	384	F	~339	#381
				SBL	1.70	402	F	~38	#63
				SBR	0.96	67	E	97	#202
McLaughlin Rd & Collector Road B	0.13	4	A	-	-	-	-	-	-
Robertson Davies Dr & Mayfield	0.83	9	A	EBL	0.87	85	F	12	#44
McLaughlin Rd & Collector Road G	0.34	6	A	-	-	-	-	-	-

Table 3.8: 2021 Full Build-Out Signalized Intersection LOS Summary

The analysis demonstrates that traffic associated with the development of the Lormel JV (Mayfield West) property will be well accommodated on the road network. All signalized intersections are expected to operate at good to acceptable LOS under full build-out traffic conditions during the AM and PM peak hours with the exception of the Mayfield/McLaughlin intersection in the AM peak hour and Hurontario/Mayfield in the PM peak hour, which is the result of the development of the rest of the MW2 area.

Analysis of operations at the unsignalized intersection of Old School/McLaughlin revealed operational issues with future traffic volumes, presented in **Table 3.9**, which is the result of increased north-south through, and east-west left turning volumes as a result of the development of MW2.

Intersection	Movement of Interest	AM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	95th Queue (m)	V/C	LOS
McLaughlin Rd & Old School Rd	EBLTR		34	Err	Err	3.88	F
	WBLTR		0	Err	Err	No Capacity Error	F
Intersection	Movement of Interest	PM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	95th Queue (m)	V/C	LOS
McLaughlin Rd & Old School Rd	EBLTR	101	278	25	12	0.36	D
	WBLTR	590	303	467	314	1.95	F

Table 3.9: 2021 Full Build-Out Unsignalized Intersection LOS Summary

To improve operations at the three above-noted intersections under full build-out traffic conditions, intersection improvements have been recommended and their impacts have been analysed in **Section 3.4.5** below.

3.4.5 2021 Full Build-Out Recommended Intersection Improvements

In order to accommodate the traffic volumes associated with the MW2 development, the following intersection improvements (illustrated in **Figure 3.11**) are recommended:

- McLaughlin Road and Mayfield Road:
 - Signal timing improvement – optimize splits for the AM peak hour to allow for more green time for the north-south approach.
- Hurontario Street and Mayfield Road:
 - Three through lanes, and single exclusive right and left turn lanes for the westbound approach; and
 - Signal timing improvement – change the southbound right turn movement from “Perm” to “pm+ov”.
- McLaughlin Road and Old School Road:
 - Exclusive left turn and shared through-right lanes for the eastbound and westbound approaches;
 - Shared through-right lanes for the northbound and southbound approaches; and
 - Two-way-left-turn lane along McLaughlin Road for this particular intersection to allow for two stage left turns from the east and west approaches.

The westbound approach of the Hurontario/Mayfield intersection is currently operating with two through lanes and a double left-turn lane. However, the traffic volumes for the westbound left turn movement is less than 200 in both AM and PM peak hours but the westbound through movement is almost 2,000 vehicles in the PM peak hour (see **Figure 3.10**). It would be more effective to utilize the second left turn lane as a through lane to accommodate the westbound through traffic during the PM peak hour.

The above-mentioned recommended intersection improvements will significantly enhance future operations as shown in **Table 3.10** (signalized intersections) and **Table 3.11** (unsignalized intersections). Detailed outputs are provided in **Appendix G**.

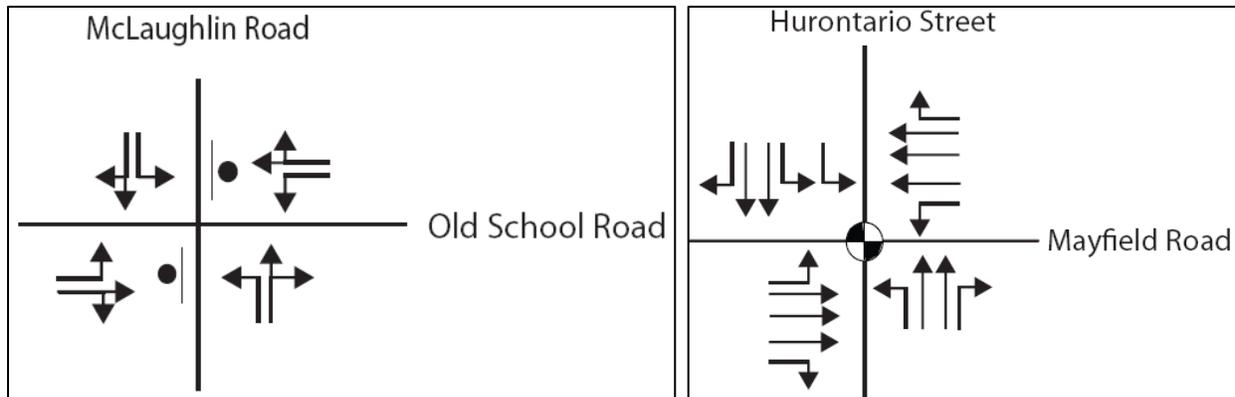


Figure 3.11: 2021 Full Build-Out – With Improvements – Lane Configuration

Intersection	Weekday AM Peak Hour								
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
McLaughlin Rd & Mayfield Rd	0.96	41	D	EBT	0.96	46	D	138	#171
				NBR	0.71	62	E	27	56
				SBL	0.99	61	E	139	#179
Intersection	Weekday PM Peak Hour								
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Hurontario St & Mayfield Rd	1.10	65	E	EBL	1.07	94	F	~90	#150
				WBT	1.08	84	F	~177	#206
				NBL	0.84	75	E	44	#82
				NBT	0.84	58	E	67	#88
				SBL	0.94	99	F	26	#50
				SBR	0.95	51	D	126	#219

Table 3.10: 2021 Signalized Intersection LOS Summary – With Improvements

Intersection	Movement of Interest	AM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	95th Queue (m)	V/C	LOS
McLaughlin Rd & Old School Rd	EBL	46	135	45	11	0.34	E
	EBTR	87	178	43	18	0.49	E
	WBL	26	158	32	4	0.16	D
	WBTR	99	255	28	13	0.39	D
Intersection	Movement of Interest	AM Peak Hour					
		Flow Rate (vph)	Capacity (vph)	Control Delay (s)	95th Queue (m)	V/C	LOS
McLaughlin Rd & Old School Rd	WBL	261	409	28	33	0.64	D

Table 3.11: 2021 Unsignalized Intersection LOS Summary – With Improvements

The recommended improvements will significantly enhance operations at the respective signalized and unsignalized intersections, with all movements operating with more capacity and shorter delays. However, the Hurontario/Mayfield intersection will continue to operate with some capacity constraints at the east-west approaches, which is common along a major corridor in a fully developed area.

4.0 RECOMMENDATIONS

The following section provides recommendations based on information found in the typical standards, MW2 TMP and the Town's Zoning By-law 2006-50.

4.1 ROAD GEOMETRY – INTERNAL ROAD NETWORK

The Aimsun models produced for this analysis are flexible enough that actual road and intersection geometry can be replicated to some extent. While a number of new intersections and planned improvements to existing intersections have been modelled, it is not the scope of this analysis to provide their detailed design. Standard lane widths and turning lane tapers were used in the models, the focus of the analysis being exerted at a large scale.

As part of its scope, the MW2 TMP has broadly addressed the location of new streets and their lane configurations, traffic calming measures to be implemented with new street construction, and a number of active transportation facilities and infrastructure. The MW2 TMP thus addressed Phases 1 and 2 of the Municipal Class Environmental Assessment (MCEA) process. The MW2 TMP identified the need for subsequent MCEA to be undertaken for the construction of The Spine Road, and the widening of McLaughlin Road. Additional details such as sections and profiles will be addressed as part of these more detailed undertakings, and will inform later construction efforts.

The proposed draft plan includes residential units with driveway access along the collector roadways. In our professional opinion, driveways along a collector roadway with low volumes such as Collector Road 'G' will not adversely impact traffic operations along the roadway or create any potential conflicts. The following general road design elements are recommended for collector roadways, which is applicable to Collector Road 'G' within the Lormel JV (Mayfield West) property:

- Two-lane roadways – one lane per direction;
- Exclusive left-turn lanes at arterial intersections – 3.0 meters with provision for a 2.0 meter median island; and
- 1.5 meter wide bike lanes or a 1.5 meter widening to accommodate cycling facilities such as on-road bike lanes or shared lanes.

The following general road design elements are recommended for local roadways, which is applicable to Streets '1', '2', '3', '4' and '5' within the Lormel JV (Mayfield West) property:

- Two-lane roadways – one lane per direction;
- 1.5 meter sidewalks; and
- No provision for cycling facilities.

The recommended lane configurations for the internal road network are illustrated in **Figure 4.1**.

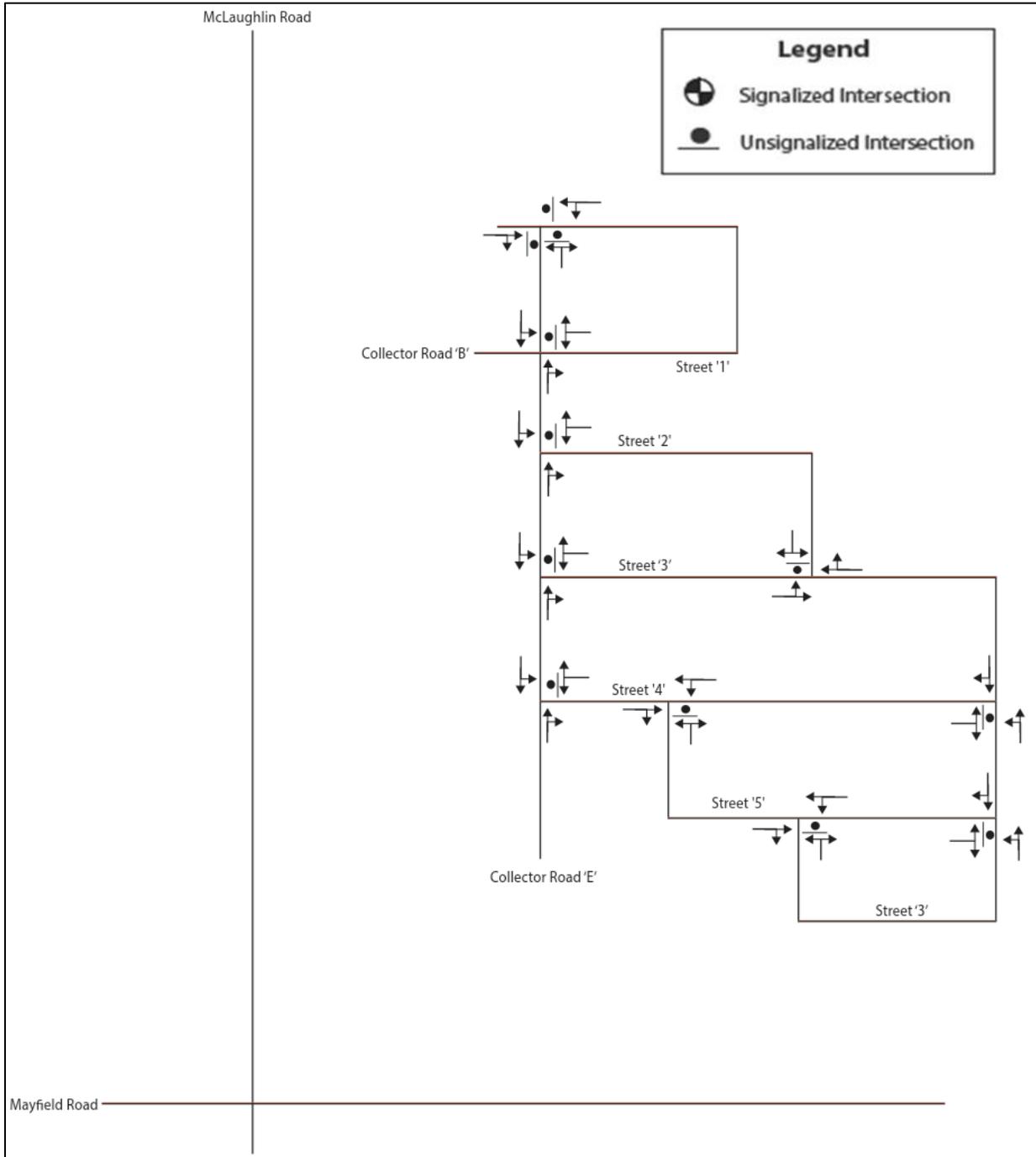


Figure 4.1: Future Internal Lane Configuration

4.2 PARKING

Parking standards and requirements were reviewed as part of the MW2 TMP and a parking strategy was developed to support the proposed parking requirements. The proposed parking requirements were based on the examination and comparison of recommended requirements in other jurisdictions as well as the suggested parking rates contained within the ITE Parking Generation Manual. **Table 4.1** compares the parking requirements from the existing Town of Caledon Zoning By-law 2006-50 and the minimum requirements proposed in the MW2 TMP.

Land Use Description	Existing Town of Caledon Zoning By-law 2006-50	TMP Proposed Minimum Parking Standard
Detached and Semi-Detached	2.00 spaces per unit, plus an additional 0.25 visitor spaces per unit for townhomes	2.00 spaces per dwelling unit
Street Townhomes		2.00 spaces per dwelling unit and 2.00 on-street spaces per dwelling unit
Multiple Family: Bachelor/1 Bedroom	1.50 spaces per unit plus 0.25 visitor spaces per unit to be provided in a designated visitor area	1.00 space per dwelling unit
2+ Bedrooms		1.50 spaces per dwelling unit
Visitor Parking		0.25 spaces per dwelling unit to be provided in a designated on-site visitor parking area

Source: MW2 TMP, October 2015

Table 4.1: Proposed Minimum Parking Standards for Residential Uses

The proposed development includes approximately 200 single-detached residential units. The required parking for is summarized in **Table 4.2**.

Use	Units	Parking Rate	Required Number of Parking Spaces
Single Detached	200	2.0	400
Total Overall Parking Requirement			400

Table 4.2: Required Minimum Parking Requirement for the Proposed Development

Based on the proposed parking standards extracted from the MW2 TMP, the proposed development would be required to provide a total of 400 parking spaces that can be satisfied with a garage and the driveway space behind the garage for the two spaces per unit requirement.

4.3 TRAFFIC CALMING

Applicable traffic calming and management measures discussed in the MW2 TMP are summarized in **Table 4.3**. The location where traffic calming and management measures are to be applied is dependent on appropriate context and objective of implementation. Implementation objectives discussed in the MW2 TMP include – reducing vehicular speeds, discouraging through traffic, minimizing conflict between street users and improving the neighbourhood environment. One example of where traffic calming measures can be implemented is near a school zone, with the objective of reducing vehicle speed.

Traffic Calming Measure		Local Road	Low-Volume Collector	Other Collector	Arterial
Vertical Deflection	Speed Hump	✓	ⓘ	✗	✗
	Raised Intersection	✗	✗	ⓘ	ⓘ
	Raised Crosswalk	✗	✓	✓	ⓘ
	Sidewalk Extension	✓	✗	✗	✗
Horizontal Deflection	Curb Extension	✓	✓	✓	✓
	Traffic Circle / Mini Roundabout	✓	✓	✗	✗
	Raised Median Island	✗	✓	✓	✓
	Curb Radius Reduction	✓	✓	✓	ⓘ
	On-Street Parking	✓	✓	✓	ⓘ
Obstruction	Directional Closure	✓	ⓘ	✗	✗
	Right-In / Right-Out Island	✓	✓	✓	✓
	Raised Median through Intersection	✗	✓	✓	ⓘ
	Intersection Channelization	✓	✓	ⓘ	ⓘ
Signage <i>(When used primarily for Traffic Calming purposes)</i>	Traffic Calmed Neighbourhood	✓	✓	ⓘ	ⓘ
	Turn Prohibited	ⓘ	ⓘ	ⓘ	ⓘ
	Through Traffic Prohibited	ⓘ	ⓘ	ⓘ	ⓘ
	One-Way	ⓘ	ⓘ	✗	✗
	Maximum Speed	✗	✗	✗	✗
	Stop	✗	✗	✗	✗
	Warning Signs (children playing, school area, etc.)	ⓘ	ⓘ	ⓘ	ⓘ

✓ = Appropriate Measure ⓘ = Use with Caution ✗ = Not Recommended

Source: MW2 TMP, December 2015

Table 4.3: Applicability of Traffic Calming and Management Measures

5.0 CONCLUSIONS AND RECOMMENDATIONS

The Lormel JV (Mayfield West) property, located west of McLaughlin Road and Collector Road 'E', has been analyzed based on the development of approximately 200 single-detached residential units.

Under existing conditions, all signalized and unsignalized intersections in the study area are currently operating with very good overall LOS and reserve capacity during both weekday AM and PM peak hours, with very short overall delays.

Overall, the proposed development is expected to generate a total of 152 new trips (38 in, 114 out) during the weekday AM peak hour, and 198 new trips (125 in, 73 out) during the weekday PM peak hour.

The analyses of future traffic associated with the development of the Lormel JV (Mayfield West) property demonstrates that under the 2017 Opening Day and 2021 Full Build-Out scenario, the key intersections most affected by site traffic will operate at acceptable levels of service during both the weekday AM and PM peak hours.

A sensitivity analysis was conducted to analyze the impact of the delay of the Mayfield Road lane widening on traffic operations under the 2017 Opening Day scenario, which was determined to be minimal.

By 2021, Mayfield Road will be widened to six lanes west of Hurontario Street. The regional growth will quickly use up the increased capacity which is a trend already visible under existing conditions. The further development of MW2 Stage 1 will therefore be met with some capacity constraints on eastbound and westbound movements on Mayfield Road in particular, with indirect impacts to movements to and from MW2. In spite of this, the analysis demonstrates that the traffic associated with the development of the Lormel JV Lands will have minimal impact on the surrounding road network. The site traffic will be accommodated on the road network throughout the development of MW2 Stage 1. The only recommendations are the addition of turning lanes at the Old School/McLaughlin intersection and the conversion of one westbound left turn lane into a through lane at the Hurontario/Mayfield intersection.

APPENDIX A

Intersection Capacity Analysis- Existing Traffic Conditions



HCM Unsignalized Intersection Capacity Analysis
2: McLaughlin Rd & Old School Rd

Existing Traffic Conditions
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		+			+			+			+	
Volume (veh/h)	16	67	0	0	128	0	0	68	0	213	60	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	16	67	0	0	128	0	0	68	0	213	60	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	618	554	60	588	555	68	61			68		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	618	554	60	588	555	68	61			68		
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	82	100	100	66	100	100			86		
cM capacity (veh/h)	266	379	1005	326	379	995	1542			1533		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	83	128	68	274								
Volume Left	16	0	0	213								
Volume Right	0	0	0	1								
cSH	350	379	1542	1533								
Volume to Capacity	0.24	0.34	0.00	0.14								
Queue Length 95th (m)	6.9	11.1	0.0	3.7								
Control Delay (s)	18.4	19.3	0.0	6.3								
Lane LOS	C	C		A								
Approach Delay (s)	18.4	19.3	0.0	6.3								
Approach LOS	C	C										

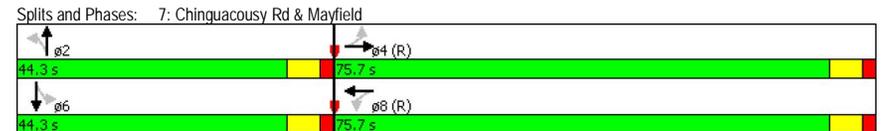
Intersection Summary			
Average Delay		10.3	
Intersection Capacity Utilization	42.8%		ICU Level of Service A
Analysis Period (min)		15	

Queues
7: Chinguacousy Rd & Mayfield

Existing Traffic Conditions
AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations		+		+		+	+
Volume (vph)	56	309	94	317	85	175	28
Lane Group Flow (vph)	0	395	0	414	0	295	165
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases		4		8		2	6
Permitted Phases		4		8		2	6
Detector Phase		4		8		2	6
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Total Split (s)	75.7	75.7	75.7	75.7	44.3	44.3	44.3
Total Split (%)	63.1%	63.1%	63.1%	63.1%	36.9%	36.9%	36.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)		5.6		5.6		5.6	5.6
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Min	C-Min	C-Min	C-Min	Max	Max	Max
v/c Ratio		0.70		0.86		0.36	0.18
Control Delay		36.6		58.6		20.4	5.6
Queue Delay		0.0		0.0		0.0	0.0
Total Delay		36.6		58.6		20.4	5.6
Queue Length 50th (m)		76.6		69.5		38.3	3.1
Queue Length 95th (m)		89.1		96.4		74.6	17.3
Internal Link Dist (m)		999.3		1373.7		1019.2	908.6
Turn Bay Length (m)							
Base Capacity (vph)		865		738		815	902
Starvation Cap Reductn		0		0		0	0
Spillback Cap Reductn		0		0		0	0
Storage Cap Reductn		0		0		0	0
Reduced v/c Ratio		0.46		0.56		0.36	0.18

Intersection Summary	
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated



HCM Signalized Intersection Capacity Analysis
7: Chinguacousy Rd & Mayfield

Existing Traffic Conditions
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Volume (vph)	56	309	30	94	317	3	85	175	35	0	28	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6		5.6		5.6		5.6		5.6	
Lane Util. Factor	1.00		1.00		1.00		1.00		1.00		1.00	
Frt	0.99		1.00		0.98		0.89		1.00		0.89	
Flt Protected	0.99		0.99		0.99		0.99		1.00		1.00	
Satd. Flow (prot)	1696		1693		1768		1589					
Flt Permitted	0.86		0.74		0.86		1.00					
Satd. Flow (perm)	1477		1265		1542		1589					
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	56	309	30	94	317	3	85	175	35	0	28	137
RTOR Reduction (vph)	0	4	0	0	1	0	0	3	0	0	65	0
Lane Group Flow (vph)	0	391	0	0	413	0	0	292	0	0	100	0
Heavy Vehicles (%)	33%	8%	5%	12%	12%	20%	4%	6%	6%	6%	4%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA		NA		NA
Protected Phases	4		8		2		2		6		6	
Permitted Phases	4		8		2		2		6		6	
Actuated Green, G (s)	44.6		44.6		62.2		62.2		62.2		62.2	
Effective Green, g (s)	45.6		45.6		63.2		63.2		63.2		63.2	
Actuated g/C Ratio	0.38		0.38		0.53		0.53		0.53		0.53	
Clearance Time (s)	6.6		6.6		6.6		6.6		6.6		6.6	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	561		480		812		836		836		836	
v/s Ratio Prot	0.26		c0.33		c0.19		0.06		0.06		0.06	
v/c Ratio	0.70		0.86		0.36		0.12		0.12		0.12	
Uniform Delay, d1	31.4		34.3		16.6		14.3		14.3		14.3	
Progression Factor	1.00		1.24		1.00		1.00		1.00		1.00	
Incremental Delay, d2	7.0		17.8		1.2		0.3		0.3		0.3	
Delay (s)	38.4		60.2		17.8		14.6		14.6		14.6	
Level of Service	D		E		B		B		B		B	
Approach Delay (s)	38.4		60.2		17.8		14.6		14.6		14.6	
Approach LOS	D		E		B		B		B		B	

Intersection Summary

HCM 2000 Control Delay	37.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.2
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues

8: McLaughlin Rd & Mayfield

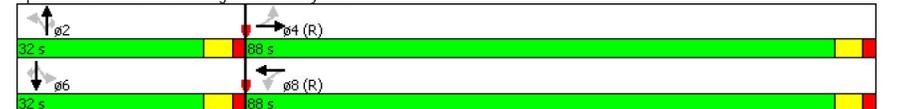
Existing Traffic Conditions
AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	2	414	47	385	10	58	109	13	44	
Lane Group Flow (vph)	2	450	47	396	0	68	109	0	57	
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	
Protected Phases	4		8		2		2		6	
Permitted Phases	4		8		2		2		6	
Detector Phase	4		8		2		2		6	
Switch Phase	4.0		4.0		4.0		4.0		4.0	
Minimum Initial (s)	22.0		22.0		22.0		22.0		22.0	
Minimum Split (s)	22.0		22.0		22.0		22.0		22.0	
Total Split (s)	88.0		88.0		32.0		32.0		32.0	
Total Split (%)	73.3%	73.3%	73.3%	73.3%	26.7%	26.7%	26.7%	26.7%	26.7%	
Yellow Time (s)	4.0		4.0		4.0		4.0		4.0	
All-Red Time (s)	2.0		2.0		2.0		2.0		2.0	
Lost Time Adjust (s)	-1.0		-1.0		-1.0		-1.0		-1.0	
Total Lost Time (s)	5.0		5.0		5.0		5.0		5.0	
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None	
v/c Ratio	0.00	0.31	0.06	0.27	0.42	0.46	0.38	0.38	0.38	
Control Delay	5.5	11.5	6.4	8.3	58.7	15.5	57.5	57.5	57.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	5.5	11.5	6.4	8.3	58.7	15.5	57.5	57.5	57.5	
Queue Length 50th (m)	0.2	78.1	3.0	27.1	15.4	0.0	12.9	12.9	12.9	
Queue Length 95th (m)	m0.0	98.7	10.9	68.4	28.9	16.3	25.5	25.5	25.5	
Internal Link Dist (m)	1373.7		866.8		1234.6		475.2		475.2	
Turn Bay Length (m)	60.0		60.0		30.0		30.0		30.0	
Base Capacity (vph)	770	1468	753	1478	405	431	380	380	380	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.00	0.31	0.06	0.27	0.17	0.25	0.15	0.15	0.15	

Intersection Summary

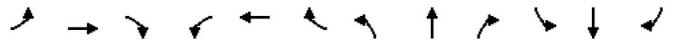
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: McLaughlin Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
8: McLaughlin Rd & Mayfield

Existing Traffic Conditions
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔	↔	↔	↔	↔
Volume (vph)	2	414	36	47	385	11	10	58	109	13	44	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.99		1.00	1.00			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1690	1775		1755	1787			1893	1543		1836	
Flt Permitted	0.52	1.00		0.49	1.00			0.94	1.00		0.91	
Satd. Flow (perm)	932	1775		911	1787			1801	1543		1689	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2	414	36	47	385	11	10	58	109	13	44	0
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	99	0	0	0
Lane Group Flow (vph)	2	449	0	47	395	0	0	68	10	0	57	0
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%	5%	0%	5%	5%	3%	8%
Bus Blockages (#/hr)	0	0	2	0	0	2	0	0	2	0	0	2
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	98.2	98.2		98.2	98.2			9.8	9.8		9.8	
Effective Green, g (s)	99.2	99.2		99.2	99.2			10.8	10.8		10.8	
Actuated g/C Ratio	0.83	0.83		0.83	0.83			0.09	0.09		0.09	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	770	1467		753	1477			162	138		152	
v/s Ratio Prot		c0.25			0.22							
v/s Ratio Perm	0.00			0.05				c0.04	0.01		0.03	
v/c Ratio	0.00	0.31		0.06	0.27			0.42	0.07		0.38	
Uniform Delay, d1	1.8	2.4		1.9	2.3			51.6	50.0		51.4	
Progression Factor	2.32	4.18		2.67	3.06			1.00	1.00		1.00	
Incremental Delay, d2	0.0	0.5		0.2	0.4			1.8	0.2		1.6	
Delay (s)	4.2	10.6		5.2	7.5			53.4	50.2		53.0	
Level of Service	A	B		A	A			D	D		D	
Approach Delay (s)		10.6			7.3			51.4			53.0	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
2: McLaughlin Rd & Old School Rd

Existing Traffic Conditions
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Volume (veh/h)	1	128	0	0	67	213	0	60	0	0	68	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	1	128	0	0	67	213	0	60	0	0	68	16
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	382	136	76	200	144	60	84			60		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	382	136	76	200	144	60	84			60		
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	83	100	100	91	79	100			100		
cM capacity (veh/h)	423	755	985	660	747	1005	1513			1544		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	129	280	60	84								
Volume Left	1	0	0	0								
Volume Right	0	213	0	16								
cSH	750	929	1513	1544								
Volume to Capacity	0.17	0.30	0.00	0.00								
Queue Length 95th (m)	4.7	9.7	0.0	0.0								
Control Delay (s)	10.8	10.5	0.0	0.0								
Lane LOS	B	B										
Approach Delay (s)	10.8	10.5	0.0	0.0								
Approach LOS	B	B										

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
7: Chinguacousy Rd & Mayfield

Existing Traffic Conditions
PM Peak Hour

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Volume (vph)	84	296	45	331	15	23	5	225
Lane Group Flow (vph)	0	459	0	376	0	114	0	323
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Total Split (s)	88.0	88.0	88.0	88.0	32.0	32.0	32.0	32.0
Total Split (%)	73.3%	73.3%	73.3%	73.3%	26.7%	26.7%	26.7%	26.7%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0		-1.0		-1.0
Total Lost Time (s)		5.6		5.6		5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	C-Min	C-Min	Max	Max	Max	Max
v/c Ratio		0.77		0.57		0.14		0.38
Control Delay		35.9		51.6		9.9		23.5
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		35.9		51.6		9.9		23.5
Queue Length 50th (m)		87.8		90.0		4.6		44.0
Queue Length 95th (m)		93.5		78.4		19.1		87.7
Internal Link Dist (m)		999.3		1373.7		1019.2		908.6
Turn Bay Length (m)								
Base Capacity (vph)		952		1060		790		851
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.48		0.35		0.14		0.38

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated

Splits and Phases: 7: Chinguacousy Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
7: Chinguacousy Rd & Mayfield

Existing Traffic Conditions
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				↔
Volume (vph)	84	296	79	45	331	0	15	23	76	5	225	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6				5.6
Lane Util. Factor		1.00			1.00			1.00				1.00
Frt		0.98			1.00			0.91				0.96
Flt Protected		0.99			0.99			0.99				1.00
Satd. Flow (prot)		1659			1705			1643				1754
Flt Permitted		0.82			0.90			0.94				1.00
Satd. Flow (perm)		1378			1543			1558				1750
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	296	79	45	331	0	15	23	76	5	225	93
RTOR Reduction (vph)	0	12	0	0	0	0	0	39	0	0	8	0
Lane Group Flow (vph)	0	448	0	0	376	0	0	75	0	0	315	0
Heavy Vehicles (%)	33%	8%	5%	12%	12%	20%	4%	6%	6%	6%	4%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		50.0			50.0			56.8			56.8	
Effective Green, g (s)		51.0			51.0			57.8			57.8	
Actuated g/C Ratio		0.42			0.42			0.48			0.48	
Clearance Time (s)		6.6			6.6			6.6			6.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		585			655			750			842	
v/s Ratio Prot												
v/s Ratio Perm		c0.32			0.24			0.05			c0.18	
v/c Ratio		0.76			0.57			0.10			0.37	
Uniform Delay, d1		29.4			26.2			16.9			19.7	
Progression Factor		1.00			1.94			1.00			1.00	
Incremental Delay, d2		9.2			3.5			0.3			1.3	
Delay (s)		38.6			54.5			17.2			20.9	
Level of Service		D			D			B			C	
Approach Delay (s)		38.6			54.5			17.2			20.9	
Approach LOS		D			D			B			C	

Intersection Summary

HCM 2000 Control Delay: 36.9, HCM 2000 Level of Service: D
 HCM 2000 Volume to Capacity ratio: 0.56
 Actuated Cycle Length (s): 120.0, Sum of lost time (s): 11.2
 Intersection Capacity Utilization: 66.5%, ICU Level of Service: C
 Analysis Period (min): 15
 c Critical Lane Group

Queues
8: McLaughlin Rd & Mayfield

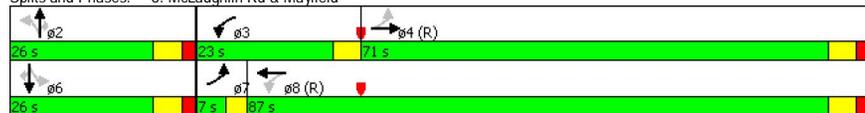
Existing Traffic Conditions
PM Peak Hour

Lane Group	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR	ø7
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	395	170	404	18	39	46	6	86	3	
Lane Group Flow (vph)	409	170	416	0	57	46	0	92	3	
Turn Type	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	4	3	8		2		6		6	7
Permitted Phases		8		2		2	6		6	
Detector Phase	4	3	8	2	2	2	6	6	6	
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	10.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	7.0
Total Split (s)	71.0	23.0	87.0	26.0	26.0	26.0	26.0	26.0	26.0	7.0
Total Split (%)	59.2%	19.2%	72.5%	21.7%	21.7%	21.7%	21.7%	21.7%	21.7%	6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	2.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.0	3.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lead	Lag							Lead
Lead-Lag Optimize?	Yes	Yes	Yes							Yes
Recall Mode	C-Max	None	C-Max	None	None	None	None	None	None	None
v/c Ratio	0.32	0.21	0.29		0.34	0.19		0.49	0.01	
Control Delay	8.6	10.3	14.7		54.4	2.4		59.2	0.0	
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	8.6	10.3	14.7		54.4	2.4		59.2	0.0	
Queue Length 50th (m)	54.6	27.0	80.2		12.7	0.0		20.8	0.0	
Queue Length 95th (m)	82.7	48.6	106.9		25.0	1.0		36.1	0.0	
Internal Link Dist (m)	1373.7		866.8		1234.6			159.7		
Turn Bay Length (m)		85.0				80.0				
Base Capacity (vph)	1279	874	1456		288	345		319	337	
Starvation Cap Reductn	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.32	0.19	0.29		0.20	0.13		0.29	0.01	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated

Splits and Phases: 8: McLaughlin Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
8: McLaughlin Rd & Mayfield

Existing Traffic Conditions
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	0	395	14	170	404	12	18	39	46	6	86	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		3.0	5.0			5.0	5.0		5.0	5.0
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt		0.99		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected		1.00		0.95	1.00			0.98	1.00		1.00	1.00
Satd. Flow (prot)		1787		1755	1787			1862	1543		1857	1500
Flt Permitted		1.00		0.48	1.00			0.87	1.00		0.98	1.00
Satd. Flow (perm)		1787		877	1787			1649	1543		1823	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	395	14	170	404	12	18	39	46	6	86	3
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	41	0	0	3
Lane Group Flow (vph)	0	408	0	170	415	0	0	57	5	0	92	0
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%	5%	0%	5%	5%	3%	8%
Bus Blockages (#/hr)	0	0	2	0	0	2	0	0	2	0	0	2
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		84.9		96.7	96.7			11.3	11.3		11.3	11.3
Effective Green, g (s)		85.9		97.7	97.7			12.3	12.3		12.3	12.3
Actuated g/C Ratio		0.72		0.81	0.81			0.10	0.10		0.10	0.10
Clearance Time (s)		6.0		4.0	6.0			6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1279		778	1454			169	158		186	153
v/s Ratio Prot		c0.23		0.02	c0.23							
v/s Ratio Perm				0.16				0.03	0.00		c0.05	0.00
v/c Ratio		0.32		0.22	0.29			0.34	0.03		0.49	0.00
Uniform Delay, d1		6.3		2.6	2.7			50.1	48.5		50.9	48.3
Progression Factor		1.14		4.41	4.72			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.6		0.1	0.5			1.2	0.1		2.1	0.0
Delay (s)		7.8		11.7	13.2			51.2	48.6		53.0	48.3
Level of Service		A		B	B			D	D		D	D
Approach Delay (s)		7.8		12.8				50.0			52.8	
Approach LOS		A		B				D			D	

Intersection Summary

HCM 2000 Control Delay: 17.5, HCM 2000 Level of Service: B
 HCM 2000 Volume to Capacity ratio: 0.34
 Actuated Cycle Length (s): 120.0, Sum of lost time (s): 13.0
 Intersection Capacity Utilization: 52.4%, ICU Level of Service: A
 Analysis Period (min): 15
 c Critical Lane Group

APPENDIX B

Intersection Capacity Analysis – 2017 Opening Day Horizon



HCM Unsignalized Intersection Capacity Analysis
2: McLaughlin Rd & Old School Rd

2017 Opening Day Horizon
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		+			+			+				+
Volume (veh/h)	44	140	0	11	106	3	1	180	53	215	112	13
Sign Control		Stop			Stop			Free				Free
Grade		0%			0%			0%				0%
Peak Hour 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
Hourly flow rate (vph)	44	140	0	11	106	3	1	180	53	215	112	13
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	813	784	118	827	764	206	125			233		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	813	784	118	827	764	206	125			233		
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	49	100	93	62	100	100			84		
cM capacity (veh/h)	185	273	933	154	280	834	1462			1335		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	184	120	234	340								
Volume Left	44	11	1	215								
Volume Right	0	3	53	13								
cSH	245	264	1462	1335								
Volume to Capacity	0.75	0.45	0.00	0.16								
Queue Length 95th (m)	40.6	16.9	0.0	4.4								
Control Delay (s)	53.8	29.4	0.0	5.7								
Lane LOS	F	D	A	A								
Approach Delay (s)	53.8	29.4	0.0	5.7								
Approach LOS	F	D										

Intersection Summary

Average Delay	17.5
Intersection Capacity Utilization	57.8%
ICU Level of Service	B
Analysis Period (min)	15

Queues
7: Chingacousy Rd & Mayfield

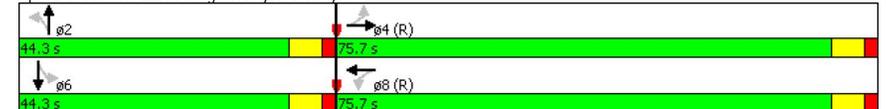
2017 Opening Day Horizon
AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		+		+		+		+
Volume (vph)	107	365	117	385	87	193	56	40
Lane Group Flow (vph)	0	489	0	515	0	340	0	218
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases		4		8		2		6
Detector Phase		4		8		2		6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Total Split (s)	75.7	75.7	75.7	75.7	44.3	44.3	44.3	44.3
Total Split (%)	63.1%	63.1%	63.1%	63.1%	36.9%	36.9%	36.9%	36.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0		-1.0		-1.0
Total Lost Time (s)		5.6		5.6		5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	C-Min	C-Min	Max	Max	Max	Max
v/c Ratio		0.80		0.84		0.52		0.35
Control Delay		35.7		37.9		31.0		21.4
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		35.7		37.9		31.0		21.4
Queue Length 50th (m)		91.9		85.4		57.5		25.2
Queue Length 95th (m)		111.2		157.8		100.9		52.5
Internal Link Dist (m)		999.3		987.4		1019.2		908.6
Turn Bay Length (m)								
Base Capacity (vph)		743		745		655		627
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.66		0.69		0.52		0.35

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 7: Chingacousy Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
7: Chinguacousy Rd & Mayfield

2017 Opening Day Horizon
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Volume (vph)	107	365	17	117	385	13	87	193	60	56	40	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6		5.6		5.6		5.6		5.6	
Lane Util. Factor	1.00		1.00		1.00		1.00		1.00		1.00	
Frt	1.00		1.00		0.98		0.92		0.99		0.92	
Flt Protected	0.99		0.99		0.99		0.99		0.99		0.99	
Satd. Flow (prot)	1668		1687		1755		1643					
Flt Permitted	0.75		0.75		0.86		0.84					
Satd. Flow (perm)	1271		1275		1525		1397					
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	365	17	117	385	13	87	193	60	56	40	122
RTOR Reduction (vph)	0	2	0	0	1	0	0	5	0	0	32	0
Lane Group Flow (vph)	0	487	0	0	514	0	0	335	0	0	186	0
Heavy Vehicles (%)	33%	8%	5%	12%	12%	20%	4%	6%	6%	6%	4%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	4		8		2		2		6		6	
Permitted Phases	4		8		2		2		6		6	
Actuated Green, G (s)	56.6		56.6		50.2		50.2		50.2		50.2	
Effective Green, g (s)	57.6		57.6		51.2		51.2		51.2		51.2	
Actuated g/C Ratio	0.48		0.48		0.43		0.43		0.43		0.43	
Clearance Time (s)	6.6		6.6		6.6		6.6		6.6		6.6	
Vehicle Extension (s)	3.0		3.0		3.0		3.0		3.0		3.0	
Lane Grp Cap (vph)	610		612		650		596					
v/s Ratio Prot	0.38		c0.40		c0.22		0.13					
v/c Ratio	0.80		0.84		0.52		0.31					
Uniform Delay, d1	26.3		27.2		25.3		22.8					
Progression Factor	1.00		0.97		1.00		1.00					
Incremental Delay, d2	10.5		12.7		2.9		1.4					
Delay (s)	36.8		38.9		28.2		24.1					
Level of Service	D		D		C		C					
Approach Delay (s)	36.8		38.9		28.2		24.1					
Approach LOS	D		D		C		C					

Intersection Summary			
HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.2
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
8: McLaughlin Rd & Mayfield

2017 Opening Day Horizon
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	1	604	56	47	386	161	7	63	177	396	75	3
Lane Group Flow (vph)	1	604	56	47	386	161	0	70	177	0	471	3
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	4		8		8		2		2		6	
Permitted Phases	4		8		8		2		2		6	
Detector Phase	4		4		8		8		8		2	
Switch Phase	4		4		4		4		4		4	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	88.0	88.0	88.0	88.0	88.0	88.0	32.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	73.3%	73.3%	73.3%	73.3%	73.3%	73.3%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None	None
v/c Ratio	0.00	0.26	0.05	0.09	0.16	0.15	0.33	0.37			1.60	0.01
Control Delay	8.0	10.2	2.9	12.2	10.8	5.5	44.1	7.8			318.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	8.0	10.2	2.9	12.2	10.8	5.5	44.1	7.8			318.5	0.0
Queue Length 50th (m)	0.1	37.5	1.6	3.7	17.0	3.7	13.9	0.0			-158.8	0.0
Queue Length 95th (m)	m0.2	37.7	4.7	12.2	34.0	21.3	27.9	17.6			#222.0	0.0
Internal Link Dist (m)	72.5		866.8		1234.6		159.7					
Turn Bay Length (m)	60.0	60.0	60.0	60.0	60.0	60.0	30.0	30.0			30.0	30.0
Base Capacity (vph)	643	2359	1074	521	2359	1087	213	484			294	358
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.00	0.26	0.05	0.09	0.16	0.15	0.33	0.37			1.60	0.01

Intersection Summary
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 - Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.



HCM Signalized Intersection Capacity Analysis
8: McLaughlin Rd & Mayfield

2017 Opening Day Horizon
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	1	604	56	47	386	161	7	63	177	396	75	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00
Satd. Flow (prot)	1690	3411	1528	1755	3411	1500	1902	1543	1761	1500	1761	1500
Flt Permitted	0.52	1.00	1.00	0.41	1.00	1.00	0.50	1.00	0.71	1.00	0.71	1.00
Satd. Flow (perm)	931	3411	1528	755	3411	1500	951	1543	1306	1500	1306	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	604	56	47	386	161	7	63	177	396	75	3
RTOR Reduction (vph)	0	0	17	0	0	50	0	0	137	0	0	2
Lane Group Flow (vph)	1	604	39	47	386	111	0	70	40	0	471	1
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%	5%	0%	5%	5%	3%	8%
Bus Blockages (#/hr)	0	0	2	0	0	2	0	0	2	0	0	2
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	82.0	82.0	82.0	82.0	82.0	82.0	26.0	26.0	26.0	26.0	26.0	26.0
Effective Green, g (s)	83.0	83.0	83.0	83.0	83.0	83.0	27.0	27.0	27.0	27.0	27.0	27.0
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.22	0.22	0.22	0.22	0.22	0.22
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	643	2359	1056	522	2359	1037	213	347	293	293	337	337
v/s Ratio Prot		c0.18			0.11							
v/s Ratio Perm	0.00		0.03	0.06		0.07	0.07	0.03		c0.36	0.00	0.00
v/c Ratio	0.00	0.26	0.04	0.09	0.16	0.11	0.33	0.11		1.61	0.00	0.00
Uniform Delay, d1	5.7	6.9	5.9	6.1	6.4	6.2	38.9	37.0		46.5	36.1	36.1
Progression Factor	1.46	1.42	1.77	1.88	1.65	5.59	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.0	0.2	0.1	0.3	0.1	0.2	0.9	0.1		288.8	0.0	0.0
Delay (s)	8.3	10.1	10.4	11.8	10.8	34.6	39.8	37.1		335.3	36.1	36.1
Level of Service	A	B	B	B	B	C	D	D		F	D	D
Approach Delay (s)		10.1			17.3		37.9			333.4		
Approach LOS		B			B		D			F		

Intersection Summary			
HCM 2000 Control Delay	93.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues
69: McLaughlin Rd & Street I/Collector Road G

2017 Opening Day Horizon
AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	24	29	126	30	75	103	22	260
Lane Group Flow (vph)	27	140	140	83	83	170	24	295
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.08	0.28	0.44	0.18	0.13	0.16	0.03	0.26
Control Delay	11.2	5.9	17.3	6.9	7.7	5.4	7.7	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.2	5.9	17.3	6.9	7.7	5.4	7.7	8.0
Queue Length 50th (m)	1.6	1.9	9.0	1.9	2.9	3.9	0.8	11.2
Queue Length 95th (m)	4.8	9.3	17.4	7.6	10.0	13.3	4.2	28.6
Internal Link Dist (m)		106.7		99.7		159.7		291.5
Turn Bay Length (m)	15.0		15.0		20.0		20.0	
Base Capacity (vph)	511	709	486	692	650	1089	729	1120
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.20	0.29	0.12	0.13	0.16	0.03	0.26

Intersection Summary	
Cycle Length:	44
Actuated Cycle Length:	44
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	45
Control Type:	Actuated-Coordinated



HCM Signalized Intersection Capacity Analysis
69: McLaughlin Rd & Street I/Collector Road G

2017 Opening Day Horizon
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Volume (vph)	24	29	97	126	30	45	75	103	50	22	260	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.91		1.00	0.95		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)	1789	1666		1789	1713		1789	1790		1789	1878	
Flt Permitted	0.70	1.00		0.67	1.00		0.58	1.00		0.65	1.00	
Satd. Flow (perm)	1324	1666		1257	1713		1092	1790		1224	1878	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	32	108	140	33	50	83	114	56	24	289	6
RTOR Reduction (vph)	0	83	0	0	39	0	0	25	0	0	1	0
Lane Group Flow (vph)	27	57	0	140	44	0	83	145	0	24	294	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.0	9.0		9.0	9.0		23.0	23.0		23.0	23.0	
Effective Green, g (s)	10.0	10.0		10.0	10.0		24.0	24.0		24.0	24.0	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.55	0.55		0.55	0.55	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	300	378		285	389		595	976		667	1024	
v/s Ratio Prot		0.03			0.03			0.08			0.16	
v/s Ratio Perm	0.02			c0.11			0.08			0.02		
v/c Ratio	0.09	0.15		0.49	0.11		0.14	0.15		0.04	0.29	
Uniform Delay, d1	13.4	13.6		14.8	13.5		4.9	4.9		4.6	5.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.10	1.05	
Incremental Delay, d2	0.1	0.2		1.3	0.1		0.5	0.3		0.1	0.7	
Delay (s)	13.5	13.8		16.1	13.6		5.4	5.3		5.2	6.3	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		13.7			15.2			5.3			6.3	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		9.4										A
HCM 2000 Volume to Capacity ratio		0.35										
Actuated Cycle Length (s)		44.0							10.0			
Intersection Capacity Utilization		49.3%										A
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
2: McLaughlin Rd & Old School Rd

2017 Opening Day Horizon
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	13	106	1	53	140	215	0	112	11	3	180	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	13	106	1	53	140	215	0	112	11	3	180	44
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	610	331	202	380	348	118	224			123		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	610	331	202	380	348	118	224			123		
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	82	100	89	76	77	100			100		
cM capacity (veh/h)	254	587	839	497	575	934	1345			1464		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	120	408	123	227								
Volume Left	13	53	0	3								
Volume Right	1	215	11	44								
cSH	515	703	1345	1464								
Volume to Capacity	0.23	0.58	0.00	0.00								
Queue Length 95th (m)	6.8	28.6	0.0	0.0								
Control Delay (s)	14.1	17.0	0.0	0.1								
Lane LOS	B	C		A								
Approach Delay (s)	14.1	17.0	0.0	0.1								
Approach LOS	B	C										
Intersection Summary												
Average Delay		9.8										
Intersection Capacity Utilization		51.4%						ICU Level of Service				A
Analysis Period (min)		15										

Queues
7: Chinguacousy Rd & Mayfield

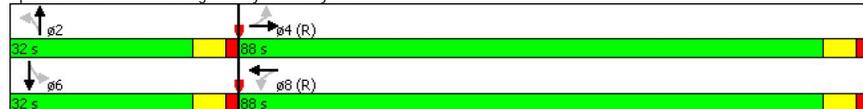
2017 Opening Day Horizon
PM Peak Hour

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Volume (vph)	75	360	78	391	8	32	23	248
Lane Group Flow (vph)	0	516	0	512	0	135	0	449
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases		4		8		2		6
Detector Phase		4		8		2		6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Total Split (s)	88.0	88.0	88.0	88.0	32.0	32.0	32.0	32.0
Total Split (%)	73.3%	73.3%	73.3%	73.3%	26.7%	26.7%	26.7%	26.7%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0		-1.0		-1.0
Total Lost Time (s)		5.6		5.6		5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	C-Min	C-Min	Max	Max	Max	Max
v/c Ratio		0.74		0.75		0.19		0.62
Control Delay		29.3		40.6		11.8		33.6
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		29.3		40.6		11.8		33.6
Queue Length 50th (m)		91.5		103.1		6.1		77.1
Queue Length 95th (m)		90.0		127.1		23.8		#164.8
Internal Link Dist (m)		999.3		983.8		1019.2		908.6
Turn Bay Length (m)								
Base Capacity (vph)		984		964		725		726
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.52		0.53		0.19		0.62

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 7: Chinguacousy Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
7: Chinguacousy Rd & Mayfield

2017 Opening Day Horizon
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				↔
Volume (vph)	75	360	81	78	391	43	8	32	95	23	248	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6				5.6
Lane Util. Factor		1.00			1.00			1.00				1.00
Frt		0.98			0.99			0.91				0.95
Flt Protected		0.99			0.99			1.00				1.00
Satd. Flow (prot)		1679			1673			1637				1716
Flt Permitted		0.84			0.83			0.97				0.98
Satd. Flow (perm)		1425			1400			1595				1688
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	75	360	81	78	391	43	8	32	95	23	248	178
RTOR Reduction (vph)	0	9	0	0	5	0	0	53	0	0	14	0
Lane Group Flow (vph)	0	507	0	0	507	0	0	82	0	0	435	0
Heavy Vehicles (%)	33%	8%	5%	12%	12%	20%	4%	6%	6%	6%	4%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases		4			8			2			6	
Actuated Green, G (s)		57.2			57.2			49.6			49.6	
Effective Green, g (s)		58.2			58.2			50.6			50.6	
Actuated g/C Ratio		0.49			0.49			0.42			0.42	
Clearance Time (s)		6.6			6.6			6.6			6.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		691			679			672			711	
v/s Ratio Prot												
v/s Ratio Perm		0.36			c0.36			0.05			c0.26	
v/c Ratio		0.73			0.75			0.12			0.61	
Uniform Delay, d1		24.7			25.0			21.2			27.0	
Progression Factor		1.00			1.46			1.00			1.00	
Incremental Delay, d2		6.8			6.7			0.4			3.9	
Delay (s)		31.5			43.2			21.5			30.9	
Level of Service		C			D			C			C	
Approach Delay (s)		31.5			43.2			21.5			30.9	
Approach LOS		C			D			C			C	

Intersection Summary

HCM 2000 Control Delay: 34.2, HCM 2000 Level of Service: C
 HCM 2000 Volume to Capacity ratio: 0.68
 Actuated Cycle Length (s): 120.0, Sum of lost time (s): 11.2
 Intersection Capacity Utilization: 78.0%, ICU Level of Service: D
 Analysis Period (min): 15

c Critical Lane Group

Queues
8: McLaughlin Rd & Mayfield

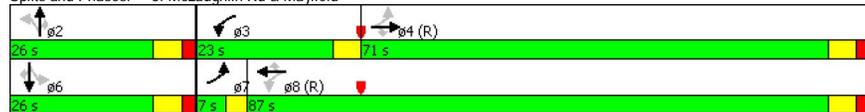
2017 Opening Day Horizon
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	4	396	10	275	589	360	28	67	46	81	93	2
Lane Group Flow (vph)	4	396	10	275	589	360	0	95	46	0	174	2
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2		6		6
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	7.0	22.0	22.0	10.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	7.0	71.0	71.0	23.0	87.0	87.0	26.0	26.0	26.0	26.0	26.0	26.0
Total Split (%)	5.8%	59.2%	59.2%	19.2%	72.5%	72.5%	21.7%	21.7%	21.7%	21.7%	21.7%	21.7%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)	2.0	5.0	5.0	3.0	5.0	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
v/c Ratio	0.01	0.18	0.01	0.35	0.23	0.30		0.44	0.14		0.78	0.01
Control Delay	1.0	2.5	0.0	11.7	12.3	7.7		52.0	1.5		71.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	1.0	2.5	0.0	11.7	12.3	7.7		52.0	1.5		71.4	0.0
Queue Length 50th (m)	0.0	3.5	0.0	38.7	44.6	29.1		20.1	0.0		39.0	0.0
Queue Length 95th (m)	m0.2	5.2	0.0	55.7	59.8	49.8		36.8	1.0		#67.8	0.0
Internal Link Dist (m)		79.0			866.8			1234.6			159.7	
Turn Bay Length (m)	60.0		60.0	60.0		60.0		30.0				30.0
Base Capacity (vph)	586	2175	1007	849	2553	1213		241	345		251	337
Starvation Cap Reductn	0	0	0	0	0	0		0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0		0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0		0	0		0	0
Reduced v/c Ratio	0.01	0.18	0.01	0.32	0.23	0.30		0.39	0.13		0.69	0.01

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: McLaughlin Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
8: McLaughlin Rd & Mayfield

2017 Opening Day Horizon
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	4	396	10	275	589	360	28	67	46	81	93	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.0	5.0	3.0	5.0	5.0		5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	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		0.99	1.00		0.98	1.00
Satd. Flow (prot)	1690	3411	1528	1755	3411	1500		1866	1543		1806	1500
Flt Permitted	0.43	1.00	1.00	0.49	1.00	1.00		0.73	1.00		0.78	1.00
Satd. Flow (perm)	764	3411	1528	913	3411	1500		1379	1543		1437	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Adj. Flow (vph)	4	396	10	275	589	360		28	67		81	93
RTOR Reduction (vph)	0	0	4	0	0	98		0	39		0	2
Lane Group Flow (vph)	4	396	6	275	589	262		95	7		174	0
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%		5%	0%		5%	3%
Bus Blockages (#/hr)	0	0	2	0	0	2		0	2		0	2
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm		Perm	Perm		NA	Perm
Protected Phases	7	4		3	8			2		6		6
Permitted Phases	4		4	8		8		2		6		6
Actuated Green, G (s)	76.3	75.5	75.5	90.2	86.4	86.4		17.8	17.8		17.8	17.8
Effective Green, g (s)	78.3	76.5	76.5	91.2	87.4	87.4		18.8	18.8		18.8	18.8
Actuated g/C Ratio	0.65	0.64	0.64	0.76	0.73	0.73		0.16	0.16		0.16	0.16
Clearance Time (s)	3.0	6.0	6.0	4.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	512	2174	974	775	2484	1092		216	241		225	235
v/s Ratio Prot	0.00	0.12		c0.03	0.17							
v/s Ratio Perm	0.00		0.00	c0.23		0.17		0.07	0.00		c0.12	0.00
v/c Ratio	0.01	0.18	0.01	0.35	0.24	0.24		0.44	0.03		0.77	0.00
Uniform Delay, d1	7.3	8.9	7.9	4.2	5.4	5.4		45.8	42.9		48.6	42.7
Progression Factor	0.28	0.24	1.00	2.72	2.39	11.23		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.2	0.0	0.3	0.2	0.5		1.4	0.1		15.2	0.0
Delay (s)	2.0	2.3	7.9	11.6	13.0	60.8		47.3	42.9		63.7	42.7
Level of Service	A	A	A	B	B	E		D	D		E	D
Approach Delay (s)		2.4			26.7			45.8			63.5	
Approach LOS		A			C			D			E	

Intersection Summary

HCM 2000 Control Delay: 26.3, HCM 2000 Level of Service: C
 HCM 2000 Volume to Capacity ratio: 0.44
 Actuated Cycle Length (s): 120.0, Sum of lost time (s): 13.0
 Intersection Capacity Utilization: 53.9%, ICU Level of Service: A
 Analysis Period (min): 15
 c Critical Lane Group

Queues
69: McLaughlin Rd & Street I

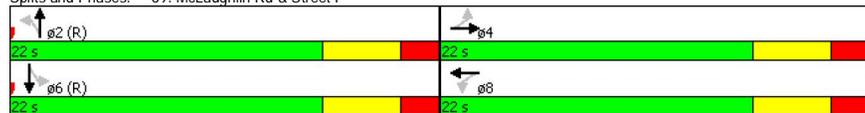
2017 Opening Day Horizon
PM Peak Hour

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Volume (vph)	5	30	50	29	97	260	45	103
Lane Group Flow (vph)	5	105	50	51	97	386	45	127
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases		4		8		2		6
Detector Phase		4		8		2		6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.02	0.28	0.21	0.15	0.10	0.29	0.06	0.09
Control Delay	13.6	8.7	16.5	10.8	4.8	4.5	4.8	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	8.7	16.5	10.8	4.8	4.5	4.8	3.9
Queue Length 50th (m)	0.3	1.9	3.3	1.9	2.7	9.9	1.2	2.8
Queue Length 95th (m)	2.0	9.9	9.1	7.4	8.3	24.4	4.7	8.8
Internal Link Dist (m)		78.9		92.5		159.7		291.5
Turn Bay Length (m)	15.0		15.0		20.0		20.0	
Base Capacity (vph)	527	695	501	693	938	1337	740	1356
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.15	0.10	0.07	0.10	0.29	0.06	0.09

Intersection Summary

Cycle Length: 44
 Actuated Cycle Length: 44
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 69: McLaughlin Rd & Street I



HCM Signalized Intersection Capacity Analysis
69: McLaughlin Rd & Street I

2017 Opening Day Horizon
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	5	30	75	50	29	22	97	260	126	45	103	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.94		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1682		1789	1762		1789	1791		1789	1830	
Flt Permitted	0.72	1.00		0.69	1.00		0.68	1.00		0.53	1.00	
Satd. Flow (perm)	1363	1682		1298	1762		1272	1791		1004	1830	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	30	75	50	29	22	97	260	126	45	103	24
RTOR Reduction (vph)	0	65	0	0	19	0	24	0	0	9	0	0
Lane Group Flow (vph)	5	40	0	50	32	0	97	362	0	45	118	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.0	5.0		5.0	5.0		27.0	27.0		27.0	27.0	
Effective Green, g (s)	6.0	6.0		6.0	6.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.64	0.64		0.64	0.64	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	185	229		177	240		809	1139		638	1164	
v/s Ratio Prot		0.02			0.02			c0.20			0.06	
v/s Ratio Perm	0.00			c0.04			0.08			0.04		
v/c Ratio	0.03	0.18		0.28	0.13		0.12	0.32		0.07	0.10	
Uniform Delay, d1	16.5	16.8		17.1	16.7		3.1	3.6		3.0	3.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Incremental Delay, d2	0.1	0.4		0.9	0.3		0.3	0.7		0.2	0.2	
Delay (s)	16.5	17.2		17.9	17.0		3.5	4.4		3.3	3.3	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		17.2			17.5			4.2			3.3	
Approach LOS		B			B			A			A	

Intersection Summary

HCM 2000 Control Delay: 7.2, HCM 2000 Level of Service: A
 HCM 2000 Volume to Capacity ratio: 0.31
 Actuated Cycle Length (s): 44.0, Sum of lost time (s): 10.0
 Intersection Capacity Utilization: 46.6%, ICU Level of Service: A
 Analysis Period (min): 15

c Critical Lane Group

APPENDIX C

Intersection Capacity Analysis – 2017 Opening Day – With Improvements



Queues
8: McLaughlin Rd & Mayfield

2017 Opening Day Horizon
AM Peak Hour - With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	1	604	56	47	386	161	7	63	177	396	75	3
Lane Group Flow (vph)	1	604	56	47	386	161	0	70	177	0	471	3
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2		2	6	6
Permitted Phases		4	4	4	8	8	2	2	2	6	6	6
Detector Phase		4	4	4	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	42.0	42.0	42.0	42.0	42.0	42.0	78.0	78.0	78.0	78.0	78.0	78.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None	None
v/c Ratio	0.00	0.39	0.08	0.16	0.25	0.21	0.08	0.23		0.77	0.00	
Control Delay	32.0	26.7	11.7	29.1	25.9	17.2	15.0	8.9		34.8	0.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.1	0.0	
Total Delay	32.0	26.7	11.7	29.1	25.9	17.2	15.0	8.9		35.0	0.0	
Queue Length 50th (m)	0.1	57.0	1.1	9.4	41.6	21.6	8.9	12.6		89.5	0.0	
Queue Length 95th (m)	m0.5	87.5	13.0	22.3	60.6	39.0	12.7	19.2		100.1	0.0	
Internal Link Dist (m)		72.5			866.8		1234.6			159.7		
Turn Bay Length (m)	60.0		60.0	60.0		60.0		30.0				30.0
Base Capacity (vph)	393	1538	719	293	1538	764	1112	969		795	923	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		25	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.00	0.39	0.08	0.16	0.25	0.21	0.06	0.18		0.61	0.00	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: McLaughlin Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
8: McLaughlin Rd & Mayfield

2017 Opening Day Horizon
AM Peak Hour - With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	1	604	56	47	386	161	7	63	177	396	75	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00
Satd. Flow (prot)	1690	3411	1528	1755	3411	1500	1902	1543		1761	1500	
Flt Permitted	0.49	1.00	1.00	0.35	1.00	1.00	0.96	1.00		0.71	1.00	
Satd. Flow (perm)	873	3411	1528	650	3411	1500	1829	1543		1306	1500	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	604	56	47	386	161	7	63	177	396	75	3
RTOR Reduction (vph)	0	0	31	0	0	88	0	43	0	0	0	2
Lane Group Flow (vph)	1	604	25	47	386	73	0	70	134	0	471	1
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%	5%	0%	5%	5%	3%	8%
Bus Blockages (#/hr)	0	0	2	0	0	2	0	0	2	0	0	2
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2		2	6	6
Permitted Phases		4	4	8	8	2	2	2	6	6	6	6
Actuated Green, G (s)	53.1	53.1	53.1	53.1	53.1	53.1	54.9	54.9		54.9	54.9	
Effective Green, g (s)	54.1	54.1	54.1	54.1	54.1	54.1	55.9	55.9		55.9	55.9	
Actuated g/C Ratio	0.45	0.45	0.45	0.45	0.45	0.45	0.47	0.47		0.47	0.47	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	393	1537	688	293	1537	676	852	718		608	698	
v/s Ratio Prot		c0.18			0.11							
v/s Ratio Perm	0.00		0.02	0.07		0.05	0.04	0.09		c0.36	0.00	
v/c Ratio	0.00	0.39	0.04	0.16	0.25	0.11	0.08	0.19		0.77	0.00	
Uniform Delay, d1	18.1	22.0	18.4	19.5	20.4	19.0	17.8	18.8		26.8	17.1	
Progression Factor	1.26	1.06	1.59	1.09	1.11	3.88	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.7	0.1	1.2	0.4	0.3	0.0	0.1		6.1	0.0	
Delay (s)	22.9	24.0	29.4	22.3	23.0	74.0	17.8	18.9		32.9	17.1	
Level of Service	C	C	C	C	C	E	B	B		C	B	
Approach Delay (s)		24.4			36.8		18.6			32.8		
Approach LOS		C			D		B			C		

Intersection Summary

HCM 2000 Control Delay: 29.4, HCM 2000 Level of Service: C
 HCM 2000 Volume to Capacity ratio: 0.59
 Actuated Cycle Length (s): 120.0, Sum of lost time (s): 10.0
 Intersection Capacity Utilization: 66.0%, ICU Level of Service: C
 Analysis Period (min): 15
 c Critical Lane Group

APPENDIX D

Region of Peel August 3, 2016 Meeting Minutes Excerpt



AGREEMENT OF PURCHASE AND SALE (the "Agreement")

BETWEEN:

[*OWNER OR CORPORATE NAME (ALL CAPS)]

(the "Owner")

- and -

THE REGIONAL MUNICIPALITY OF PEEL

(the "Region")

WHEREAS:

- A. The Owner is the owner of those lands located on the north side of Mayfield Road (Regional Road 14) and legally described as Part of Lot 18, Concession * West of Hurontario Street Town of Caledon (formerly Township of Chinguacousy), Regional Municipality of Peel, and designated as * (the "Owner's Lands");
- B. The Region proposes to reconstruct and widen Mayfield Road from west of Chinguacousy Road to west of Hurontario Street (the "Works") on a portion of the Owner's Lands; and
- C. The Owner proposes to develop the Owner's Lands pursuant to the Mayfield West Secondary Plan Area – Phase 2.

NOW THEREFORE, the parties agree as follows:

1. THE LANDS AND PURCHASE PRICE

- 1.1. The Owner hereby offers to convey and the Region hereby agrees to acquire:
 - (a) the fee simple lands shown hatched in red on Schedule "A" attached hereto, (the "Fee Simple Lands"); and
 - (b) a permanent easement for the purpose of constructing, installing, operating, maintaining, inspecting, altering, removing, replacing, reconstructing, enlarging and repairing drainage ditches, culverts, headwalls and/or retaining walls and related appurtenances, and sideslopes and grading appurtenant to Mayfield Road (Regional Road 14) on, over, under and through a portion of the Owner's Lands shown hatched in blue on Schedule "A" attached hereto, (the "Permanent Easement Lands").
- 1.2. The Fee Simple Lands and the Permanent Easement Lands shall collectively be referred to as the "Lands", and the Owner agrees to transfer the Lands gratuitously to the Region for the price of **Two Dollars (\$2.00)** (the "Purchase Price"), constituting good and valuable consideration.

- 1.3. Areas shown are approximate and the Owner shall prepare and deposit at its own expense a reference plan and/or subdivision plan that accords substantially to the property sketch attached as Schedule "A" hereto, which reference plan and/or subdivision plan, as applicable and normally accepted practice, shall include area calculations of each part to be acquired.
- 1.4. The Purchase Price shall be paid on the Closing Date, as defined below, subject to any adjustments, provided the title is good and free from all physical structures, including billboards and their underground supports, and all encumbrances except any registered municipal easements, any registered municipal agreements, by-laws or governmental enactments, provided same have been complied with.
- 1.5. The parties agree that any improvements, trees or shrubs within the Lands shall be included in the Purchase Price.
- 1.6. The Purchase Price does not include any taxes payable under the *Excise Tax Act*, RSC 1985, c E-15 and the Region hereby covenants to self-assess and remit applicable Harmonized Sales Tax (HST) in addition to the Purchase Price in accordance with the provisions of the *Excise Tax Act*.
- 1.7. Execution of this Agreement by the parties shall be deemed to grant to the Region and its permitted contractors and invitees the right to enter into possession of the Lands and the Region to exercise any and all rights that the Region would acquire following the conveyance of the Lands, without prejudice to its rights herein or acknowledgement of title.

2. CLOSING

- 2.1. The closing date of this transaction shall be the later of **January 4, 2021** or the date on which the transactions contemplated herein are completed by the Owner in conjunction with the registration of a subdivision plan and registration documents that include the Lands, or other development approval_(the "**Closing Date**"). Vacant unencumbered possession of the Lands shall be given to the Region on the Closing Date, unless otherwise provided. In the event that a plan of subdivision of the Owner's Lands, which includes the Lands in blocks to be conveyed to the Region as a condition of subdivision approval or other development approval, is registered prior to **January 4, 2021**, then this Agreement shall be terminated following registration of any required conveyances pursuant to such application and the parties shall have no further obligations hereunder.
- 2.2. Any tender of documents or money may be made upon either party or their solicitors, and the money may be tendered by negotiable cheque.
- 2.3. The Region shall be allowed to investigate the title to the Lands, at its own expense, until the Closing Date. If within that time any valid objection to title is made, in writing, which the Owner is unable to remove and which is not waived by the Region, this Agreement shall be null and void.

- 2.4. The Region shall not call for the production of any title deed or other evidence of title, except as may be in the possession of the Owner.
- 2.5. The Owner shall provide on the Closing Date any certificates, affidavits, declarations or any other documents required for compliance with the *Family Law Act*, RSO 1990, c F.3, the *Income Tax Act*, RSC 1985, c 1 (5th Supp), and any other statutes, where such certificates, affidavits, declarations or documents are required to permit the conveyance of the Lands to the Region free of any claim, lien or interest of any person or government.
- 2.6. The Transfer(s) pursuant to this Agreement shall be prepared by the Region's solicitor and the Owner shall execute all necessary Transfer(s) and documents required in connection with this transaction. The Easement Schedule(s) shall be in the standard form attached as Schedule "B".
- 2.7. This transaction shall be completed by electronic registration pursuant to Part III of the *Land Registration Reform Act*, RSO 1990, c L.4. The Owner and the Region agree to instruct their respective solicitors to enter into the form of "Document Registration Agreement" approved by the Law Society of Upper Canada from time to time (the "DRA"). The Owner and the Region acknowledge and agree that the delivery of documents and the release thereof will: (a) not occur at the same time as the registration of the Transfer (and other documents intended to be registered in connection with the completion of this transaction); and (b) be subject to conditions whereby the solicitor(s) receiving documents and/or money will be required to hold them in escrow and not release them except in accordance with the terms of the DRA.
- 2.8. Until completion of this transaction on the Closing Date, the Lands shall be and remain at the risk of the Owner, except as otherwise provided.
- 2.9. Time is of the essence hereof, provided that the time for doing or completing any matter herein may be extended or abridged as agreed in writing between the Owner and Region or by their respective solicitors.

3. RIGHT OF ENTRY

- 3.1. The Region, its agents and contractors, shall have the right of entry onto the Lands from the date of acceptance of this Agreement for the purposes of inspection, survey and performing environmental testing as it deems necessary including, but not limited to, obtaining soil and liquid samples and drilling test holes.
- 3.2. The Region shall indemnify and save harmless the Owner from any kind of liability, suit, claim, demand, fine, action or proceeding of any kind for which the Owner may become liable or suffer by reason of the Region's early entry onto the Lands, and any breach of or non-performance by the Region of this Agreement, save and except any negligence by the Owner, and those for whom the Owner is responsible in law.

4. LEGAL EXPENSES AND INDEPENDENT LEGAL ADVICE

- 4.1. The parties agree that the Owner is responsible for any legal fees incurred by the Owner in connection with the negotiation of this Agreement and the conveyance of the Lands
- 4.2. The Owner acknowledges that it has read, understands and agrees with all of the provisions of this Agreement, and acknowledges that it has had the opportunity to obtain independent legal advice with respect to same.

5. OWNER'S REPRESENTATIONS AND WARRANTIES

- 5.1. If all or any part of the Owner's Lands are subject to any interest or right to occupy or use the Owner's Lands, the Owner hereby warrants:
- (a) that it has disclosed those interests or rights to the Region in writing, prior to executing this Agreement; and
 - (b) that it has obtained all necessary consents, authorizations, or surrenders from the tenant for this transaction.
- 5.2. The Owner represents and warrants to the Region that:
- (a) there has been no release, deposit, spill, disposal, leakage or discharge of any contaminant, waste, pollutant, or hazardous substance on, from, under or to the Owner's Lands;
 - (b) the Owner has not received notice of any violation or alleged non-compliance with any laws, regulations, by-laws, guidelines, or policies pertaining to the environmental condition of the Owner's Lands, nor has any proceeding, investigation or other evaluation been commenced to determine whether any such violation or non-compliance exists;
 - (c) the Owner has not received notice of any claims or demands pertaining to the environmental condition of the Owner's Lands or of adjacent lands;
 - (d) there are no facts or conditions relating to the Owner's Lands that could give rise to any remedial obligations, claims, demands or orders;
 - (e) the Owner's Lands have not been used as a waste disposal site; and
 - (f) no storage tanks are or have been on, at or under the Owner's Lands.
- 5.3. The Owner shall provide the Region with all consents or authorizations, written or otherwise, necessary or desirable to enable the Region to obtain information as the Region may consider necessary or advisable in determining the environmental condition of the Lands within three (3) days following the request therefor. In addition, prior to the Closing Date, the Owner shall provide to the Region:

- a) an environmental site assessment. The environmental clearance shall be paid for by the Owner and based on the appropriate level of site assessment as established by the Ministry of the Environment and Climate Change; and
 - b) a Ministry of the Environment and Climate Change record of site condition for all lands, including easements, to be conveyed to the Region, including lands for public highway purposes. The costs associated with the record of site condition shall be payable by the Owner.
- 5.4. In the event that the Region is not satisfied, in its sole and absolute discretion, with results of any inspection, environmental test, survey, or response to inquiries or if any environmental contaminants are released prior to the Closing Date, the Region may, without limiting any other right that the Region may have, at its sole option, rescind this Agreement by delivering notice of termination to the Owner in accordance with section 8 herein, and in such event the Region shall be released from all obligations hereunder.
- 5.5. The Owner warrants that spousal consent is not necessary to this transaction under the provisions of the *Family Law Act*, unless the Owner's spouse has executed the consent herein provided.
- 5.6. In the event the Owner becomes a party to any negotiations or agreements for the sale or lease or other disposal of any part of the Owner's Lands, the Owner shall advise the Region of the details of same prior to the completion of any sale or disposal of any part of the Owner's Lands. For greater clarity, the foregoing obligation to notify the Region shall not apply to the Owner negotiating or entering into any agreements to sell any portion of the Owner's Lands to a bona fide third party purchaser of any residential internal lots for a dwelling to be constructed on a portion of the Owner's Lands.
- 5.7. It is agreed that there is no representation, warranty, collateral agreement or conditions affecting this Agreement or the Lands other than as expressed herein.

6. INDEMNITY

- 6.1. The Region will indemnify and save harmless the Owner from any kind of liability, suit, claim, demand, fine, action, or proceeding of any kind for which the Owner may become liable or suffer by reason of the use of the Permanent Easement Lands for the Works by the Region or those for whom it is in law responsible, including any breach of or non-performance by the Region of any provision of this Agreement, save and except any negligence by the Owner (and those from whom the Owner is responsible in law).

7. NOTICES

- 7.1. Any demand, notice or communication to be provided hereunder, except for demands, notices or communications exchanged in anticipation of closing, shall be in writing and may be given by personal delivery, or by courier sent by prepaid registered mail or by fax transmission, addressed to the respective parties as follows:

- (a) **in the case of the Owner, to:**

OWNER ADDRESS

- (b) **in the case of the Region, to:**

The Regional Municipality of Peel
10 Peel Centre Drive, Suite B, 6th Floor
Brampton, ON L6T 4B9
Attention: Manager, Real Estate
Telephone: (905) 791-7800 Ext. 7624
Facsimile: (905) 791-3645

or to any other address, fax number or person that the party designates. Any notice, if delivered personally or by courier, is deemed to have been given when actually received, if transmitted by fax before 4:00 p.m. on a Business Day, is deemed to have been given on that Business Day, defined below, and if transmitted by fax after 4:00 p.m. on a Business Day, is deemed to have been given on the next Business Day.

For the purposes of this section, Business Day means every day except Saturday, Sundays and statutory and civic holidays in the Province of Ontario.

- 7.2. Such addresses may be changed from time to time by either party giving notice as provided in section 8.1 above.

8. ENTIRE AGREEMENT

- 8.1. This Agreement constitutes the entire agreement between the parties and supersedes and invalidates all other commitments, representations and warranties relating to the subject matter hereof which may have been made by the parties either orally or in writing prior to the date hereof, and all of which become null and void from the date the Agreement is signed.

- 8.2. The following attached schedule(s) are incorporated by reference and form an integral part of this Agreement:

Schedule "A" – Property Sketch(s);

Schedule "B" – Permanent Easement; and

Schedule "C" – Additional Clauses.

9. NO ASSIGNMENT

- 9.1. This Agreement shall not be assigned by the Owner without the written consent of the Region, which consent may be withheld in the Region's sole and absolute discretion.

10. GENERAL

- 10.1. The recitals herein are true and accurate.
- 10.2. All covenants, provisions and terms contained in this Agreement on the part of both the Owner and Region shall not merge upon the closing of this transaction and shall survive the Closing Date.
- 10.3. The parties agree that this Agreement is strictly confidential and deals with matters of a personal and commercially sensitive nature. Accordingly, this Agreement shall not be disclosed to any person or entity other than for the purpose of proceeding with this transaction, legal purposes, accounting and auditing purposes, or as required by any applicable law.
- 10.4. This Agreement shall enure to the benefit of and be binding upon the heirs, executors, successors and assigns of the parties.
- 10.5. Unless otherwise specified, the singular includes the plural and vice versa and words importing gender include all genders.
- 10.6. Each capitalized term has the meaning given to it in this Agreement.
- 10.7. All dollar amounts referred to in this Agreement are in the lawful money of Canada.
- 10.8. This Agreement is governed by the laws of the Province of Ontario and the laws of Canada applicable therein.
- 10.9. References to any statute or any provision thereof include such statute or provision as amended, revised, re-enacted and/or consolidated from time to time and any successor statute.
- 10.10. The headings are for convenience of reference only and do not affect the interpretation of this Agreement.

THE REMAINDER OF THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK.

10.11. This Agreement, when executed by the parties, shall constitute a binding agreement.

IN WITNESS WHEREOF the Owner has at _____ on the _____ day of _____, 20____ affixed its corporate seal attested by the hands of the duly authorized officer(s).

*** Insert company name in CAPS, as shown in corporate search**

PER: _____
Name:
Title:

PER: _____
Name:
Title:

I/We have authority to bind the Corporation.

IN WITNESS WHEREOF The Regional Municipality of Peel has at the City of Brampton on the _____ day of _____, 20____ affixed its name under the hands of its duly authorized signing officer(s).

Document Execution
No.: _____

THE REGIONAL MUNICIPALITY OF PEEL

PER: _____
Name: Gary Kocialek, P. Eng.
Title: Director of Transportation
Public Works

I have authority to bind the Regional Corporation.

File No.: PF- 10054.XX
Legal File No.: XXX
Project: #13-4055
Date: August 2, 2016

SCHEDULE "A" – Property Sketch(s)

SCHEDULE "B" – Permanent Easement

SCHEDULE TO TRANSFER OF EASEMENT IN GROSS

WHEREAS the dominant tenement of the Transferee consists of the system of roads of **THE REGIONAL MUNICIPALITY OF PEEL** situate in the Regional Municipality of Peel together with the buildings and plants of the Region situate on lands owned by The Regional Municipality of Peel.

The Transferor hereby grants, conveys and transfers unto the Transferee its successors and assigns the right, interest and easement in gross on, over, under and through the servient tenement for the following purposes, namely, to construct, install, operate, maintain, inspect, alter, remove, replace, reconstruct, enlarge and repair:

- a) **DRAINAGE DITCHES, CULVERTS, HEADWALLS AND RELATED APPURTENANCES, and**
- b) **SIDESLOPES AND GRADING APPURTENANT TO MAYFIELD ROAD (REGIONAL ROAD 14)**

and for every such purpose and for all purposes necessary or incidental to the exercise of the rights hereby created, the Transferees shall have access to the servient tenement at all times by its servants, agents, contractors, licensees and assignees and its or their vehicles, supplies and equipment.

The Transferor hereby agrees that the Transferee shall have the right to sever, fell, cut, trim and remove at any time all trees, shrubs, bushes and branches, stumps and roots, and to prevent or control the growth of same within the limits of the servient tenement which may at any time interfere with or endanger the operation of the **DRAINAGE DITCHES, CULVERTS, HEADWALLS, SIDE SLOPES AND GRADING AND RELATED APPURTENANCES.**

The Transferor hereby promises the Transferee that no other easement will be granted over the servient tenement prior to registration of this document.

The Transferor, for itself, its successors and assigns, covenants with the Transferee, its successors and assigns to keep the servient tenement free and clear of any buildings, structures or obstructions; not to deposit on or remove any fill from the servient tenement and not to do or suffer to be done any other thing which might injure or damage the said drainage ditches, culverts, headwalls, side slopes and grading. Provided however, that the Transferor may undertake such work on the servient tenement as may be required in connection with the development of the lands pursuant to an approved plan of subdivision or approved site plan, provided that such work shall only be undertaken in accordance with such engineering drawings approved by the Transferee acting reasonably.

The Transferor covenants with the Transferee that it has the right to convey this easement to the Transferee notwithstanding any act of the Transferor.

The Transferor covenants with the Transferee that it will execute such further assurances of the servient tenement in respect of this easement as may be requisite.

Notwithstanding any rule of law or equity, the drainage ditches, culverts, headwalls, side slopes, grading and related appurtenances thereto shall be the property of the Transferee even though the same may be annexed or affixed to the servient tenement.

SCHEDULE "C" – Additional Clauses

1. The Owner acknowledges that there may be other Regional requirements relating to any development of the Owner's Lands including but not limited to future intersection blocks, buffer blocks, reserves, easements, etc. This Agreement in no way limits the Region's ability to make conditions and requirements during any planning process. The Owner further acknowledges that should additional property requirements be identified, the Region reserves the right to acquire these additional property requirements from the Owner gratuitously, whether or not the Owner has commenced a planning application process and the Owner agrees to co-operate with the Region in conveying these additional property requirements. The parties acknowledge and agree that nothing in this Agreement shall be deemed to fetter or interfere with the Region's responsibilities and rights as a municipal body to grant regulatory approval(s) or conditions for any of the additional or future works to be completed by the Owner.

2. Once the Owner has developed the Owner's Lands and confirmed that the new property lines are at grade with the newly constructed road, the Owner may apply to the Region, in writing, for release of the easement and, provided that the easement is no longer required by the Region, the said easement shall be released by the Region.

APPENDIX E

*Intersection Capacity Analysis – 2017 Opening Day Sensitivity
Analysis*



HCM Unsignalized Intersection Capacity Analysis 2017 Opening Day Horizon - Sensitivity Analysis
 2: McLaughlin Rd & Old School Rd
 AM Peak Hour

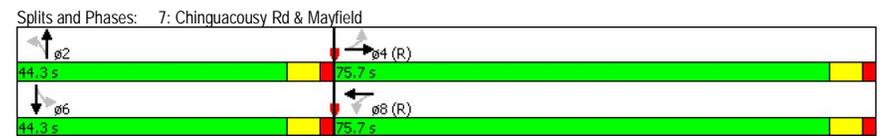
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	44	171	0	13	138	3	0	180	72	215	112	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	44	171	0	13	138	3	0	180	72	215	112	13
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	836	800	118	850	771	216	125			252		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	836	800	118	850	771	216	125			252		
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	71	36	100	89	50	100	100			84		
cM capacity (veh/h)	154	266	933	121	277	824	1462			1313		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	215	154	252	340								
Volume Left	44	13	0	215								
Volume Right	0	3	72	13								
cSH	231	252	1462	1313								
Volume to Capacity	0.93	0.61	0.00	0.16								
Queue Length 95th (m)	61.0	27.6	0.0	4.4								
Control Delay (s)	87.0	39.3	0.0	5.8								
Lane LOS	F	E		A								
Approach Delay (s)	87.0	39.3	0.0	5.8								
Approach LOS	F	E										

Intersection Summary			
Average Delay		27.8	
Intersection Capacity Utilization	63.8%		ICU Level of Service B
Analysis Period (min)	15		

Queues
 7: Chinguacousy Rd & Mayfield
 2017 Opening Day Horizon - Sensitivity Analysis
 AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Volume (vph)	123	342	122	346	104	197	45	41
Lane Group Flow (vph)	0	489	0	481	0	351	0	239
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases		4		8		2		6
Detector Phase		4		8		2		6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Total Split (s)	75.7	75.7	75.7	75.7	44.3	44.3	44.3	44.3
Total Split (%)	63.1%	63.1%	63.1%	63.1%	36.9%	36.9%	36.9%	36.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0		-1.0		-1.0
Total Lost Time (s)		5.6		5.6		5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	C-Min	C-Min	Max	Max	Max	Max
v/c Ratio		0.84		0.81		0.56		0.36
Control Delay		39.4		37.3		32.3		19.3
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		39.4		37.3		32.3		19.3
Queue Length 50th (m)		94.8		77.9		60.7		24.5
Queue Length 95th (m)		115.3		149.2		108.0		53.0
Internal Link Dist (m)		999.3		987.4		1019.2		908.6
Turn Bay Length (m)								
Base Capacity (vph)		717		725		629		668
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.68		0.66		0.56		0.36

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	



HCM Signalized Intersection Capacity Analysis 2017 Opening Day Horizon - Sensitivity Analysis
 7: Chinguacousy Rd & Mayfield AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
Volume (vph)	123	342	24	122	346	13	104	197	50	45	41	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6			5.6			5.6			5.6		
Lane Util. Factor	1.00			1.00			1.00			1.00		
Frt	0.99			1.00			0.98			0.91		
Flt Protected	0.99			0.99			0.99			0.99		
Satd. Flow (prot)	1651			1684			1761			1626		
Flt Permitted	0.73			0.73			0.81			0.88		
Satd. Flow (perm)	1225			1242			1452			1448		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	123	342	24	122	346	13	104	197	50	45	41	153
RTOR Reduction (vph)	0	2	0	0	1	0	0	4	0	0	45	0
Lane Group Flow (vph)	0	487	0	0	480	0	0	347	0	0	194	0
Heavy Vehicles (%)	33%	8%	5%	12%	12%	20%	4%	6%	6%	6%	4%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	56.1			56.1			50.7			50.7		
Effective Green, g (s)	57.1			57.1			51.7			51.7		
Actuated g/C Ratio	0.48			0.48			0.43			0.43		
Clearance Time (s)	6.6			6.6			6.6			6.6		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	582			590			625			623		
v/s Ratio Prot	c0.40			0.39			c0.24			0.13		
v/c Ratio	0.84			0.81			0.56			0.31		
Uniform Delay, d1	27.4			26.9			25.5			22.4		
Progression Factor	1.00			1.01			1.00			1.00		
Incremental Delay, d2	13.4			11.4			3.5			1.3		
Delay (s)	40.8			38.5			29.1			23.8		
Level of Service	D			D			C			C		
Approach Delay (s)	40.8			38.5			29.1			23.8		
Approach LOS	D			D			C			C		

Intersection Summary			
HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.2
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues 2017 Opening Day Horizon - Sensitivity Analysis
 8: McLaughlin Rd & Mayfield AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	2	544	60	35	354	143	8	62	136	373	84	7
Lane Group Flow (vph)	2	544	60	35	354	143	0	70	136	0	457	7
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Detector Phase	4			8			2			6		
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	88.0	88.0	88.0	88.0	88.0	88.0	32.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	73.3%	73.3%	73.3%	73.3%	73.3%	73.3%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None	None
v/c Ratio	0.00	0.23	0.06	0.06	0.15	0.13	0.33	0.30		1.54	0.02	
Control Delay	7.5	10.1	2.8	11.9	10.8	5.6	44.3	8.2		294.1	0.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	7.5	10.1	2.8	11.9	10.8	5.6	44.3	8.2		294.1	0.1	
Queue Length 50th (m)	0.2	33.8	1.7	2.8	15.4	3.2	13.9	0.0		-151.3	0.0	
Queue Length 95th (m)	m0.5	34.2	4.9	9.5	31.3	19.5	28.0	15.7		#214.0	0.2	
Internal Link Dist (m)	72.5			866.8			1234.6			159.7		
Turn Bay Length (m)	60.0		60.0	60.0		60.0		30.0			30.0	
Base Capacity (vph)	664	2359	1075	559	2359	1081	210	452		296	358	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.00	0.23	0.06	0.06	0.15	0.13	0.33	0.30		1.54	0.02	

Intersection Summary
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 - Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.



HCM Signalized Intersection Capacity Analysis 2017 Opening Day Horizon - Sensitivity Analysis
 8: McLaughlin Rd & Mayfield AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↗	↖	↖↗	↗	↖	↖	↖	↖	↖	↖
Volume (vph)	2	544	60	35	354	143	8	62	136	373	84	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.99	1.00	0.96	1.00	0.96	1.00
Satd. Flow (prot)	1690	3411	1528	1755	3411	1500	1899	1543	1764	1500	1764	1500
Flt Permitted	0.54	1.00	1.00	0.44	1.00	1.00	0.49	1.00	0.72	1.00	0.72	1.00
Satd. Flow (perm)	960	3411	1528	809	3411	1500	933	1543	1318	1500	1318	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2	544	60	35	354	143	8	62	136	373	84	7
RTOR Reduction (vph)	0	0	19	0	0	44	0	0	105	0	0	5
Lane Group Flow (vph)	2	544	42	35	354	99	0	70	31	0	457	2
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%	5%	0%	5%	5%	3%	8%
Bus Blockages (#/hr)	0	0	2	0	0	2	0	0	2	0	0	2
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	82.0	82.0	82.0	82.0	82.0	82.0	26.0	26.0	26.0	26.0	26.0	26.0
Effective Green, g (s)	83.0	83.0	83.0	83.0	83.0	83.0	27.0	27.0	27.0	27.0	27.0	27.0
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.22	0.22	0.22	0.22	0.22	0.22
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	664	2359	1056	559	2359	1037	209	347	296	337	296	337
v/s Ratio Prot		c0.16			0.10							
v/s Ratio Perm	0.00		0.03	0.04		0.07	0.08	0.02		c0.35	0.00	
v/c Ratio	0.00	0.23	0.04	0.06	0.15	0.10	0.33	0.09		1.54	0.00	
Uniform Delay, d1	5.7	6.8	5.9	6.0	6.4	6.1	39.0	36.8		46.5	36.1	
Progression Factor	1.35	1.44	1.82	1.90	1.66	5.38	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.2	0.1	0.2	0.1	0.2	1.0	0.1		261.0	0.0	
Delay (s)	7.7	10.0	10.7	11.6	10.7	33.0	39.9	36.9		307.5	36.1	
Level of Service	A	A	B	B	B	C	D	D		F	D	
Approach Delay (s)		10.0			16.7		37.9			303.4		
Approach LOS		B			B		D			F		

Intersection Summary			
HCM 2000 Control Delay	90.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues 2017 Opening Day Horizon - Sensitivity Analysis
 69: McLaughlin Rd & Street I/Collector Road G AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↖↗	↖	↖↗	↖	↖	↖	↖
Volume (vph)	22	29	121	29	58	101	22	263
Lane Group Flow (vph)	24	138	134	89	64	168	24	298
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.07	0.28	0.43	0.19	0.10	0.15	0.03	0.26
Control Delay	11.3	6.0	17.2	6.8	7.3	5.3	8.1	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.3	6.0	17.2	6.8	7.3	5.3	8.1	8.3
Queue Length 50th (m)	1.4	1.9	8.6	1.9	2.2	3.8	0.8	11.1
Queue Length 95th (m)	4.5	9.5	16.9	7.8	7.9	12.9	4.5	30.8
Internal Link Dist (m)		106.7		99.7		159.7		291.5
Turn Bay Length (m)	15.0		15.0		20.0		20.0	
Base Capacity (vph)	508	709	486	692	652	1094	735	1127
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.19	0.28	0.13	0.10	0.15	0.03	0.26

Intersection Summary	
Cycle Length:	44
Actuated Cycle Length:	44
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	45
Control Type:	Actuated-Coordinated



HCM Signalized Intersection Capacity Analysis 2017 Opening Day Horizon - Sensitivity Analysis
 69: McLaughlin Rd & Street I/Collector Road G AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	22	29	95	121	29	51	58	101	50	22	263	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.90		1.00	0.95		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)	1789	1666		1789	1703		1789	1789		1789	1878	
Flt Permitted	0.70	1.00		0.67	1.00		0.58	1.00		0.65	1.00	
Satd. Flow (perm)	1317	1666		1260	1703		1089	1789		1226	1878	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	24	32	106	134	32	57	64	112	56	24	292	6
RTOR Reduction (vph)	0	82	0	0	44	0	0	25	0	0	1	0
Lane Group Flow (vph)	24	56	0	134	45	0	64	143	0	24	297	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.8	8.8		8.8	8.8		23.2	23.2		23.2	23.2	
Effective Green, g (s)	9.8	9.8		9.8	9.8		24.2	24.2		24.2	24.2	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.55	0.55		0.55	0.55	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	293	371		280	379		598	983		674	1032	
v/s Ratio Prot		0.03			0.03			0.08			0.16	
v/s Ratio Perm	0.02			c0.11			0.06			0.02		
v/c Ratio	0.08	0.15		0.48	0.12		0.11	0.15		0.04	0.29	
Uniform Delay, d1	13.5	13.8		14.9	13.6		4.7	4.8		4.5	5.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.18	1.11	
Incremental Delay, d2	0.1	0.2		1.3	0.1		0.4	0.3		0.1	0.7	
Delay (s)	13.7	13.9		16.2	13.8		5.1	5.2		5.5	6.6	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		13.9			15.2			5.1			6.5	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		9.5			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.34										
Actuated Cycle Length (s)		44.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		48.2%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 2017 Opening Day Horizon - Sensitivity Analysis
 2: McLaughlin Rd & Old School Rd PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	13	138	0	72	171	215	0	112	13	3	180	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	13	138	0	72	171	215	0	112	13	3	180	44
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	627	333	202	396	348	118	224			125		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	627	333	202	396	348	118	224			125		
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	76	100	84	70	77	100			100		
cM capacity (veh/h)	234	586	839	461	574	933	1345			1462		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	151	458	125	227								
Volume Left	13	72	0	3								
Volume Right	0	215	13	44								
cSH	519	669	1345	1462								
Volume to Capacity	0.29	0.68	0.00	0.00								
Queue Length 95th (m)	9.1	41.0	0.0	0.0								
Control Delay (s)	14.8	21.2	0.0	0.1								
Lane LOS	B	C		A								
Approach Delay (s)	14.8	21.2	0.0	0.1								
Approach LOS	B	C										
Intersection Summary												
Average Delay		12.5										
Intersection Capacity Utilization		58.7%			ICU Level of Service			B				
Analysis Period (min)		15										

Queues
7: Chinguacousy Rd & Mayfield

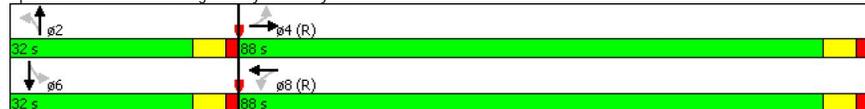
2017 Opening Day Horizon - Sensitivity Analysis
PM Peak Hour

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔		↔
Volume (vph)	94	323	65	366	12	33	23	253
Lane Group Flow (vph)	0	514	0	465	0	144	0	481
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases		4		8		2		6
Detector Phase		4		8		2		6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
Total Split (s)	88.0	88.0	88.0	88.0	32.0	32.0	32.0	32.0
Total Split (%)	73.3%	73.3%	73.3%	73.3%	26.7%	26.7%	26.7%	26.7%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0		-1.0		-1.0
Total Lost Time (s)		5.6		5.6		5.6		5.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	C-Min	C-Min	Max	Max	Max	Max
v/c Ratio		0.76		0.64		0.21		0.68
Control Delay		29.9		37.7		13.9		36.0
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		29.9		37.7		13.9		36.0
Queue Length 50th (m)		91.2		93.9		8.4		85.7
Queue Length 95th (m)		89.0		114.3		28.2		#186.4
Internal Link Dist (m)		999.3		983.8		1019.2		908.6
Turn Bay Length (m)								
Base Capacity (vph)		934		1003		698		712
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.55		0.46		0.21		0.68

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 7: Chinguacousy Rd & Mayfield



HCM Signalized Intersection Capacity Analysis 2017 Opening Day Horizon - Sensitivity Analysis
7: Chinguacousy Rd & Mayfield PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				↔
Volume (vph)	94	323	97	65	366	34	12	33	99	23	253	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6			5.6			5.6				5.6
Lane Util. Factor		1.00			1.00			1.00				1.00
Frt		0.97			0.99			0.91				0.94
Flt Protected		0.99			0.99			1.00				1.00
Satd. Flow (prot)		1656			1678			1640				1707
Flt Permitted		0.81			0.86			0.95				0.98
Satd. Flow (perm)		1350			1458			1567				1681
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	94	323	97	65	366	34	12	33	99	23	253	205
RTOR Reduction (vph)	0	11	0	0	4	0	0	50	0	0	17	0
Lane Group Flow (vph)	0	503	0	0	461	0	0	94	0	0	464	0
Heavy Vehicles (%)	33%	8%	5%	12%	12%	20%	4%	6%	6%	6%	4%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases		4			8			2			6	
Actuated Green, G (s)		58.1			58.1			48.7			48.7	
Effective Green, g (s)		59.1			59.1			49.7			49.7	
Actuated g/C Ratio		0.49			0.49			0.41			0.41	
Clearance Time (s)		6.6			6.6			6.6			6.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		664			718			648			696	
v/s Ratio Prot												
v/s Ratio Perm		c0.37			0.32			0.06			c0.28	
v/c Ratio		0.76			0.64			0.15			0.67	
Uniform Delay, d1		24.6			22.6			21.9			28.4	
Progression Factor		1.00			1.61			1.00			1.00	
Incremental Delay, d2		7.9			4.1			0.5			5.0	
Delay (s)		32.5			40.6			22.4			33.5	
Level of Service		C			D			C			C	
Approach Delay (s)		32.5			40.6			22.4			33.5	
Approach LOS		C			D			C			C	

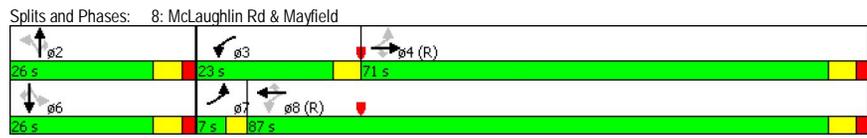
Intersection Summary

HCM 2000 Control Delay: 34.2, HCM 2000 Level of Service: C
 HCM 2000 Volume to Capacity ratio: 0.72
 Actuated Cycle Length (s): 120.0, Sum of lost time (s): 11.2
 Intersection Capacity Utilization: 82.2%, ICU Level of Service: E
 Analysis Period (min): 15
 c Critical Lane Group

Queues 2017 Opening Day Horizon - Sensitivity Analysis
 8: McLaughlin Rd & Mayfield PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	8	363	11	212	530	339	30	75	34	72	92	3
Lane Group Flow (vph)	8	363	11	212	530	339	0	105	34	0	164	3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2		6		6
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	7.0	22.0	22.0	10.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	7.0	71.0	71.0	23.0	87.0	87.0	26.0	26.0	26.0	26.0	26.0	26.0
Total Split (%)	5.8%	59.2%	59.2%	19.2%	72.5%	72.5%	21.7%	21.7%	21.7%	21.7%	21.7%	21.7%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)	2.0	5.0	5.0	3.0	5.0	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
v/c Ratio	0.01	0.16	0.01	0.26	0.21	0.28		0.49	0.11		0.77	0.01
Control Delay	1.2	2.6	0.0	11.4	12.8	8.6		54.0	0.7		71.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	1.2	2.6	0.0	11.4	12.8	8.6		54.0	0.7		71.8	0.0
Queue Length 50th (m)	0.1	3.8	0.0	31.3	42.3	30.9		22.5	0.0		36.8	0.0
Queue Length 95th (m)	m0.5	5.5	0.0	46.7	56.7	52.1		39.8	0.0		#63.4	0.0
Internal Link Dist (m)		79.0			866.8			1234.6			159.7	
Turn Bay Length (m)	60.0		60.0	60.0		60.0		30.0			30.0	
Base Capacity (vph)	629	2226	1028	875	2563	1211		243	345		243	337
Starvation Cap Reductn	0	0	0	0	0	0		0	0		0	0
Spillback Cap Reductn	0	0	0	0	0	0		0	0		0	0
Storage Cap Reductn	0	0	0	0	0	0		0	0		0	0
Reduced v/c Ratio	0.01	0.16	0.01	0.24	0.21	0.28		0.43	0.10		0.67	0.01

Intersection Summary
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.



HCM Signalized Intersection Capacity Analysis 2017 Opening Day Horizon - Sensitivity Analysis
 8: McLaughlin Rd & Mayfield PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	8	363	11	212	530	339	30	75	34	72	92	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.0	5.0	3.0	5.0	5.0		5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	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		0.99	1.00		0.98	1.00
Satd. Flow (prot)	1690	3411	1528	1755	3411	1500		1867	1543		1810	1500
Flt Permitted	0.46	1.00	1.00	0.52	1.00	1.00		0.74	1.00		0.75	1.00
Satd. Flow (perm)	810	3411	1528	952	3411	1500		1394	1543		1391	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Adj. Flow (vph)	8	363	11	212	530	339		30	75		34	92
RTOR Reduction (vph)	0	0	4	0	0	91		0	29		0	3
Lane Group Flow (vph)	8	363	7	212	530	248		105	5		164	0
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%		5%	0%		5%	3%
Bus Blockages (#/hr)	0	0	2	0	0	2		0	2		0	2
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm		Perm	Perm		NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8		2			6	
Actuated Green, G (s)	78.1	77.3	77.3	90.6	86.8	86.8		17.4	17.4		17.4	17.4
Effective Green, g (s)	80.1	78.3	78.3	91.6	87.8	87.8		18.4	18.4		18.4	18.4
Actuated g/C Ratio	0.67	0.65	0.65	0.76	0.73	0.73		0.15	0.15		0.15	0.15
Clearance Time (s)	3.0	6.0	6.0	4.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	553	2225	997	795	2495	1097		213	236		213	230
v/s Ratio Prot	0.00	0.11		c0.02	0.16							
v/s Ratio Perm	0.01		0.00	c0.18		0.17		0.08	0.00		c0.12	0.00
v/c Ratio	0.01	0.16	0.01	0.27	0.21	0.23		0.49	0.02		0.77	0.00
Uniform Delay, d1	6.7	8.1	7.3	3.9	5.1	5.2		46.5	43.2		48.8	43.0
Progression Factor	0.33	0.28	1.00	2.89	2.57	12.43		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.2	0.0	0.2	0.2	0.5		1.8	0.0		15.4	0.0
Delay (s)	2.2	2.4	7.3	11.4	13.3	64.8		48.3	43.2		64.1	43.0
Level of Service	A	A	A	B	B	E		D	D		E	D
Approach Delay (s)		2.6			29.1			47.1			63.8	
Approach LOS		A			C			D			E	

Intersection Summary
 HCM 2000 Control Delay: 28.1
 HCM 2000 Volume to Capacity ratio: 0.36
 HCM 2000 Level of Service: C
 Actuated Cycle Length (s): 120.0
 Sum of lost time (s): 13.0
 Intersection Capacity Utilization: 48.9%
 ICU Level of Service: A
 Analysis Period (min): 15
 c Critical Lane Group

Queues
69: McLaughlin Rd & Street I

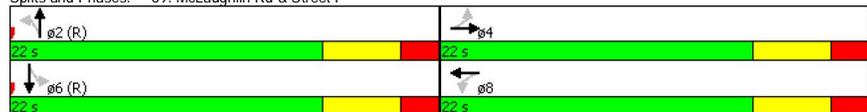
2017 Opening Day Horizon - Sensitivity Analysis
PM Peak Hour

	EBL	EBT	NBL	NBT	SBT	ø8
Lane Configurations	↖	↗	↖	↗	↖	↖
Volume (vph)	4	0	91	119	74	
Lane Group Flow (vph)	4	86	91	119	91	
Turn Type	Perm	NA	Perm	NA	NA	
Protected Phases		4		2	6	8
Permitted Phases	4		2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
v/c Ratio	0.02	0.09	0.09	0.08	0.06	
Control Delay	15.8	0.2	3.5	3.3	3.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	15.8	0.2	3.5	3.3	3.1	
Queue Length 50th (m)	0.3	0.0	2.2	2.9	1.7	
Queue Length 95th (m)	2.1	0.0	5.9	6.9	5.5	
Internal Link Dist (m)		78.9		159.7	291.5	
Turn Bay Length (m)	15.0		20.0			
Base Capacity (vph)	646	1143	1012	1450	1413	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.01	0.08	0.09	0.08	0.06	

Intersection Summary

Cycle Length: 44
 Actuated Cycle Length: 44
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 69: McLaughlin Rd & Street I



HCM Signalized Intersection Capacity Analysis 2017 Opening Day Horizon - Sensitivity Analysis
69: McLaughlin Rd & Street I PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	4	0	86	0	0	0	91	119	0	0	74	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0					5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00					1.00	1.00			1.00	
Frt	1.00	0.85					1.00	1.00			0.97	
Flt Protected	0.95	1.00					0.95	1.00			1.00	
Satd. Flow (prot)	1789	1601					1789	1883			1831	
Flt Permitted	0.89	1.00					0.70	1.00			1.00	
Satd. Flow (perm)	1674	1601					1315	1883			1831	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	0	86	0	0	0	91	119	0	0	74	17
RTOR Reduction (vph)	0	77	0	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	4	9	0	0	0	0	91	119	0	0	85	0
Turn Type	Perm	NA		Perm			Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	3.5	3.5					28.5	28.5			28.5	
Effective Green, g (s)	4.5	4.5					29.5	29.5			29.5	
Actuated g/C Ratio	0.10	0.10					0.67	0.67			0.67	
Clearance Time (s)	6.0	6.0					6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	171	163					881	1262			1227	
v/s Ratio Prot		c0.01						0.06			0.05	
v/s Ratio Perm	0.00						c0.07					
v/c Ratio	0.02	0.05					0.10	0.09			0.07	
Uniform Delay, d1	17.8	17.8					2.6	2.6			2.5	
Progression Factor	1.00	1.00					1.00	1.00			1.06	
Incremental Delay, d2	0.1	0.1					0.2	0.1			0.1	
Delay (s)	17.8	18.0					2.8	2.7			2.8	
Level of Service	B	B					A	A			A	
Approach Delay (s)		18.0			0.0			2.7			2.8	
Approach LOS		B			A			A			A	

Intersection Summary

HCM 2000 Control Delay: 6.3, HCM 2000 Level of Service: A
 HCM 2000 Volume to Capacity ratio: 0.10
 Actuated Cycle Length (s): 44.0, Sum of lost time (s): 10.0
 Intersection Capacity Utilization: 25.4%, ICU Level of Service: A
 Analysis Period (min): 15

c Critical Lane Group

APPENDIX F

Intersection Capacity Analysis – 2021 Full Build-Out



HCM Unsignalized Intersection Capacity Analysis
2: McLaughlin Rd & Old School Rd

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕
Volume (veh/h)	46	87	0	26	95	4	2	420	261	242	364	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	46	87	0	26	95	4	2	420	261	242	364	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1456	1535	366	1448	1406	550	368			681		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1456	1535	366	1448	1406	550	368			681		
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	100	0	7	99	100			73		
cM capacity (veh/h)	16	85	679	0	102	534	1191			912		

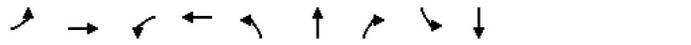
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	133	125	683	610
Volume Left	46	26	2	242
Volume Right	0	4	261	4
cSH	34	0	1191	912
Volume to Capacity	3.88	Err	0.00	0.27
Queue Length 95th (m)	Err	Err	0.0	8.1
Control Delay (s)	Err	Err	0.0	6.2
Lane LOS	F	F	A	A
Approach Delay (s)	Err	Err	0.0	6.2
Approach LOS	F	F		

Intersection Summary

Average Delay		Err	
Intersection Capacity Utilization		92.8%	ICU Level of Service F
Analysis Period (min)		15	

Queues
7: Chinguacousy Rd & Mayfield

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

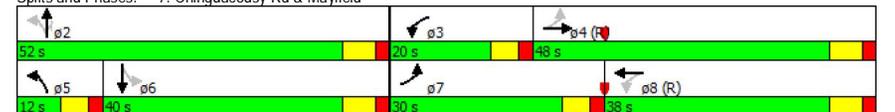


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↕	↕	↕	↕	↕	↕	↕	↕	↕
Volume (vph)	118	861	167	553	36	204	184	3	34
Lane Group Flow (vph)	118	884	167	553	36	204	184	0	208
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases	7	4	3	8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	7	4	3	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	25.6	10.0	25.6	10.0	25.6	25.6	25.6	25.6
Total Split (s)	30.0	48.0	20.0	38.0	12.0	52.0	52.0	40.0	40.0
Total Split (%)	25.0%	40.0%	16.7%	31.7%	10.0%	43.3%	43.3%	33.3%	33.3%
Yellow Time (s)	4.0	4.6	4.0	4.6	4.0	4.6	4.6	4.6	4.6
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.6	5.0	5.6	5.0	5.6	5.6		5.6
Lead/Lag	Lead	Lag	Lead	Lag	Lead			Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
v/c Ratio	0.25	0.47	0.38	0.28	0.22	0.61	0.42		0.62
Control Delay	7.9	18.3	20.0	22.5	40.1	51.4	8.3		20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	7.9	18.3	20.0	22.5	40.1	51.4	8.3		20.2
Queue Length 50th (m)	7.5	63.7	25.0	46.6	7.0	44.2	0.0		8.4
Queue Length 95th (m)	16.7	96.9	35.5	41.5	14.9	63.4	17.1		30.7
Internal Link Dist (m)		999.3		312.6		1019.2			908.6
Turn Bay Length (m)	15.0		60.0		60.0				
Base Capacity (vph)	618	1888	456	1944	164	700	708		575
Starvation Cap Reductn	0	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0	0		0
Reduced v/c Ratio	0.19	0.47	0.37	0.28	0.22	0.29	0.26		0.36

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 51 (43%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 7: Chinguacousy Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
7: Chinguacousy Rd & Mayfield

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	118	861	23	167	553	0	36	204	184	3	34	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.6		5.0	5.6		5.0	5.6	5.6		5.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00	0.85		0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)	1372	3369		1630	3259		1755	1812	1541		1590	
Flt Permitted	0.45	1.00		0.24	1.00		0.21	1.00	1.00		0.99	
Satd. Flow (perm)	643	3369		408	3259		385	1812	1541		1581	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	118	861	23	167	553	0	36	204	184	3	34	171
RTOR Reduction (vph)	0	1	0	0	0	0	0	146	0	151	0	0
Lane Group Flow (vph)	118	883	0	167	553	0	36	204	38	0	57	0
Heavy Vehicles (%)	33%	8%	5%	12%	12%	20%	4%	6%	6%	6%	4%	8%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	NA
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	72.7	63.8		81.5	68.2		23.7	23.7	23.7		13.2	
Effective Green, g (s)	74.7	64.8		83.5	69.2		24.7	24.7	24.7		14.2	
Actuated g/C Ratio	0.62	0.54		0.70	0.58		0.21	0.21	0.21		0.12	
Clearance Time (s)	6.0	6.6		6.0	6.6		6.0	6.6	6.6		6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	460	1819		429	1879		142	372	317		187	
v/s Ratio Prot	0.02	c0.26		c0.05	0.17		0.01	c0.11				
v/s Ratio Perm	0.14			0.22			0.04		0.02		0.04	
v/c Ratio	0.26	0.49		0.39	0.29		0.25	0.55	0.12		0.31	
Uniform Delay, d1	9.4	17.2		8.1	13.0		39.6	42.7	38.8		48.4	
Progression Factor	1.00	1.00		2.89	1.67		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.9		0.6	0.4		0.9	1.7	0.2		0.9	
Delay (s)	9.7	18.1		24.1	22.1		40.6	44.3	39.0		49.3	
Level of Service	A	B		C	C		D	D	D		D	
Approach Delay (s)		17.1			22.5			41.7			49.3	
Approach LOS		B			C			D			D	

Intersection Summary

HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.2
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues
8: McLaughlin Rd & Mayfield

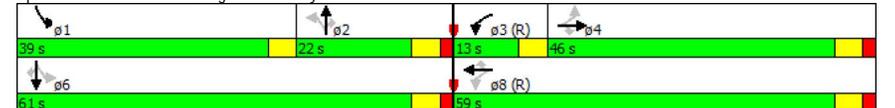
2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	17	1096	204	111	358	143	22	88	251	718	182	5
Lane Group Flow (vph)	17	1096	204	111	358	143	22	88	251	718	182	5
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8					1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	3	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	10.0	22.0	22.0	22.0	22.0	22.0	10.0	22.0	22.0
Total Split (%)	46.0	46.0	46.0	13.0	59.0	59.0	22.0	22.0	22.0	39.0	61.0	61.0
Total Split (%)	38.3%	38.3%	38.3%	10.8%	49.2%	49.2%	18.3%	18.3%	18.3%	32.5%	50.8%	50.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes		
Recall Mode	Min	Min	Min	C-Max	C-Min	C-Min	None	None	None	Min	Min	Min
v/c Ratio	0.05	0.94	0.32	0.41	0.22	0.18	0.18	0.23	0.80	1.06	0.12	0.01
Control Delay	17.4	44.3	3.7	12.1	7.2	2.9	49.9	48.9	36.6	82.8	19.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.8	0.0	0.0
Total Delay	17.4	44.3	3.7	12.1	7.2	2.9	49.9	48.9	36.6	97.6	19.9	0.0
Queue Length 50th (m)	2.4	134.6	10.3	3.0	9.4	0.4	4.8	10.0	18.6	-168.3	13.1	0.0
Queue Length 95th (m)	m3.6	#172.8	2.3	22.5	34.2	15.0	12.5	17.5	47.0	#200.7	19.1	0.0
Internal Link Dist (m)		388.2			866.8			1234.6			159.7	
Turn Bay Length (m)	80.0		80.0	80.0		80.0	80.0		80.0	80.0		80.0
Base Capacity (vph)	326	1165	644	271	1650	799	165	517	362	676	1653	734
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	24	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.94	0.32	0.41	0.22	0.18	0.13	0.17	0.69	1.10	0.11	0.01

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 113 (94%), Referenced to phase 3:WBL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: McLaughlin Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
8: McLaughlin Rd & Mayfield

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↖	↘	↗	↖	↘	↗	↖	↘	↗	↖
Volume (vph)	17	1096	204	111	358	143	22	88	251	718	182	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	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)	1690	3411	1528	1755	3411	1500	1738	3650	1543	1738	3544	1500
Flt Permitted	0.54	1.00	1.00	0.09	1.00	1.00	0.64	1.00	1.00	0.56	1.00	1.00
Satd. Flow (perm)	957	3411	1528	168	3411	1500	1166	3650	1543	1033	3544	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	17	1096	204	111	358	143	22	88	251	718	182	5
RTOR Reduction (vph)	0	0	123	0	0	74	0	0	150	0	0	3
Lane Group Flow (vph)	17	1096	81	111	358	69	22	88	101	718	182	2
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%	5%	0%	5%	5%	3%	8%
Bus Blockages (#/hr)	0	0	2	0	0	2	0	0	2	0	0	2
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		2		1	6		6
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	39.9	39.9	39.9	57.1	57.1	57.1	11.8	11.8	11.8	50.9	50.9	50.9
Effective Green, g (s)	40.9	40.9	40.9	58.1	58.1	58.1	12.8	12.8	12.8	51.9	51.9	51.9
Actuated g/C Ratio	0.34	0.34	0.34	0.48	0.48	0.48	0.11	0.11	0.11	0.43	0.43	0.43
Clearance Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	326	1162	520	269	1651	726	124	389	164	658	1532	648
v/s Ratio Prot		c0.32		c0.05	0.10			0.02		c0.33	0.05	
v/s Ratio Perm	0.02		0.05	0.15		0.05	0.02		0.07	c0.14		0.00
v/c Ratio	0.05	0.94	0.16	0.41	0.22	0.10	0.18	0.23	0.62	1.09	0.12	0.00
Uniform Delay, d1	26.5	38.4	27.5	23.0	17.8	16.7	48.8	49.1	51.2	31.8	20.4	19.4
Progression Factor	0.63	0.75	0.47	0.42	0.37	0.76	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	13.8	0.1	4.5	0.3	0.3	0.7	0.3	6.7	62.5	0.0	0.0
Delay (s)	16.9	42.5	13.1	14.1	6.9	13.0	49.5	49.4	57.9	94.3	20.4	19.4
Level of Service	B	D	B	B	A	B	D	D	E	F	C	B
Approach Delay (s)		37.6			9.7			55.3			79.0	
Approach LOS		D			A			E			E	

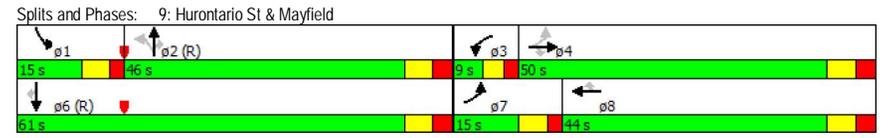
Intersection Summary			
HCM 2000 Control Delay	46.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	97.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Queues
9: Hurontario St & Mayfield

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↖	↘	↗	↖	↘	↗	↖	↘	↗	↖
Volume (vph)	452	1714	178	74	274	75	31	119	156	96	619	291
Lane Group Flow (vph)	452	1714	178	74	274	75	31	119	156	96	619	291
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8					1	6	
Permitted Phases	4		4		8	8	2		2		6	6
Detector Phase	7	4	4	3	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	44.0	44.0	9.0	44.0	44.0	45.0	45.0	45.0	10.0	45.0	45.0
Total Split (s)	15.0	50.0	50.0	9.0	44.0	44.0	46.0	46.0	46.0	15.0	61.0	61.0
Total Split (%)	12.5%	41.7%	41.7%	7.5%	36.7%	36.7%	38.3%	38.3%	38.3%	12.5%	50.8%	50.8%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.67	0.74	0.22	0.31	0.35	0.20	0.19	0.16	0.37	0.41	0.52	0.42
Control Delay	11.9	20.4	1.7	55.3	37.8	1.1	44.7	40.5	12.5	72.8	31.1	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	20.4	1.7	55.3	37.8	1.1	44.7	40.5	12.5	72.8	31.1	6.0
Queue Length 50th (m)	33.5	113.6	2.6	8.6	28.1	0.0	6.1	12.3	3.9	12.2	44.0	2.0
Queue Length 95th (m)	m56.8	152.1	m5.6	15.9	36.3	0.3	15.4	20.7	22.1	21.2	61.4	17.2
Internal Link Dist (m)		456.2			1363.3			1227.0			551.5	
Turn Bay Length (m)	170.0		170.0	128.0		128.0	70.0		109.0	190.0		190.0
Base Capacity (vph)	675	2310	798	238	1050	469	252	1116	571	251	1593	831
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.74	0.22	0.31	0.26	0.16	0.12	0.11	0.27	0.38	0.39	0.35

Intersection Summary	
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	62 (52%), Referenced to phase 2:NBL and 6:SBT, Start of Green
Natural Cycle:	110
Control Type:	Actuated-Coordinated
m	Volume for 95th percentile queue is metered by upstream signal.



HCM Signalized Intersection Capacity Analysis
9: Hurontario St & Mayfield

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	452	1714	178	74	274	75	31	119	156	96	619	291
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1596	4948	1506	3079	3318	1186	1722	3349	1428	3001	3476	1471
Flt Permitted	0.46	1.00	1.00	0.95	1.00	1.00	0.42	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	781	4948	1506	3079	3318	1186	756	3349	1428	3001	3476	1471
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	452	1714	178	74	274	75	31	119	156	96	619	291
RTOR Reduction (vph)	0	0	95	0	57	0	0	107	0	0	194	0
Lane Group Flow (vph)	452	1714	83	74	274	18	31	119	49	96	619	97
Confl. Peds. (#/hr)	12		1	1		12			19	19		
Heavy Vehicles (%)	14%	6%	7%	15%	10%	34%	6%	9%	10%	18%	5%	11%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4		4			8	2		2			6
Actuated Green, G (s)	67.1	55.0	55.0	7.1	28.1	28.1	24.5	24.5	24.5	8.4	38.9	38.9
Effective Green, g (s)	68.1	56.0	56.0	8.1	29.1	29.1	25.5	25.5	25.5	9.4	39.9	39.9
Actuated g/C Ratio	0.57	0.47	0.47	0.07	0.24	0.24	0.21	0.21	0.21	0.08	0.33	0.33
Clearance Time (s)	6.0	7.0	7.0	5.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	674	2309	702	207	804	287	160	711	303	235	1155	489
v/s Ratio Prot	c0.19	c0.35		0.02	0.08			0.04		0.03	c0.18	
v/s Ratio Perm	0.19		0.06			0.02	0.04		0.03			0.07
v/c Ratio	0.67	0.74	0.12	0.36	0.34	0.06	0.19	0.17	0.16	0.41	0.54	0.20
Uniform Delay, d1	16.0	26.1	18.1	53.5	37.5	35.0	38.8	38.6	38.5	52.7	32.5	28.6
Progression Factor	0.60	0.73	0.52	1.00	1.00	1.00	1.00	1.00	1.00	1.29	0.90	1.19
Incremental Delay, d2	1.3	0.6	0.0	1.1	0.3	0.1	2.7	0.5	1.1	1.1	1.7	0.8
Delay (s)	10.9	19.7	9.4	54.5	37.8	35.1	41.5	39.1	39.7	68.9	30.8	34.9
Level of Service	B	B	A	D	D	D	D	D	D	E	C	C
Approach Delay (s)		17.2			40.2			39.6			35.6	
Approach LOS		B			D			D			D	

Intersection Summary

HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues

21: McLaughlin Rd & Collector Road B

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

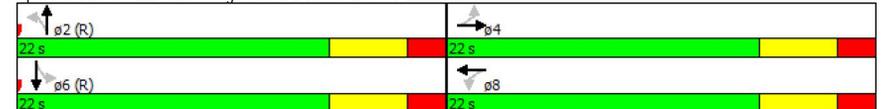


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↕	↔	↕	↔	↕	↔	↕
Volume (vph)	27	5	14	8	14	179	10	287
Lane Group Flow (vph)	27	39	14	54	14	210	10	297
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.11	0.13	0.06	0.17	0.02	0.08	0.01	0.11
Control Delay	16.0	8.4	15.2	8.3	6.7	5.1	4.1	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.0	8.4	15.2	8.3	6.7	5.1	4.1	3.4
Queue Length 50th (m)	1.8	0.3	0.9	0.5	0.5	3.5	0.3	3.9
Queue Length 95th (m)	6.2	5.5	4.0	6.6	2.7	8.3	1.5	8.3
Internal Link Dist (m)		139.8		112.0		291.5		261.3
Turn Bay Length (m)	20.0		20.0		20.0		20.0	
Base Capacity (vph)	549	653	549	662	808	2642	879	2682
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.06	0.03	0.08	0.02	0.08	0.01	0.11

Intersection Summary

Cycle Length: 44
Actuated Cycle Length: 44
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated

Splits and Phases: 21: McLaughlin Rd & Collector Road B



HCM Signalized Intersection Capacity Analysis
21: McLaughlin Rd & Collector Road B

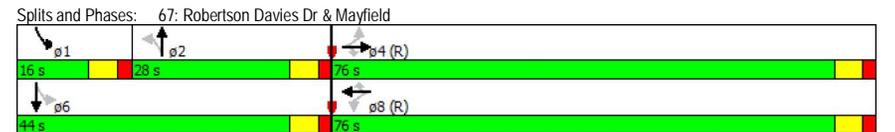
2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	27	5	34	14	8	46	14	179	31	10	287	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
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	0.87		1.00	0.98		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)	1789	1637		1789	1643		1789	3499		1789	3560	
Flt Permitted	0.75	1.00		0.75	1.00		0.57	1.00		0.62	1.00	
Satd. Flow (perm)	1421	1637		1421	1643		1074	3499		1168	3560	
Peak-hour factor, PHF	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Adj. Flow (vph)	27	5	34	14	8	46	14	179	31	10	287	10
RTOR Reduction (vph)	0	30	0	0	40	0	0	11	0	0	3	0
Lane Group Flow (vph)	27	9	0	14	14	0	14	199	0	10	294	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	4.3	4.3		4.3	4.3		27.7	27.7		27.7	27.7	
Effective Green, g (s)	5.3	5.3		5.3	5.3		28.7	28.7		28.7	28.7	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.65	0.65		0.65	0.65	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	171	197		171	197		700	2282		761	2322	
v/s Ratio Prot		0.01		0.01	0.01		0.06	0.06		0.08	0.08	
v/s Ratio Perm	c0.02			0.01			0.01			0.01		
v/c Ratio	0.16	0.05		0.08	0.07		0.02	0.09		0.01	0.13	
Uniform Delay, d1	17.3	17.1		17.2	17.2		2.7	2.8		2.7	2.9	
Progression Factor	1.00	1.00		1.00	1.00		1.64	1.65		1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.2	0.1		0.1	0.1		0.0	0.1	
Delay (s)	17.8	17.2		17.4	17.3		4.5	4.7		2.7	3.0	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		17.4			17.3			4.7			3.0	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay	6.5		HCM 2000 Level of Service				A					
HCM 2000 Volume to Capacity ratio	0.13											
Actuated Cycle Length (s)	44.0		Sum of lost time (s)				10.0					
Intersection Capacity Utilization	28.1%		ICU Level of Service				A					
Analysis Period (min)	15											
c Critical Lane Group												

Queues
67: Robertson Davies Dr & Mayfield

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↘	↖	↗	↘
Volume (vph)	144	1912	36	578	6	2	191	0
Lane Group Flow (vph)	144	1912	36	578	6	262	191	66
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		8		6	
Detector Phase	4	4	8	8	8	2	1	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	28.0	28.0	28.0	28.0	28.0	28.0	10.0	28.0
Total Split (s)	76.0	76.0	76.0	76.0	76.0	28.0	16.0	44.0
Total Split (%)	63.3%	63.3%	63.3%	63.3%	63.3%	23.3%	13.3%	36.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						Lag	Lead	
Lead-Lag Optimize?						Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None
v/c Ratio	0.31	0.88	0.57	0.27	0.01	0.85	0.77	0.09
Control Delay	10.6	18.5	57.8	12.9	0.2	65.6	53.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	18.5	57.8	12.9	0.2	65.6	53.0	0.3
Queue Length 50th (m)	11.2	221.8	6.0	47.4	0.0	51.6	33.8	0.0
Queue Length 95th (m)	m12.6	m230.0	#25.2	54.8	m0.0	#90.7	#53.2	0.0
Internal Link Dist (m)		866.8		456.2		231.1		552.0
Turn Bay Length (m)	100.0		100.0		100.0		60.0	
Base Capacity (vph)	466	2177	63	2177	1005	335	249	727
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.88	0.57	0.27	0.01	0.78	0.77	0.09
Intersection Summary								
Cycle Length: 120								
Actuated Cycle Length: 120								
Offset: 50 (42%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green								
Natural Cycle: 90								
Control Type: Actuated-Coordinated								
# 95th percentile volume exceeds capacity, queue may be longer.								
Queue shown is maximum after two cycles.								
m Volume for 95th percentile queue is metered by upstream signal.								



HCM Signalized Intersection Capacity Analysis
67: Robertson Davies Dr & Mayfield

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	144	1912	0	36	578	6	0	2	260	191	0	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1789	3579		1789	3579	1601		1603		1789	1601	
Flt Permitted	0.41	1.00		0.05	1.00	1.00		1.00		0.21	1.00	
Satd. Flow (perm)	767	3579		103	3579	1601		1603		395	1601	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	144	1912	0	36	578	6	0	2	260	191	0	66
RTOR Reduction (vph)	0	0	0	0	0	2	0	29	0	0	46	0
Lane Group Flow (vph)	144	1912	0	36	578	4	0	233	0	191	20	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	pm+pt	NA		
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	72.0	72.0		72.0	72.0	72.0		20.0		36.0	36.0	
Effective Green, g (s)	73.0	73.0		73.0	73.0	73.0		21.0		37.0	37.0	
Actuated g/C Ratio	0.61	0.61		0.61	0.61	0.61		0.18		0.31	0.31	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	466	2177		62	2177	973		280		249	493	
v/s Ratio Prot		c0.53			0.16			0.15		c0.07	0.01	
v/s Ratio Perm	0.19			0.35		0.00				c0.17		
v/c Ratio	0.31	0.88		0.58	0.27	0.00		0.83		0.77	0.04	
Uniform Delay, d1	11.3	19.8		14.2	11.0	9.2		47.8		33.6	29.1	
Progression Factor	0.81	0.79		1.13	1.11	1.00		1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.8		33.3	0.3	0.0		18.7		13.2	0.0	
Delay (s)	9.7	17.5		49.4	12.5	9.2		66.5		46.8	29.1	
Level of Service	A	B		D	B	A		E		D	C	
Approach Delay (s)		16.9			14.6			66.5			42.2	
Approach LOS		B			B			E			D	
Intersection Summary												
HCM 2000 Control Delay	22.6		HCM 2000 Level of Service				C					
HCM 2000 Volume to Capacity ratio	0.87											
Actuated Cycle Length (s)	120.0		Sum of lost time (s)				15.0					
Intersection Capacity Utilization	99.6%		ICU Level of Service				F					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

69: McLaughlin Rd & Street I/Collector Road G

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↕	↔	↕	↔	↕	↔	↕
Volume (vph)	89	26	266	31	51	137	8	426
Lane Group Flow (vph)	89	277	266	45	51	197	8	431
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.19	0.39	0.73	0.07	0.12	0.13	0.02	0.28
Control Delay	10.4	4.0	25.8	7.1	9.7	6.4	7.6	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	4.0	25.8	7.1	9.7	6.4	7.6	8.2
Queue Length 50th (m)	4.3	1.2	15.9	1.4	2.4	3.2	0.4	9.3
Queue Length 95th (m)	10.8	11.4	#42.0	5.6	7.4	7.8	1.7	15.5
Internal Link Dist (m)		78.9		92.5		159.7		291.5
Turn Bay Length (m)	15.0		15.0		30.0		30.0	
Base Capacity (vph)	529	782	419	702	411	1521	515	1558
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.35	0.63	0.06	0.12	0.13	0.02	0.28
Intersection Summary								
Cycle Length: 44								
Actuated Cycle Length: 44								
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green								
Natural Cycle: 45								
Control Type: Actuated-Coordinated								
# 95th percentile volume exceeds capacity, queue may be longer.								
Queue shown is maximum after two cycles.								
Splits and Phases: 69: McLaughlin Rd & Street I/Collector Road G								

HCM Signalized Intersection Capacity Analysis
69: McLaughlin Rd & Street I/Collector Road G

2021 Full Buildout Horizon
AM Peak Hour - Baseline Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	26	251	266	31	14	51	137	60	8	426	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86		1.00	0.95		1.00	0.95		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)	1789	1627		1789	1796		1789	3415		1789	3572	
Flt Permitted	0.73	1.00		0.58	1.00		0.50	1.00		0.63	1.00	
Satd. Flow (perm)	1371	1627		1087	1796		944	3415		1183	3572	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	89	26	251	266	31	14	51	137	60	8	426	5
RTOR Reduction (vph)	0	167	0	0	9	0	0	34	0	0	2	0
Lane Group Flow (vph)	89	110	0	266	36	0	51	163	0	8	429	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.8	13.8		13.8	13.8		18.2	18.2		18.2	18.2	
Effective Green, g (s)	14.8	14.8		14.8	14.8		19.2	19.2		19.2	19.2	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.44	0.44		0.44	0.44	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	461	547		365	604		411	1490		516	1558	
v/s Ratio Prot		0.07			0.02			0.05			c0.12	
v/s Ratio Perm	0.06			c0.24			0.05			0.01		
v/c Ratio	0.19	0.20		0.73	0.06		0.12	0.11		0.02	0.28	
Uniform Delay, d1	10.4	10.4		12.8	9.9		7.4	7.3		7.0	7.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.90	0.88	
Incremental Delay, d2	0.2	0.2		7.1	0.0		0.6	0.1		0.1	0.4	
Delay (s)	10.6	10.6		19.9	9.9		8.0	7.5		6.4	7.4	
Level of Service	B	B		B	A		A	A		A	A	
Approach Delay (s)		10.6			18.5			7.6			7.4	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay		10.8			HCM 2000 Level of Service						B	
HCM 2000 Volume to Capacity ratio		0.47										
Actuated Cycle Length (s)		44.0			Sum of lost time (s)					10.0		
Intersection Capacity Utilization		63.5%			ICU Level of Service						B	
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
2: McLaughlin Rd & Old School Rd

2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	95	2	261	87	242	0	364	26	4	420	46
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	4	95	2	261	87	242	0	364	26	4	420	46
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1114	841	443	878	851	377	466				390	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1114	841	443	878	851	377	466				390	
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	96	68	100	0	71	64	100				100	
cM capacity (veh/h)	91	300	615	202	296	670	1095				1169	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	101	590	390	470								
Volume Left	4	261	0	4								
Volume Right	2	242	26	46								
cSH	278	303	1095	1169								
Volume to Capacity	0.36	1.95	0.00	0.00								
Queue Length 95th (m)	12.1	313.7	0.0	0.1								
Control Delay (s)	25.2	467.4	0.0	0.1								
Lane LOS	D	F		A								
Approach Delay (s)	25.2	467.4	0.0	0.1								
Approach LOS	D	F										
Intersection Summary												
Average Delay		179.5										
Intersection Capacity Utilization		75.3%			ICU Level of Service						D	
Analysis Period (min)		15										

Queues
7: Chinguacousy Rd & Mayfield

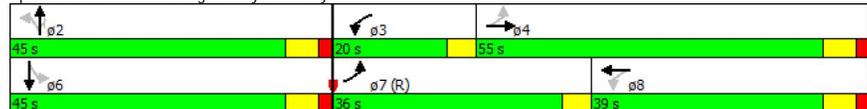
2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	↖	→	↘	↙	↑	↗	↓	
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Configurations	↖	↖↗	↘	↖↗	↖	↑	↗	↖↗
Volume (vph)	105	517	238	922	11	27	135	262
Lane Group Flow (vph)	105	551	238	924	11	27	135	459
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	7	4	3	8		2		6
Permitted Phases	4		8		2		2	
Detector Phase	7	4	3	8	2	2	2	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	25.6	10.0	25.6	25.6	25.6	25.6	25.6
Total Split (s)	36.0	55.0	20.0	39.0	45.0	45.0	45.0	45.0
Total Split (%)	30.0%	45.8%	16.7%	32.5%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	4.0	4.6	4.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	5.6	3.0	5.6	5.6	5.6	5.6	5.6
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	C-Min	Min	Min	Min	None	None	None	None
v/c Ratio	0.28	0.35	0.49	0.76	0.12	0.05	0.25	0.87
Control Delay	11.9	22.2	16.4	35.6	31.7	28.1	5.8	53.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	22.2	16.4	35.6	31.7	28.1	5.8	53.6
Queue Length 50th (m)	9.5	42.8	29.9	73.5	1.9	4.5	0.0	93.9
Queue Length 95th (m)	18.0	61.2	49.5	87.6	6.6	11.0	13.5	#132.7
Internal Link Dist (m)		999.3		312.6		1019.2		908.6
Turn Bay Length (m)	15.0		60.0		60.0			
Base Capacity (vph)	457	1592	531	1210	105	602	602	592
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.35	0.45	0.76	0.10	0.04	0.22	0.78

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 70 (58%), Referenced to phase 7:EBL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 7: Chinguacousy Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
7: Chinguacousy Rd & Mayfield

2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	↖	→	↘	↙	↑	↗	↓	↖	↗	↘	↙	↑	↗	↓	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations	↖	↖↗		↘	↖↗		↖	↑	↗			↖↗			
Volume (vph)	105	517	34	238	922	2	11	27	135	0	262	197			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Total Lost time (s)	3.0	5.6		3.0	5.6		5.6	5.6	5.6		5.6	5.6			
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00		1.00	1.00			
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85		0.94	0.94			
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		1.00	1.00			
Satd. Flow (prot)	1372	3354		1630	3257		1755	1812	1541		1712	1712			
Flt Permitted	0.14	1.00		0.45	1.00		0.17	1.00	1.00		1.00	1.00			
Satd. Flow (perm)	209	3354		765	3257		319	1812	1541		1712	1712			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj. Flow (vph)	105	517	34	238	922	2	11	27	135	0	262	197			
RTOR Reduction (vph)	0	4	0	0	0	0	0	95	0	24	0	0			
Lane Group Flow (vph)	105	547	0	238	924	0	11	27	40	0	435	0			
Heavy Vehicles (%)	33%	8%	5%	12%	12%	20%	4%	6%	6%	6%	4%	8%			
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm		NA	NA			
Protected Phases	7	4		3	8		2		2		6	6			
Permitted Phases	4			8			2		2		6				
Actuated Green, G (s)	72.2	55.2		56.6	43.6		34.6	34.6	34.6		34.6	34.6			
Effective Green, g (s)	73.2	56.2		58.6	44.6		35.6	35.6	35.6		35.6	35.6			
Actuated g/C Ratio	0.61	0.47		0.49	0.37		0.30	0.30	0.30		0.30	0.30			
Clearance Time (s)	4.0	6.6		4.0	6.6		6.6	6.6	6.6		6.6	6.6			
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	375	1570		474	1210		94	537	457		507	507			
v/s Ratio Prot	0.06	c0.16		c0.06	c0.28		0.01				c0.25				
v/s Ratio Perm	0.11			0.19			0.03		0.03						
v/c Ratio	0.28	0.35		0.50	0.76		0.12	0.05	0.09		0.86	0.86			
Uniform Delay, d1	13.4	20.3		18.4	33.1		30.7	30.1	30.5		39.8	39.8			
Progression Factor	1.00	1.00		1.13	0.94		1.00	1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.4	0.1		0.8	2.7		0.6	0.0	0.1		13.5	13.5			
Delay (s)	13.8	20.4		21.6	33.9		31.3	30.2	30.6		53.3	53.3			
Level of Service	B	C		C	C		C	C	C		D	D			
Approach Delay (s)		19.3			31.3			30.5			53.3				
Approach LOS		B			C			C			D				

Intersection Summary

HCM 2000 Control Delay: 32.2, HCM 2000 Level of Service: C
 HCM 2000 Volume to Capacity ratio: 0.71
 Actuated Cycle Length (s): 120.0, Sum of lost time (s): 14.2
 Intersection Capacity Utilization: 69.9%, ICU Level of Service: C
 Analysis Period (min): 15

c Critical Lane Group

Queues
8: McLaughlin Rd & Mayfield

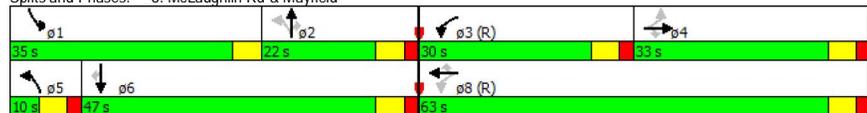
2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖
Volume (vph)	34	367	30	390	1068	773	101	163	109	233	130	28
Lane Group Flow (vph)	34	367	30	390	1068	773	101	163	109	233	130	28
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases		4	4	8	8	8	2	2	2			6
Detector Phase	4	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	33.0	33.0	33.0	30.0	63.0	63.0	10.0	22.0	22.0	35.0	47.0	47.0
Total Split (%)	27.5%	27.5%	27.5%	25.0%	52.5%	52.5%	8.3%	18.3%	18.3%	29.2%	39.2%	39.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Min	Min	Min	C-Max	C-Min	C-Min	None	None	None	None	None	None
v/c Ratio	0.42	0.63	0.07	0.48	0.52	0.64	0.41	0.46	0.36	0.72	0.19	0.07
Control Delay	48.9	40.5	0.6	14.4	9.4	2.1	38.0	55.0	4.0	58.2	38.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	40.5	0.6	14.4	9.4	2.1	38.0	55.0	4.0	58.2	38.8	0.3
Queue Length 50th (m)	7.4	43.2	0.2	27.8	37.2	0.0	17.4	19.4	0.0	52.1	14.0	0.0
Queue Length 95th (m)	18.1	58.1	0.1	65.3	62.5	4.8	27.1	29.6	2.1	73.8	19.0	0.0
Internal Link Dist (m)		388.2			866.8			1234.6			159.7	
Turn Bay Length (m)	80.0		80.0	80.0		80.0	80.0		80.0	80.0		80.0
Base Capacity (vph)	111	795	489	805	2073	1209	247	517	367	463	1240	613
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.46	0.06	0.48	0.52	0.64	0.41	0.32	0.30	0.50	0.10	0.05

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 43 (36%), Referenced to phase 3:WBL and 8:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 8: McLaughlin Rd & Mayfield



HCM Signalized Intersection Capacity Analysis
8: McLaughlin Rd & Mayfield

2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖
Volume (vph)	34	367	30	390	1068	773	101	163	109	233	130	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	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)	1690	3411	1528	1755	3411	1500	1738	3650	1543	1738	3544	1500
Flt Permitted	0.27	1.00	1.00	0.28	1.00	1.00	0.67	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	476	3411	1528	523	3411	1500	1225	3650	1543	1738	3544	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	34	367	30	390	1068	773	101	163	109	233	130	28
RTOR Reduction (vph)	0	0	25	0	0	298	0	98	0	0	23	0
Lane Group Flow (vph)	34	367	5	390	1068	475	101	163	11	233	130	5
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%	5%	0%	5%	5%	3%	8%
Bus Blockages (#/hr)	0	0	2	0	0	2	0	2	0	2	0	2
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases		4	4	8	8	8	2	2	2			6
Actuated Green, G (s)	19.5	19.5	19.5	72.0	72.0	72.0	18.5	10.7	10.7	21.3	22.2	22.2
Effective Green, g (s)	20.5	20.5	20.5	73.0	73.0	73.0	20.5	11.7	11.7	22.3	23.2	23.2
Actuated g/C Ratio	0.17	0.17	0.17	0.61	0.61	0.61	0.17	0.10	0.10	0.19	0.19	0.19
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	81	582	261	805	2075	912	246	355	150	322	685	290
v/s Ratio Prot		c0.11		0.19	0.31		0.03	c0.04		c0.13	0.04	
v/s Ratio Perm	0.07		0.00	0.10		c0.32	0.04		0.01			0.00
v/c Ratio	0.42	0.63	0.02	0.48	0.51	0.52	0.41	0.46	0.07	0.72	0.19	0.02
Uniform Delay, d1	44.4	46.2	41.4	12.8	13.4	13.5	43.8	51.2	49.2	46.0	40.5	39.2
Progression Factor	0.78	0.78	1.00	0.95	0.59	0.17	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	2.2	0.0	1.5	0.7	1.5	1.1	0.9	0.2	7.8	0.1	0.0
Delay (s)	37.9	38.1	41.4	13.7	8.6	3.9	44.9	52.1	49.4	53.8	40.7	39.2
Level of Service	D	D	D	B	A	A	D	D	D	D	D	D
Approach Delay (s)		38.3			7.9			49.4				48.4
Approach LOS		D			A			D				D

Intersection Summary

HCM 2000 Control Delay: 20.8, HCM 2000 Level of Service: C
 HCM 2000 Volume to Capacity ratio: 0.60
 Actuated Cycle Length (s): 120.0, Sum of lost time (s): 20.0
 Intersection Capacity Utilization: 68.2%, ICU Level of Service: C
 Analysis Period (min): 15
 c Critical Lane Group

Queues
9: Hurontario St & Mayfield

2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

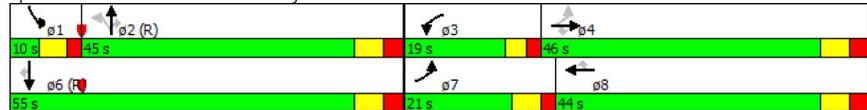
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗
Volume (vph)	400	404	26	182	1840	66	196	563	77	212	168	739
Lane Group Flow (vph)	400	404	26	182	1840	66	196	563	77	212	168	739
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		2		2	1	6	
Permitted Phases	4		4			8	2		2			6
Detector Phase	7	4	4	3	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	44.0	44.0	9.0	44.0	44.0	45.0	45.0	45.0	10.0	45.0	45.0
Total Split (%)	21.0	46.0	46.0	19.0	44.0	44.0	45.0	45.0	45.0	10.0	55.0	55.0
Total Split (%)	17.5%	38.3%	38.3%	15.8%	36.7%	36.7%	37.5%	37.5%	37.5%	8.3%	45.8%	45.8%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	1.37	0.22	0.04	0.55	1.75	0.14	0.54	0.54	0.14	1.70	0.12	0.97
Control Delay	212.0	26.4	1.0	56.8	370.6	0.6	40.1	36.2	0.8	379.4	24.9	49.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	212.0	26.4	1.0	56.8	370.6	0.6	40.1	36.2	0.8	379.4	24.9	49.0
Queue Length 50th (m)	-112.4	33.9	0.0	21.1	-339.0	0.0	37.3	56.4	0.0	-38.2	12.4	97.3
Queue Length 95th (m)	#178.7	37.8	1.5	32.4	#381.0	0.0	61.0	73.5	0.6	#63.0	23.7	#202.2
Internal Link Dist (m)		456.2			1363.3			1227.0			551.5	
Turn Bay Length (m)	170.0		170.0	128.0		128.0	70.0		109.0	190.0		190.0
Base Capacity (vph)	292	1802	634	384	1050	469	380	1088	560	125	1419	778
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.37	0.22	0.04	0.47	1.75	0.14	0.52	0.52	0.14	1.70	0.12	0.95

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 10 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

- Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Hurontario St & Mayfield



HCM Signalized Intersection Capacity Analysis
9: Hurontario St & Mayfield

2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗	↖ ↗
Volume (vph)	400	404	26	182	1840	66	196	563	77	212	168	739
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1601	4948	1506	3079	3318	1190	1722	3349	1440	3001	3476	1471
Flt Permitted	0.09	1.00	1.00	0.95	1.00	1.00	0.65	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	157	4948	1506	3079	3318	1190	1170	3349	1440	3001	3476	1471
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	400	404	26	182	1840	66	196	563	77	212	168	739
RTOR Reduction (vph)	0	0	17	0	0	45	0	53	0	0	182	0
Lane Group Flow (vph)	400	404	9	182	1840	21	196	563	24	212	168	557
Confl. Peds. (#/hr)	12		1	1		12		19	19			
Heavy Vehicles (%)	14%	6%	7%	15%	10%	34%	6%	9%	10%	18%	5%	11%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		2		2	1	6	
Permitted Phases	4		4			8	2		2			6
Actuated Green, G (s)	59.4	42.7	42.7	12.0	37.0	37.0	36.3	36.3	36.3	4.0	46.3	46.3
Effective Green, g (s)	60.7	43.7	43.7	13.0	38.0	38.0	37.3	37.3	37.3	5.0	47.3	47.3
Actuated g/C Ratio	0.51	0.36	0.36	0.11	0.32	0.32	0.31	0.31	0.31	0.04	0.39	0.39
Clearance Time (s)	6.0	7.0	7.0	5.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	292	1801	548	333	1050	376	363	1040	447	125	1370	579
v/s Ratio Prot	c0.20	0.08		0.06	c0.55		0.17			c0.07	0.05	
v/s Ratio Perm	0.49		0.01			0.02	0.17		0.02			c0.38
v/c Ratio	1.37	0.22	0.02	0.55	1.75	0.06	0.54	0.54	0.05	1.70	0.12	0.96
Uniform Delay, d1	37.6	26.4	24.4	50.7	41.0	28.5	34.2	34.3	29.0	57.5	23.1	35.5
Progression Factor	0.65	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.09	1.07
Incremental Delay, d2	186.5	0.1	0.0	1.8	342.5	0.1	5.7	2.0	0.2	345.0	0.2	29.2
Delay (s)	210.9	25.3	24.4	52.5	383.5	28.6	39.9	36.3	29.2	402.2	25.4	67.3
Level of Service	F	C	C	D	F	C	D	D	C	F	C	E
Approach Delay (s)	114.7				343.4			36.5		124.5		
Approach LOS	F				F			D		F		

Intersection Summary

HCM 2000 Control Delay: 201.5, HCM 2000 Level of Service: F
 HCM 2000 Volume to Capacity ratio: 1.41
 Actuated Cycle Length (s): 120.0, Sum of lost time (s): 22.0
 Intersection Capacity Utilization: 122.5%, ICU Level of Service: H
 Analysis Period (min): 15
 c Critical Lane Group

Queues
21: McLaughlin Rd & Collector Road B

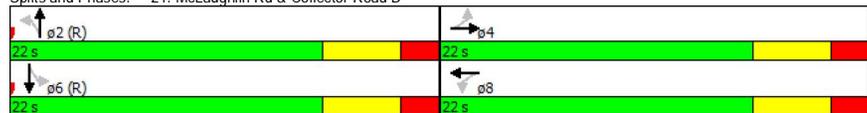
2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Volume (vph)	10	8	31	5	34	287	46	179
Lane Group Flow (vph)	10	22	31	15	34	301	46	206
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4	8	8	2	2	6	6
Permitted Phases		4	8	8	2	2	6	6
Detector Phase		4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.03	0.07	0.10	0.05	0.03	0.10	0.05	0.07
Control Delay	14.7	10.7	15.5	10.7	3.6	2.7	3.6	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	10.7	15.5	10.7	3.6	2.7	3.6	2.6
Queue Length 50th (m)	0.7	0.5	2.1	0.3	0.0	0.0	0.0	0.0
Queue Length 95th (m)	3.2	4.3	6.6	3.5	3.4	8.4	4.2	5.7
Internal Link Dist (m)		139.8		112.0		291.5		261.3
Turn Bay Length (m)	20.0		20.0		20.0		20.0	
Base Capacity (vph)	710	667	710	661	973	2951	888	2915
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.03	0.04	0.02	0.03	0.10	0.05	0.07

Intersection Summary

Cycle Length: 44
 Actuated Cycle Length: 44
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 21: McLaughlin Rd & Collector Road B



HCM Signalized Intersection Capacity Analysis
21: McLaughlin Rd & Collector Road B

2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	10	8	14	31	5	10	34	287	14	46	179	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.90		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1704		1789	1695		1789	3554		1789	3508	
Flt Permitted	0.98	1.00		0.98	1.00		0.62	1.00		0.57	1.00	
Satd. Flow (perm)	1838	1704		1838	1695		1173	3554		1070	3508	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	8	14	31	5	10	34	287	14	46	179	27
RTOR Reduction (vph)	0	13	0	0	9	0	4	0	4	0	9	0
Lane Group Flow (vph)	10	9	0	31	6	0	34	297	0	46	197	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	3.1	3.1		3.1	3.1		28.9	28.9		28.9	28.9	
Effective Green, g (s)	4.1	4.1		4.1	4.1		29.9	29.9		29.9	29.9	
Actuated g/C Ratio	0.09	0.09		0.09	0.09		0.68	0.68		0.68	0.68	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	171	158		171	157		797	2415		727	2383	
v/s Ratio Prot		0.01			0.00			c0.08			0.06	
v/s Ratio Perm	0.01			c0.02			0.03			0.04		
v/c Ratio	0.06	0.06		0.18	0.04		0.04	0.12		0.06	0.08	
Uniform Delay, d1	18.2	18.2		18.4	18.2		2.3	2.5		2.4	2.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2		0.5	0.1		0.1	0.1		0.2	0.1	
Delay (s)	18.3	18.3		18.9	18.3		2.4	2.6		2.5	2.5	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		18.3			18.7			2.6			2.5	
Approach LOS		B			B			A			A	

Intersection Summary

HCM 2000 Control Delay: 4.4, HCM 2000 Level of Service: A
 HCM 2000 Volume to Capacity ratio: 0.13
 Actuated Cycle Length (s): 44.0, Sum of lost time (s): 10.0
 Intersection Capacity Utilization: 32.6%, ICU Level of Service: A
 Analysis Period (min): 15

c Critical Lane Group

Queues
67: Robertson Davies Dr & Mayfield

2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Configurations	↖	↖↗	↖	↖↗	↖	↖	↖	↖
Volume (vph)	66	739	260	2032	191	0	6	2
Lane Group Flow (vph)	66	739	260	2032	191	36	6	146
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		8		2	1	6
Permitted Phases		4	8		8		6	
Detector Phase	4	4	8	8	8	2	1	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	28.0	28.0	28.0	28.0	28.0	28.0	10.0	28.0
Total Split (s)	82.0	82.0	82.0	82.0	82.0	28.0	10.0	38.0
Total Split (%)	68.3%	68.3%	68.3%	68.3%	68.3%	23.3%	8.3%	31.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						Lag	Lead	
Lead-Lag Optimize?						Yes	Yes	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None
v/c Ratio	0.81	0.26	0.50	0.73	0.15	0.08	0.04	0.63
Control Delay	80.1	1.1	2.7	5.4	0.0	0.4	42.0	56.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.1	1.1	2.7	5.4	0.0	0.4	42.0	56.0
Queue Length 50th (m)	12.0	4.4	2.3	38.8	0.0	0.0	1.3	29.8
Queue Length 95th (m)	#43.8	7.6	m2.3	m9.5	m0.0	0.0	4.9	48.4
Internal Link Dist (m)		866.8		456.2		231.1		552.0
Turn Bay Length (m)	100.0		100.0		100.0		60.0	
Base Capacity (vph)	81	2794	523	2794	1291	535	171	451
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.26	0.50	0.73	0.15	0.07	0.04	0.32

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 115 (96%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 67: Robertson Davies Dr & Mayfield



HCM Signalized Intersection Capacity Analysis
67: Robertson Davies Dr & Mayfield

2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖	↖	↖	↖	↖
Volume (vph)	66	739	0	260	2032	191	0	0	36	6	2	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1789	3579		1789	3579	1601		1601		1789	1605	
Flt Permitted	0.05	1.00		0.36	1.00	1.00		1.00		0.54	1.00	
Satd. Flow (perm)	103	3579		671	3579	1601		1601		1024	1605	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	66	739	0	260	2032	191	0	0	36	6	2	144
RTOR Reduction (vph)	0	0	0	0	0	50	0	32	0	0	12	0
Lane Group Flow (vph)	66	739	0	260	2032	141	0	4	0	6	134	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	pm+pt	NA		
Protected Phases		4		8		8	2			6		
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	87.9	87.9		87.9	87.9	87.9		13.3		20.1	20.1	
Effective Green, g (s)	88.9	88.9		88.9	88.9	88.9		14.3		21.1	21.1	
Actuated g/C Ratio	0.74	0.74		0.74	0.74	0.74		0.12		0.18	0.18	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0		6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	76	2651		497	2651	1186		190		191	282	
v/s Ratio Prot		0.21			0.57			0.00		0.00	0.08	
v/s Ratio Perm	c0.64			0.39		0.09				0.01		
v/c Ratio	0.87	0.28		0.52	0.77	0.12		0.02		0.03	0.48	
Uniform Delay, d1	11.3	5.1		6.6	9.3	4.4		46.7		41.0	44.5	
Progression Factor	1.48	0.22		0.39	0.69	0.00		1.00		1.00	1.00	
Incremental Delay, d2	68.0	0.2		0.4	0.2	0.0		0.0		0.1	1.3	
Delay (s)	84.7	1.4		2.9	6.6	0.0		46.7		41.1	45.8	
Level of Service	F	A		A	A	A		D		D	D	
Approach Delay (s)		8.2			5.7			46.7			45.6	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay 8.5 HCM 2000 Level of Service A
 HCM 2000 Volume to Capacity ratio 0.83
 Actuated Cycle Length (s) 120.0 Sum of lost time (s) 15.0
 Intersection Capacity Utilization 81.3% ICU Level of Service D
 Analysis Period (min) 15
 c Critical Lane Group

Queues
69: McLaughlin Rd & Street I/Collector Road G

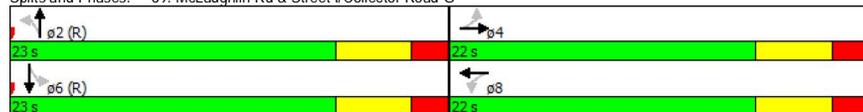
2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Volume (vph)	5	31	60	26	251	426	14	137
Lane Group Flow (vph)	5	82	60	34	251	692	14	226
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases		4		8		2		6
Detector Phase		4		8		2		6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	23.0	23.0	23.0	23.0
Total Split (%)	48.9%	48.9%	48.9%	48.9%	51.1%	51.1%	51.1%	51.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
v/c Ratio	0.02	0.23	0.24	0.10	0.30	0.27	0.03	0.09
Control Delay	13.6	9.3	17.1	12.3	6.2	3.0	5.0	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	9.3	17.1	12.3	6.2	3.0	5.0	2.9
Queue Length 50th (m)	0.3	2.1	4.1	1.7	8.5	6.7	0.4	2.0
Queue Length 95th (m)	2.1	9.1	10.4	6.2	22.7	15.1	2.2	5.8
Internal Link Dist (m)		78.9		92.5		159.7		291.5
Turn Bay Length (m)	15.0		15.0		30.0		30.0	
Base Capacity (vph)	522	676	500	691	848	2554	540	2504
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.12	0.12	0.05	0.30	0.27	0.03	0.09

Intersection Summary

Cycle Length: 45
 Actuated Cycle Length: 45
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 69: McLaughlin Rd & Street I/Collector Road G



HCM Signalized Intersection Capacity Analysis
69: McLaughlin Rd & Street I/Collector Road G

2021 Full Buildout Horizon
PM Peak Hour - Baseline Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	5	31	51	60	26	8	251	426	266	14	137	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.91		1.00	0.96		1.00	0.94		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1708		1789	1817		1789	3372		1789	3367	
Flt Permitted	0.73	1.00		0.70	1.00		0.61	1.00		0.39	1.00	
Satd. Flow (perm)	1384	1708		1325	1817		1150	3372		732	3367	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	31	51	60	26	8	251	426	266	14	137	89
RTOR Reduction (vph)	0	44	0	0	7	0	0	96	0	0	32	0
Lane Group Flow (vph)	5	38	0	60	27	0	251	596	0	14	194	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases		4			8			2			6	
Actuated Green, G (s)	5.2	5.2		5.2	5.2		27.8	27.8		27.8	27.8	
Effective Green, g (s)	6.2	6.2		6.2	6.2		28.8	28.8		28.8	28.8	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.64	0.64		0.64	0.64	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	190	235		182	250		736	2158		468	2154	
v/s Ratio Prot		0.02			0.01			0.18			0.06	
v/s Ratio Perm	0.00			c0.05			c0.22			0.02		
v/c Ratio	0.03	0.16		0.33	0.11		0.34	0.28		0.03	0.09	
Uniform Delay, d1	16.8	17.1		17.5	17.0		3.7	3.5		3.0	3.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3		1.1	0.2		1.3	0.3		0.1	0.1	
Delay (s)	16.8	17.4		18.6	17.2		5.0	3.9		3.1	3.2	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		17.4			18.1			4.2			3.2	
Approach LOS		B			B			A			A	

Intersection Summary

HCM 2000 Control Delay: 5.8, HCM 2000 Level of Service: A
 HCM 2000 Volume to Capacity ratio: 0.34
 Actuated Cycle Length (s): 45.0, Sum of lost time (s): 10.0
 Intersection Capacity Utilization: 46.1%, ICU Level of Service: A
 Analysis Period (min): 15

c Critical Lane Group

APPENDIX G

Intersection Capacity Analysis – 2021 Full Build-Out – With Improvements



HCM Unsignalized Intersection Capacity Analysis
2: McLaughlin Rd & Old School Rd

2021 Full Buildout Horizon
AM Peak Hour - With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔		↔	↔			↔		↔	↔	↔	
Volume (veh/h)	46	87	0	26	95	4	2	420	261	242	364	4	
Sign Control		Stop			Stop			Free			Free		
Grade		0%			0%			0%			0%		
Peak Hour 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	
Hourly flow rate (vph)	46	87	0	26	95	4	2	420	261	242	364	4	
Pedestrians													
Lane Width (m)													
Walking Speed (m/s)													
Percent Blockage													
Right turn flare (veh)													
Median type						TWLTL		TWLTL					
Median storage (veh)						2		2					
Upstream signal (m)													
pX, platoon unblocked													
vC, conflicting volume	1456	1535	366	1448	1406	550	368						681
vC1, stage 1 conf vol	850	850		554	554								
vC2, stage 2 conf vol	606	685		894	852								
vCu, unblocked vol	1456	1535	366	1448	1406	550	368						681
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1						4.1
IC, 2 stage (s)	6.1	5.5		6.1	5.5								
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2						2.2
p0 queue free %	66	51	100	84	62	99	100						73
cM capacity (veh/h)	135	178	679	158	249	534	1191						912
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1							
Volume Total	46	87	26	99	683	610							
Volume Left	46	0	26	0	2	242							
Volume Right	0	0	0	4	261	4							
cSH	135	178	158	255	1191	912							
Volume to Capacity	0.34	0.49	0.16	0.39	0.00	0.27							
Queue Length 95th (m)	10.5	18.1	4.3	13.3	0.0	8.1							
Control Delay (s)	44.9	43.3	32.2	27.9	0.0	6.2							
Lane LOS	E	E	D	D	A	A							
Approach Delay (s)	43.8		28.8		0.0	6.2							
Approach LOS	E		D										

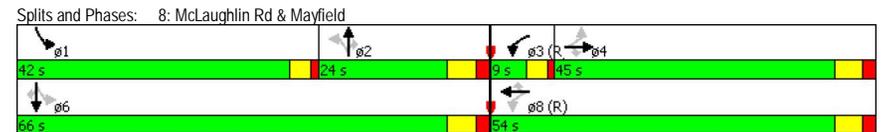
Intersection Summary			
Average Delay		8.5	
Intersection Capacity Utilization		90.1%	ICU Level of Service E
Analysis Period (min)		15	

Queues
8: McLaughlin Rd & Mayfield

2021 Full Buildout Horizon
AM Peak Hour - With Improvements

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	17	1096	204	111	358	143	22	88	251	718	182	5
Lane Group Flow (vph)	17	1096	204	111	358	143	22	88	251	718	182	5
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	3	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	8.0	21.0	21.0	21.0	21.0	21.0	8.0	21.0	21.0
Total Split (s)	45.0	45.0	45.0	9.0	54.0	54.0	24.0	24.0	24.0	42.0	66.0	66.0
Total Split (%)	37.5%	37.5%	37.5%	7.5%	45.0%	45.0%	20.0%	20.0%	20.0%	35.0%	55.0%	55.0%
Yellow Time (s)	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes		
Recall Mode	Min	Min	Min	C-Max	C-Min	C-Min	None	None	None	Min	Min	Min
v/c Ratio	0.05	0.96	0.32	0.52	0.24	0.19	0.15	0.20	0.82	0.97	0.11	0.01
Control Delay	19.5	48.1	3.9	21.5	9.7	3.1	47.1	46.6	44.5	54.0	17.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2	0.0	0.0
Total Delay	19.5	48.1	3.9	21.5	9.7	3.1	47.1	46.6	44.5	67.2	17.0	0.0
Queue Length 50th (m)	2.2	137.8	8.1	5.6	16.3	2.5	4.6	9.7	27.1	138.8	11.8	0.0
Queue Length 95th (m)	m4.2	#171.3	3.8	#32.2	42.4	15.0	12.2	17.2	55.6	#179.0	17.4	0.0
Internal Link Dist (m)	388.2		866.8		1234.6		159.7					
Turn Bay Length (m)	80.0		80.0	80.0		80.0	80.0		80.0	80.0		80.0
Base Capacity (vph)	319	1137	631	213	1512	744	184	577	356	740	1801	793
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	40	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.96	0.32	0.52	0.24	0.19	0.12	0.15	0.71	1.03	0.10	0.01

Intersection Summary	
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	113 (94%), Referenced to phase 3:WBL and 8:WBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.



HCM Signalized Intersection Capacity Analysis
8: McLaughlin Rd & Mayfield

2021 Full Buildout Horizon
AM Peak Hour - With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	17	1096	204	111	358	143	22	88	251	718	182	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	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)	1690	3411	1528	1755	3411	1500	1738	3650	1543	1738	3544	1500
Flt Permitted	0.54	1.00	1.00	0.09	1.00	1.00	0.64	1.00	1.00	0.58	1.00	1.00
Satd. Flow (perm)	957	3411	1528	172	3411	1500	1166	3650	1543	1060	3544	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	17	1096	204	111	358	143	22	88	251	718	182	5
RTOR Reduction (vph)	0	0	122	0	0	80	0	0	117	0	0	3
Lane Group Flow (vph)	17	1096	82	111	358	63	22	88	134	718	182	2
Heavy Vehicles (%)	8%	7%	6%	4%	7%	8%	5%	0%	5%	5%	3%	8%
Bus Blockages (#/hr)	0	0	2	0	0	2	0	0	2	0	0	2
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4	3	8	8	2	2	1	6	6	6	6
Permitted Phases	4	4	8	8	2	2	6	6	6	6	6	6
Actuated Green, G (s)	39.0	39.0	39.0	52.2	52.2	52.2	13.8	13.8	13.8	55.8	55.8	55.8
Effective Green, g (s)	40.0	40.0	40.0	53.2	53.2	53.2	14.8	14.8	14.8	56.8	56.8	56.8
Actuated g/C Ratio	0.33	0.33	0.33	0.44	0.44	0.44	0.12	0.12	0.12	0.47	0.47	0.47
Clearance Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	319	1137	509	210	1512	665	143	450	190	722	1677	710
v/s Ratio Prot	c0.32	c0.32	c0.04	0.10	0.02	0.02	0.02	0.09	c0.15	0.05	0.05	0.00
v/s Ratio Perm	0.02	0.05	0.16	0.53	0.24	0.10	0.15	0.20	0.71	0.99	0.11	0.00
v/c Ratio	0.05	0.96	0.16	0.53	0.24	0.10	0.15	0.20	0.71	0.99	0.11	0.00
Uniform Delay, d1	27.1	39.3	28.2	25.8	20.8	19.4	47.0	47.3	50.5	29.0	17.5	16.7
Progression Factor	0.69	0.74	0.47	0.49	0.43	0.70	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	17.4	0.1	9.0	0.4	0.3	0.5	0.2	11.4	31.9	0.0	0.0
Delay (s)	18.9	46.3	13.4	21.7	9.3	13.9	47.5	47.5	61.9	60.9	17.6	16.7
Level of Service	B	D	B	C	A	B	D	D	E	E	B	B
Approach Delay (s)	40.9	40.9	12.6	12.6	12.6	12.6	57.5	57.5	57.5	57.5	52.0	52.0
Approach LOS	D	D	B	B	B	B	E	E	E	E	D	D

Intersection Summary			
HCM 2000 Control Delay	40.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	97.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
2: McLaughlin Rd & Old School Rd

2021 Full Buildout Horizon
PM Peak Hour - With Improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	4	95	2	261	87	242	0	364	26	4	420	46
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	4	95	2	261	87	242	0	364	26	4	420	46
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLT				TWLT	
Median storage (veh)							2				2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1114	841	443	878	851	377	466				390	
vC1, stage 1 conf vol	451	451		377	377							
vC2, stage 2 conf vol	662	390		500	474							
vCu, unblocked vol	1114	841	443	878	851	377	466				390	
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
IC, 2 stage (s)	6.1	5.5		6.1	5.5							
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	98	80	100	36	82	64	100				100	
cM capacity (veh/h)	229	478	615	409	475	670	1095				1169	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	4	97	261	329	390	470						
Volume Left	4	0	261	0	0	4						
Volume Right	0	2	0	242	26	46						
cSH	229	481	409	604	1700	1169						
Volume to Capacity	0.02	0.20	0.64	0.54	0.23	0.00						
Queue Length 95th (m)	0.4	5.7	32.6	24.9	0.0	0.1						
Control Delay (s)	21.0	14.4	28.0	17.9	0.0	0.1						
Lane LOS	C	B	D	C		A						
Approach Delay (s)	14.6		22.4		0.0	0.1						
Approach LOS	B		C									

Intersection Summary			
Average Delay	9.5		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

Queues
9: Hurontario St & Mayfield

2021 Full Buildout Horizon
PM Peak Hour - With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔	↔	↔	↔	↔↔	↔	↔
Volume (vph)	400	404	26	182	1840	66	196	563	77	212	168	739
Lane Group Flow (vph)	400	404	26	182	1840	66	196	563	77	212	168	739
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	pm+ov
Protected Phases	7	4		3	8			2		1	6	7
Permitted Phases	4		4	8		8	2		2			6
Detector Phase	7	4	4	3	8	8	2	2	2	1	6	7
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	44.0	44.0	8.0	11.0	11.0	11.0	11.0	11.0	10.0	45.0	10.0
Total Split (%)	26.0	62.0	62.0	13.0	49.0	49.0	31.0	31.0	31.0	14.0	45.0	26.0
Total Split (%)	21.7%	51.7%	51.7%	10.8%	40.8%	40.8%	25.8%	25.8%	25.8%	11.7%	37.5%	21.7%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	6.0	6.0	3.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min	None	C-Min	None
v/c Ratio	1.06	0.17	0.03	0.40	1.08	0.12	0.84	0.84	0.18	0.94	0.15	0.87
Control Delay	90.6	7.3	0.3	15.0	83.1	0.5	75.0	58.0	1.0	101.6	31.4	35.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.6	7.3	0.3	15.0	83.1	0.5	75.0	58.0	1.0	101.6	31.4	35.8
Queue Length 50th (m)	-90.4	14.2	0.0	18.2	-176.9	0.0	44.2	66.8	0.0	26.1	15.4	125.9
Queue Length 95th (m)	#150.2	16.8	0.5	29.4	#206.1	0.0	#82.3	#87.5	0.0	#50.0	24.2	#219.3
Internal Link Dist (m)		456.2			1363.3			1227.0			551.5	
Turn Bay Length (m)	170.0		170.0	128.0		128.0	70.0		109.0	190.0		190.0
Base Capacity (vph)	378	2353	782	456	1708	532	243	697	427	225	1129	849
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.06	0.17	0.03	0.40	1.08	0.12	0.81	0.81	0.18	0.94	0.15	0.87

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Hurontario St & Mayfield



HCM Signalized Intersection Capacity Analysis
9: Hurontario St & Mayfield

2021 Full Buildout Horizon
PM Peak Hour - With Improvements

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔	↔	↔	↔	↔↔	↔	↔
Volume (vph)	400	404	26	182	1840	66	196	563	77	212	168	739
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	3.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0	3.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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)	1601	4948	1506	1587	4768	1192	1722	3349	1425	3001	3476	1471
Flt Permitted	0.09	1.00	1.00	0.51	1.00	1.00	0.65	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	147	4948	1506	844	4768	1192	1170	3349	1425	3001	3476	1471
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	400	404	26	182	1840	66	196	563	77	212	168	739
RTOR Reduction (vph)	0	0	14	0	0	42	0	62	0	0	0	17
Lane Group Flow (vph)	400	404	12	182	1840	24	196	563	15	212	168	722
Confl. Peds. (#/hr)	12		1	1		12		19		19		
Heavy Vehicles (%)	14%	6%	7%	15%	10%	34%	6%	9%	10%	18%	5%	11%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	pm+ov
Protected Phases	7	4		3	8			2		1	6	7
Permitted Phases	4		4	8		8	2		2			6
Actuated Green, G (s)	68.9	56.1	56.1	50.8	42.0	42.0	23.1	23.1	23.1	8.0	37.1	60.0
Effective Green, g (s)	69.9	57.1	57.1	52.8	43.0	43.0	24.1	24.1	24.1	9.0	38.1	62.0
Actuated g/C Ratio	0.58	0.48	0.48	0.44	0.36	0.36	0.20	0.20	0.20	0.08	0.32	0.52
Clearance Time (s)	4.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	375	2354	716	432	1708	427	234	672	286	225	1103	760
v/s Ratio Prot	c0.21	0.08		0.03	0.39		0.17			0.07	0.05	c0.19
v/s Ratio Perm	c0.41		0.01	0.15		0.02	0.17		0.01			0.30
v/c Ratio	1.07	0.17	0.02	0.42	1.08	0.06	0.84	0.05	0.94	0.15	0.95	1.07
Uniform Delay, d1	38.5	18.0	16.6	21.3	38.5	25.2	46.1	38.7	55.2	29.4	27.5	38.5
Progression Factor	0.77	0.39	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.07	1.08
Incremental Delay, d2	64.9	0.0	0.0	0.7	45.9	0.1	28.5	11.9	0.4	43.9	0.3	20.9
Delay (s)	94.3	7.1	16.6	21.9	84.4	25.3	74.6	58.0	39.1	98.5	31.6	50.7
Level of Service	F	A	B	C	F	C	E	E	D	F	C	D
Approach Delay (s)	49.4				77.1			60.1			56.8	
Approach LOS	D				E			E			E	

Intersection Summary

HCM 2000 Control Delay: 64.8
 HCM 2000 Level of Service: E
 HCM 2000 Volume to Capacity ratio: 1.10
 Actuated Cycle Length (s): 120.0
 Sum of lost time (s): 20.0
 Intersection Capacity Utilization: 105.5%
 ICU Level of Service: G
 Analysis Period (min): 15
 c Critical Lane Group