



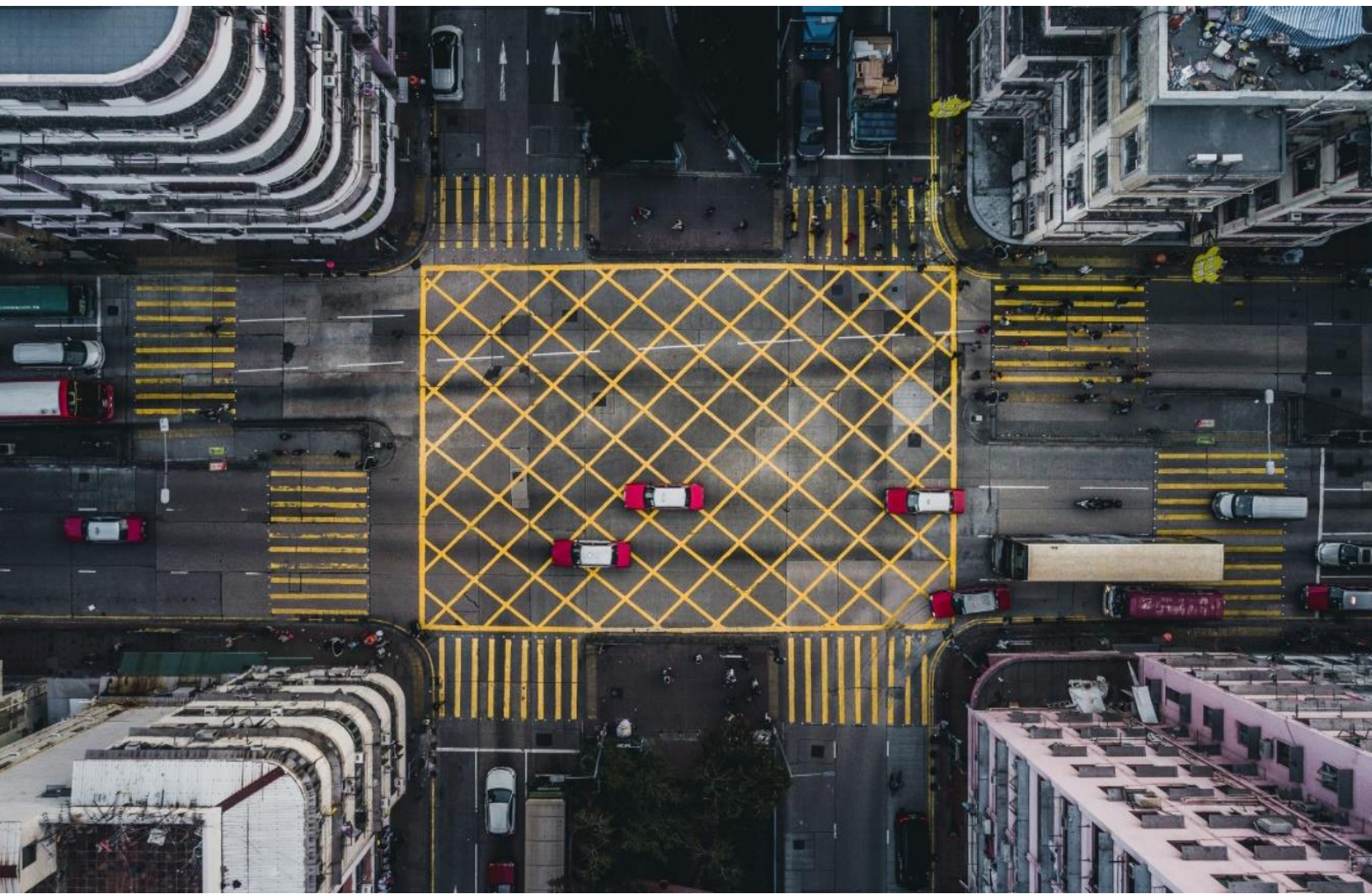
Traffic Impact Study

Oakwood Drive Residential Development

Branthaven Belmont Oakwood Inc.

20 September 2022

→ The Power of Commitment



Executive summary

GHD Limited was retained to prepare a Traffic Impact Study in support of the proposed residential development located on Oakwood Drive in the City of Niagara Falls

This report determines the site related traffic and subsequent traffic related impacts on the adjacent road network during the weekday a.m. and p.m. peak hours. These impacts are based on the projected future background traffic and road network conditions derived for a 2024, 2029 and 2034 future planning horizon year.

The proposed draft plan of subdivision prepared by Orchard Design Studio Inc. is dated March 2022 and consists of townhouses with the following unit types:

- 46 3-Storey Rear-Lane Townhouse (with a secondary unit)
- 67 3-Storey Townhouse
- 54 3-Storey Back-to-Back Townhouses
- 69 2-Storey Townhouses

Including the 46 3-storey rear-lane townhouses with a secondary unit, the proposed residential development consists of a total of 282 dwelling units.

Access to the development is proposed from Oakwood Drive via three accesses. The first access is located on the south approach of the existing signalized commercial plaza access; the second is located along Oakwood Drive near the southern limit of the property and will be unsignalized and lastly, the third access is a right-in/right-out access onto Oakwood Drive located near the northeast limit of the subject site.

Future traffic volumes for the 2024, 2029 and 2034 planning horizons included corridor growth rates that considered the following background developments:

- Thundering Waters
- Grand Niagara Secondary Plans

Based on ITE Trip Generation rates, the proposed subdivision is expected to generate a total of 145 new two-way trips during the weekday a.m. peak hour consisting of 40 inbound and 105 outbound trips and 171 new two-way trips during the weekday p.m. peak hour consisting of 101 inbound and 70 outbound trips.

Niagara Region is planning to improve the intersection of Oakwood Drive and McLeod Road to include a dual westbound left turn lane and is reviewing the addition of a dual right turn lane in the eastbound direction. Both of these geometric improvements were included in the analysis of future traffic conditions.

The overall impact of the development generated traffic is found to be negligible to the operation of the study area intersections and traffic flow along the study area road network.

Under future total traffic conditions, the signal timings for all signalized intersections along McLeod Road were optimized to reduce v/c ratios and delays.

A sightline assessment was conducted at the proposed south leg of the commercial plaza's south access (existing signalized intersection). The assessment was undertaken per TAC Guidelines for two scenarios: a right-turn from the minor road and a left-turn from the major road (Cases B2 and F respectively). The result of the sightline assessment concluded that there is sufficient available sightlines to accommodate the expected design vehicle.

Application of the current City of Niagara Falls By-Law parking rates to the subject site results in a requirement of 377 parking spaces. The subject site provides a total of 630 spaces, exceeding the City's By-law requirement

We trust that this satisfies your requirements, but do not hesitate to contact the undersigned if you have any questions.

Sincerely,

GHD



William Maria, P. Eng.

Transportation Planning Lead

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1. Introduction

1.1 Retainer and Objective

GHD Limited was retained to prepare a Traffic Impact Study in support of the proposed residential development located on Oakwood Drive in the City of Niagara Falls

The site location is illustrated in **Figure 1**.

The purpose of this study is to:

- Establish baseline traffic conditions for the study area in 2022 and determine future background operating conditions for a future planning horizon in 2024, 2029 and 2034.
- Utilize Institute of Transportation Engineer's (ITE) Trip Generation data and first principles to estimate the site trips generated by the proposed development and distribute the traffic to the adjacent road network.
- Determine future operating traffic conditions during the weekday peak periods through intersection capacity analysis.
- Review the proposed site plan and access design and compare to the Region's and City design standards.

1.2 Study Team

The GHD team involved in the preparation of the study are:

- William Maria, P. Eng., Transportation Planning Lead
- Rafael Andrenacci, B.Eng., Transportation Planner



Figure 1 Site Location

2. Site Characteristics

2.1 Study Area

Based on the approved Terms of Reference for the study provided in **Appendix A**, the following intersections were included in the study area:

- McLeod Road and Montrose Road;
- McLeod Road and the southbound Queen Elizabeth Way off-ramp/Niagara Square Drive;
- McLeod Road and the northbound Queen Elizabeth Way off-ramp;
- McLeod Road and Oakwood Drive;
- Oakwood Drive and Montrose Road;

- Oakwood Drive and the north Commercial Access;
- Oakwood Drive and the south Commercial Access/Site Access #1;
- Oakwood Drive and Site Access #2; and
- Oakwood Drive and the Right-In/Right-Out Access

2.2 Proposed Development Content

A site plan was prepared by Orchard Design Studio Inc., dated May 2022 and is shown in **Figure 2**. The proposed residential development consists of 236 townhouses with the following unit type breakdown:

- 46 3-Storey Rear-Lane Townhouse (with a secondary unit)
- 67 3-Storey Townhouse
- 54 3-Storey Back-to-Back Townhouses
- 69 2-Storey Townhouses

Including the 46 proposed 3-Storey Rear-Lane Townhouses containing a secondary unit, the proposed residential development consists of a total of 282 dwelling units

Access to the proposed development is proposed via three accesses; the first is located at the existing signalized intersection located south of the commercial plaza along Oakwood Drive; the second is proposed along Oakwood Drive near the southern limit of the subject site and the third is a right-in/right-out driveway located near the northeast limit of the subject site.



Figure 2 Site Plan

3. Existing Conditions

3.1 Existing Road Network

Oakwood Drive is a north-south collector road under the jurisdiction of the City of Niagara Falls. In the study area it has a four-lane cross-section between McLeod Road and the south commercial access and is reduced to a two-lane cross-section west and south of the southern commercial access and north of McLeod Road. The intersection of Oakwood Drive and McLeod Road is signalized with a through-right and auxiliary left-turn lane in the southbound direction and one right-turn, one through-left and one auxiliary left-turn lane in the northbound approach. The north commercial access along Oakwood Drive is signalized with a through lane in both directions with a northbound through-left turn lane and southbound through-right turn lane. The south commercial access along Oakwood Drive is also signalized, with one through lane, one right-turn lane and one provisional auxiliary left-turn lane in the westbound direction and one through lane and one auxiliary left-turn lane in the eastbound direction. The intersection of Oakwood Drive and Montrose Road is unsignalized, with the stop control located on the minor approach on Oakwood Drive, with a left-right turn lane. The speed limit along Oakwood Drive is 60 km/h from the south at Montrose Road and decreases to 50 km/h as you approach the subject site's location from the south.

McLeod Road is an east-west regional road under the jurisdiction of the Region of Niagara. In the study area, it has a four-lane cross-section which increases to a six-lane cross-section between Montrose Road and Oakwood Drive. The intersection with Montrose Road is signalized with two through-lanes and one auxiliary left-turn lane in both directions, one right-turn lane in the westbound direction and one through-right turn lane in the eastbound direction. Both intersections with the QEW off-ramps are signalized with three through lanes in both directions. In addition to the through lanes, there is one auxiliary westbound left-turn and one auxiliary right-turn lane at the intersection with the southbound QEW off-ramp that provides access to Niagara Square Drive. The intersection with Oakwood Drive is also signalized, with one right-turn, two through lanes and one auxiliary left-turn lane in the eastbound direction, and one through-right one through and one auxiliary left-turn lane in the westbound direction. The posted speed along McLeod Road is 50 km/h.

Montrose Road is a north-south regional road under the jurisdiction of the Region of Niagara. In the study area it has a two-lane cross-section from the south which increases to a four-lane cross-section north of Canadian Drive. The intersection of Montrose Road and McLeod Road is signalized with one auxiliary left-turn and one through lane in both direction, one through-right turn lane in the southbound direction and a channelized right-turn lane in the northbound direction. The intersection with Oakwood Drive is unsignalized with the stop-control only located on the minor approach along Oakwood Drive. The posted speed limit along Montrose is 50 km/h from McLeod Road south towards Canadian Drive (along the frontage of Niagara Square). The speed limit increases to 60 km/h south of Canadian Drive and increases again to 70 km/h as it approaches Oakwood Drive.

Queen Elizabeth Way off-ramps are under the jurisdiction of the MTO and both the northbound and southbound QEW off-ramps are signalized. The northbound off-ramp has a dual left-turn lane and a right-turn lane while the southbound off-ramp has a dual left-turn lane, a through-right lane and a right-turn lane.

The existing lane configurations for each study intersection is shown in **Figure 3**.

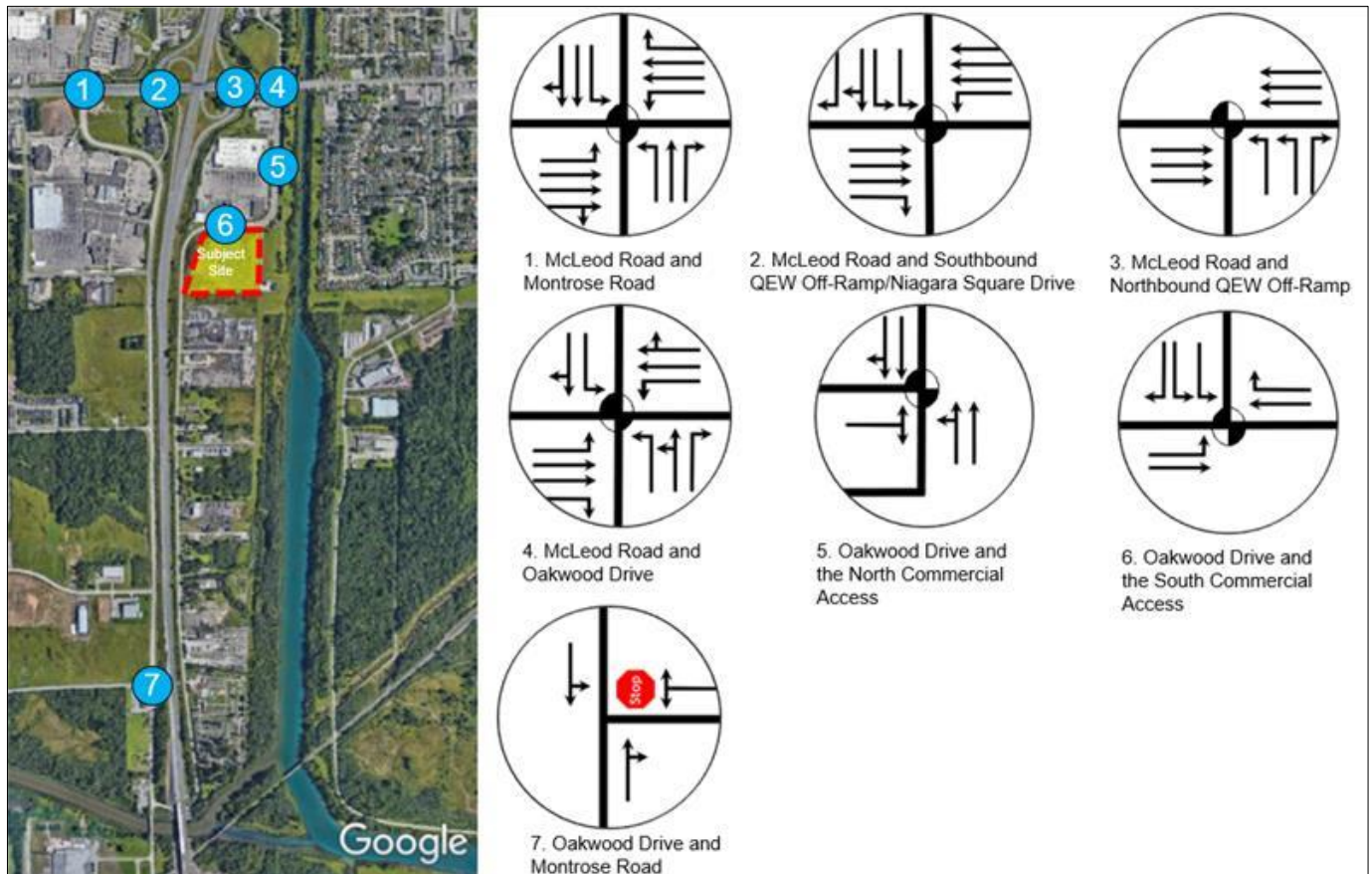


Figure 3 Existing Lane Configuration

3.2 Pedestrian and Bicycle Routes

Pedestrian sidewalks are available on both sides of the road along McLeod Road throughout the study area. Between McLeod Road and the south commercial access, Oakwood Drive has a sidewalk provision only along the west side of the road. Along Montrose Road, sidewalks are provided on both sides of the road north of the intersection with McLeod Road and only on the west side of the road south of the intersection.

Within the study area, a bicycle lane is provided on both sides of the road along McLeod Road. A bicycle lane is also provided along both sides of the road on Oakwood Drive and begins from the north just south of the intersection with McLeod Road and end just west of the south commercial access. Millennium Trail begins within the study area in the northeast corner of the intersection of McLeod Road and Oakwood Drive and is found between Oakwood Drive and the Hydro canal and runs north towards Lundy’s Lane.

All existing pedestrian and cycling amenities within the study area are shown on **Figure 4**.



Figure 4 Existing Pedestrian and Cycling Facilities

3.3 Transit Services

Niagara Falls Transit currently offers the following routes within or near the study area:

Route 101 operates in the east/west direction along McLeod Road within the study area. The route has a 60-minute headway and runs between Niagara Square and the Main Street and Ferry Street Hub along Dorchester Road, Dunn Street, Stanley Avenue and Main Street

Route 103 operates in the east/west direction along McLeod Road within the study area. Similar to Route 101, Route 103 has a 60-minute headway and runs between Niagara Square and the Main Street and Ferry Street Hub. East of the study area, Route 103 generally operates in the north/south direction along Drummond Road to and from the Main Street and Ferry Street Hub

Route 112 operates similarly to routes 101 and 103 within the study area, as it begins at Niagara Square in the west, operates through the study area along McLeod Road. East of the study area, the route continues along Portage Road with the eastern terminus found at Gunning and Willoughby.

The nearest stop to the proposed development is found in the commercial plaza to the north. All three bus routes service the transit stop found within the plaza.

All transit stops within the study area are show on **Figure 5**, with the transit routes provided in **Figure 6**, **Figure 7** and **Figure 8**.



Figure 5 Transit Stops

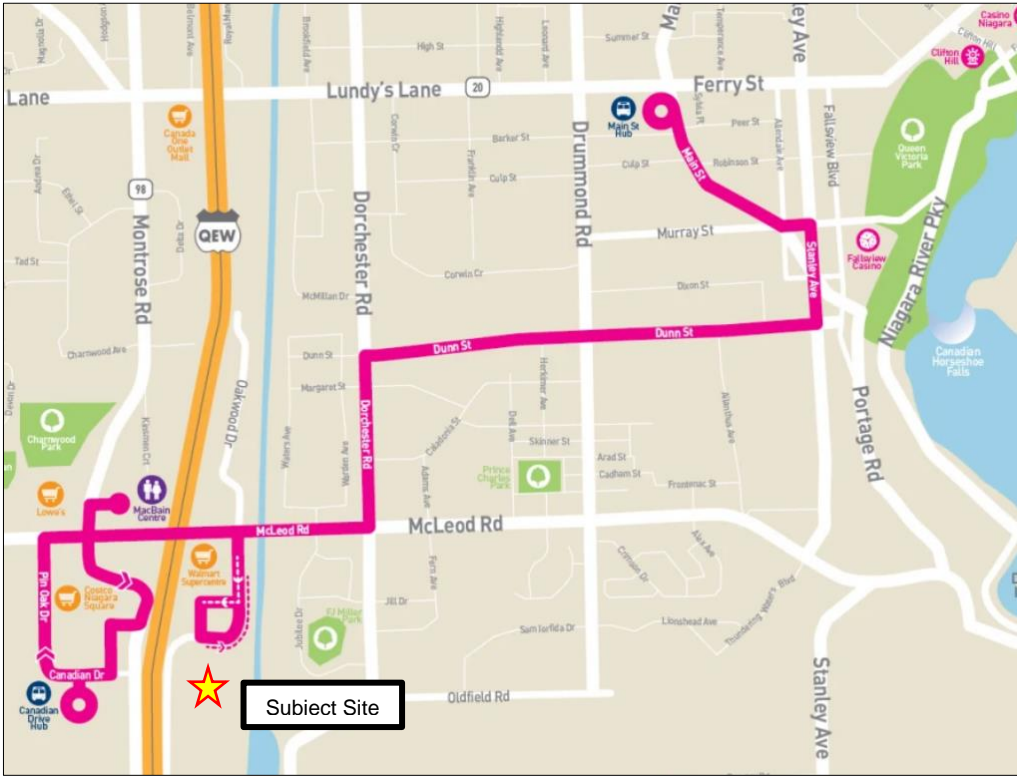


Figure 6 Niagara Falls Transit Route 103

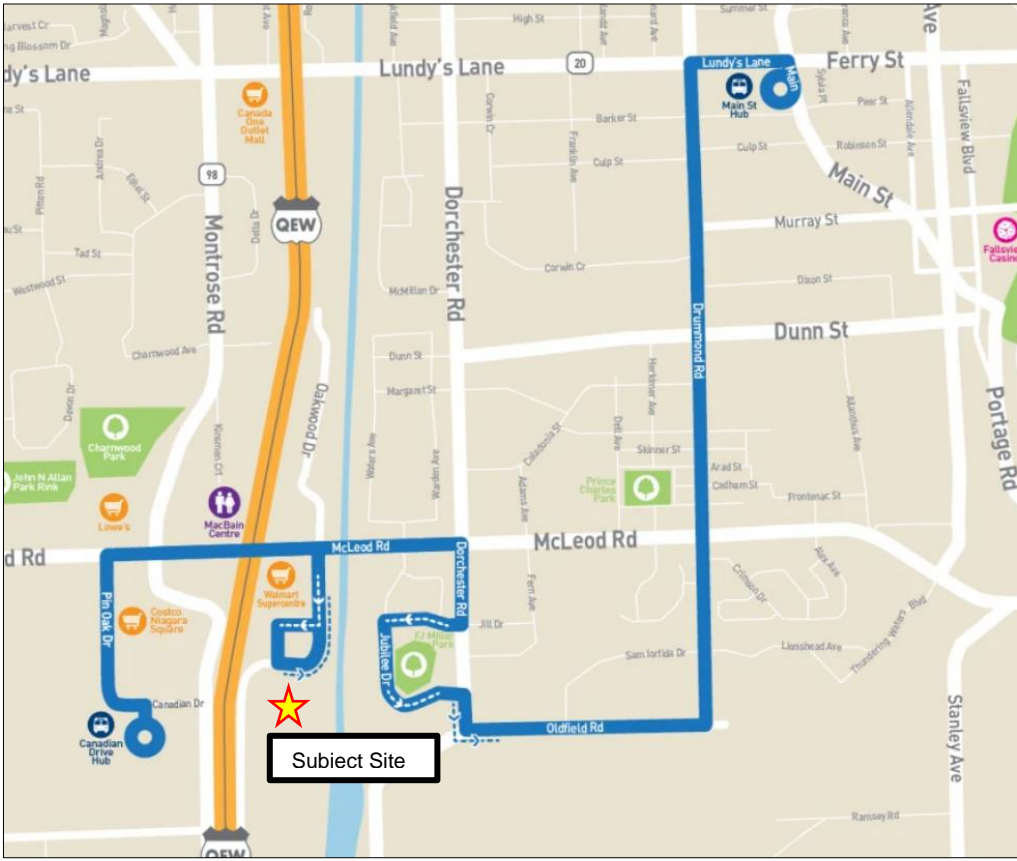


Figure 7 Niagara Falls Transit Route 103



Figure 8 Niagara Falls Transit Route 112

3.4 Existing Traffic Data

Due to impacts to travel patterns resulting from the COVID-19 pandemic, Niagara Region has requested that traffic counts conducted prior to March 2020 be used and grown to estimate existing conditions. As a result, GHD utilized historic traffic counts for the study intersections that were purchased from the City of Niagara Falls, Niagara Region and the MTO. The counts are summarized in the table below:

Table 1 Turning Movement Count Summary

Intersection	Date	Source
McLeod Road and Montrose Road	May 2019	Niagara Region
McLeod Road and the southbound Queen Elizabeth Way off-ramp/Niagara Square Drive	November 2018	MTO
McLeod Road and the northbound Queen Elizabeth Way off-ramp	November 2018	MTO
McLeod Road and Oakwood Drive	July 2019	Niagara Region
Oakwood Drive and the north Commercial Access	May 2018	City of Niagara Falls
Oakwood Drive and the south Commercial Access	May 2018	City of Niagara Falls
Oakwood Drive and Montrose Road	February 2011	Niagara Region

As directed by Niagara Region staff, a 2% per annum growth rate was applied to all regional intersections to derive the baseline 2022 traffic volumes. The terms of reference and assumptions were submitted to the MTO for their review and comment. At the time of writing this report, no response has been received from MTO and therefore GHD assumed the same corridor growth rate provided by the Region for both ramps terminals.

The projected baseline 2022 traffic volumes for the a.m. and p.m. peak hours are summarized in **Figure 9**.

The historic turning movement count data is provided in **Appendix B**.

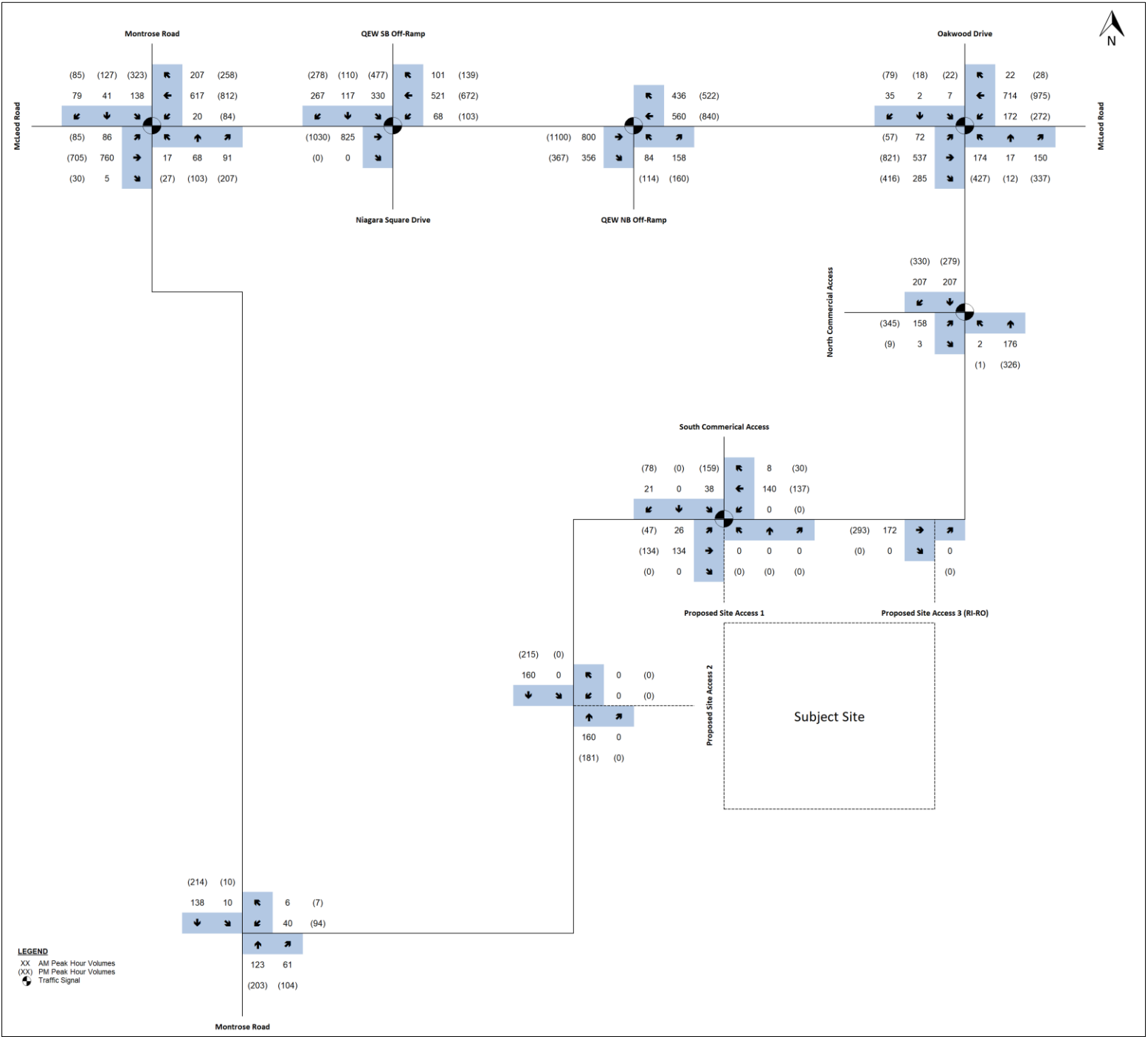


Figure 9 Projected 2022 Existing Traffic Volumes

4. Future Background Traffic

4.1 Study Horizon Year

As agreed with the City of Niagara Falls and Niagara Region, the future horizon years selected for analysis includes the full build-out year in 2024, along with 5 and 10 years post build out corresponding to a 2029 and 2034 planning horizon. This planning horizons are also consistent with the requirements of the MTO based on their traffic impact study guidelines.

4.2 Future Road Network Improvements

Niagara Region provided GHD with the proposed redesign of the intersection of McLeod Road and Oakwood Drive. As seen in **Figure 10** below, the intersection is proposed to have a 7-lane urban cross-section on the east approach. The new alignment will include two through lanes, one auxiliary right-turn lane and a dual auxiliary left-turn lane. Due to the canal located just east of the intersection, the road cannot be widened to provide a six-lane cross section as currently existing west of the intersection. Additionally, the west approach will include one left-turn lane, two through lanes, and at a minimum one right-turn lane. The Region requested that GHD review the capacity of the intersection under two scenarios, 1) a single eastbound right turn lane and 2) with a dual eastbound right-turn lanes.

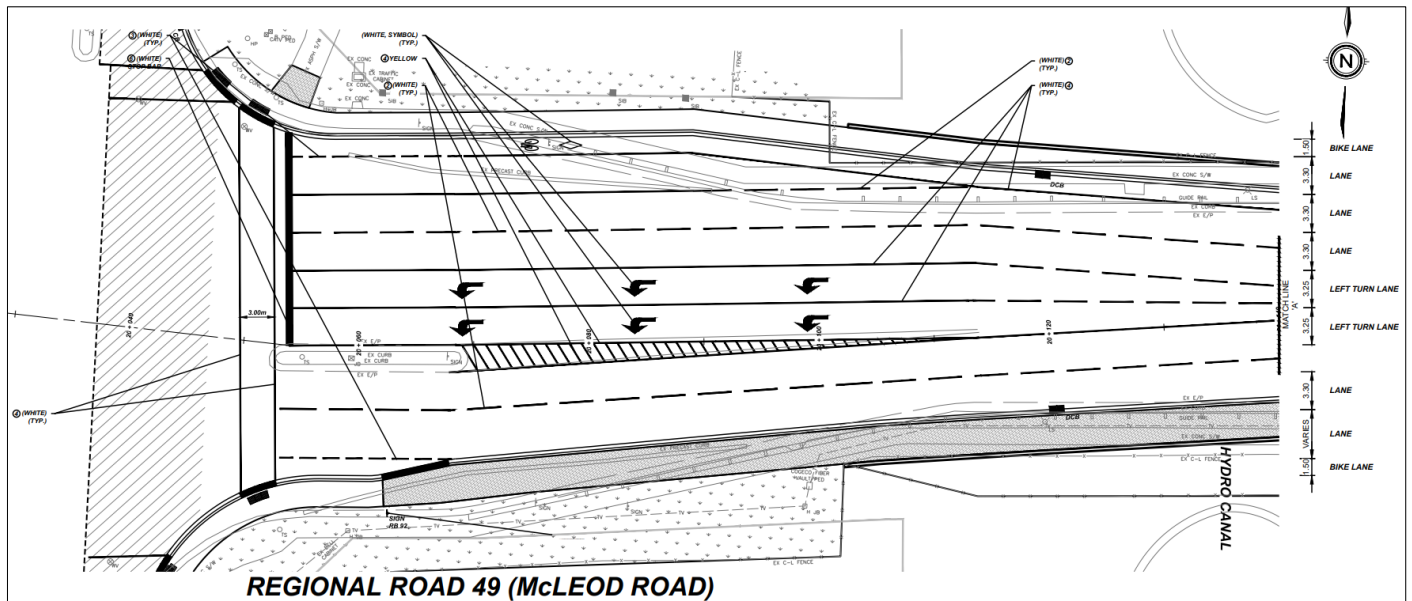


Figure 10 Future Lane Configuration

The capacity of the future horizon years assumed these intersection improvements are completed before the 2024 planning horizon.

The future lane configuration within the study area is provided in **Figure 11**, with the improvements shown in red.

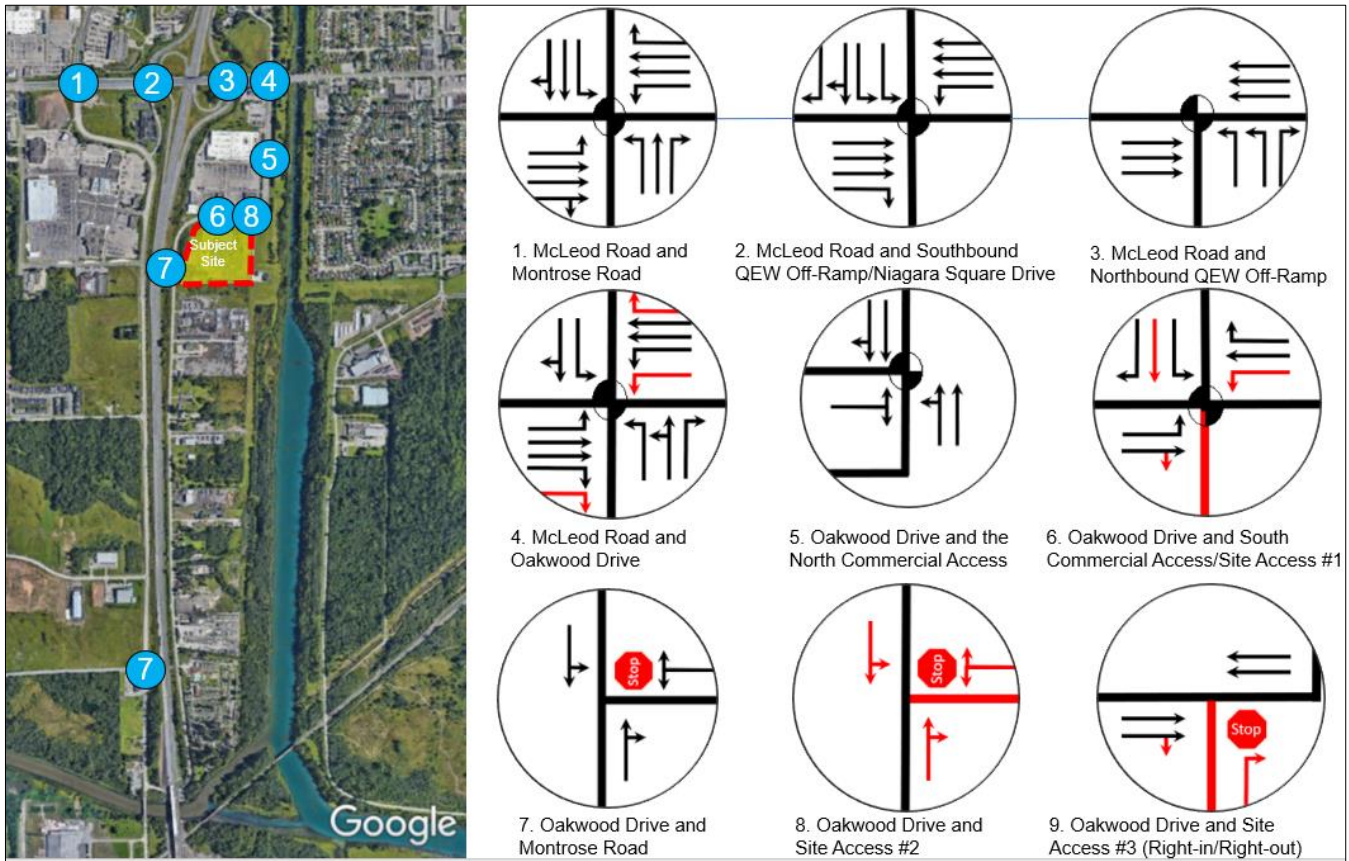


Figure 11 Future Lane Configuration

4.3 Corridor Growth

GHD applied a two percent compounded annually growth rate to all regional intersections within the study area. It was confirmed with the Region that the Region’s EMME model and growth rates took into consideration development of both the Thundering Waters and the Grand Niagara Secondary Plans. As a result, no additional site specific traffic volumes were assigned to the study road network to account for future growth as a result of these or any other background development.

4.4 Future Background Traffic Volumes

The background traffic volumes for the 2024, 2029 and 2034 horizon years were derived by applying a 2% per annum corridor growth rate to the projected 2022 traffic volumes.

The resulting 2024, 2029 and 2032 future background traffic volumes are summarized in **Figure 12**, **Figure 13** and **Figure 14**.

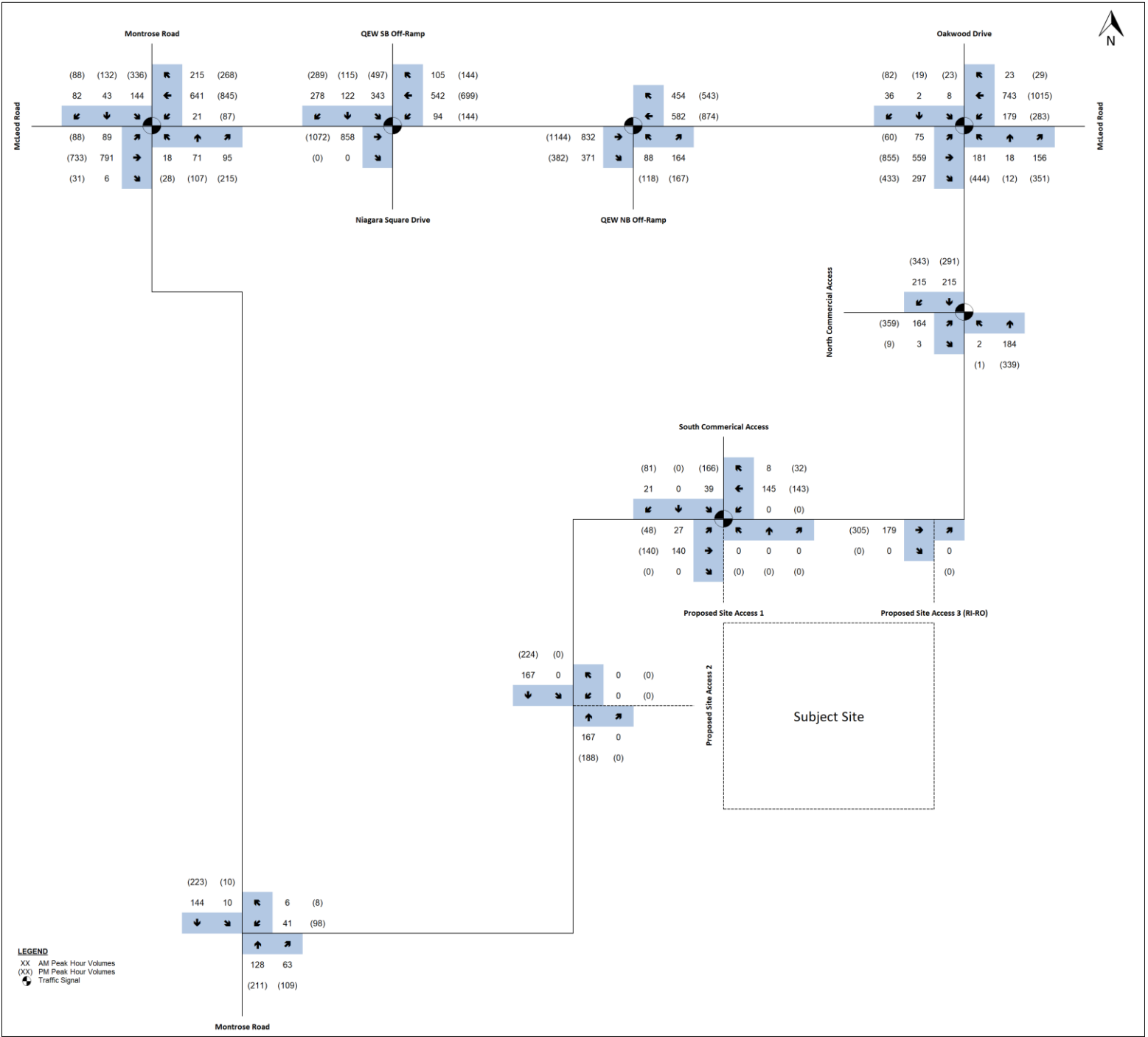


Figure 12 2024 Future Background Traffic Volumes

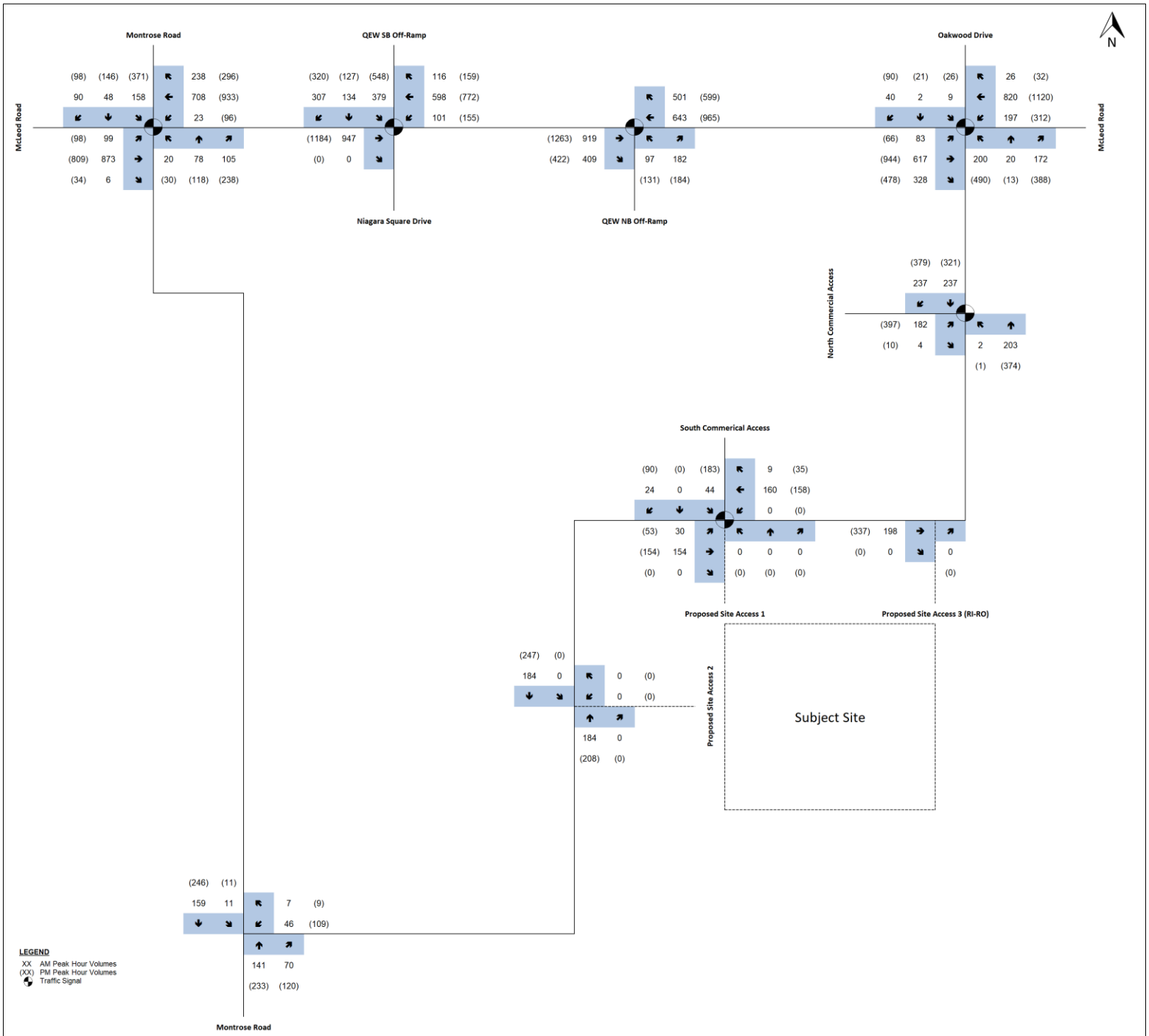


Figure 13 2029 Future Background Traffic Volumes

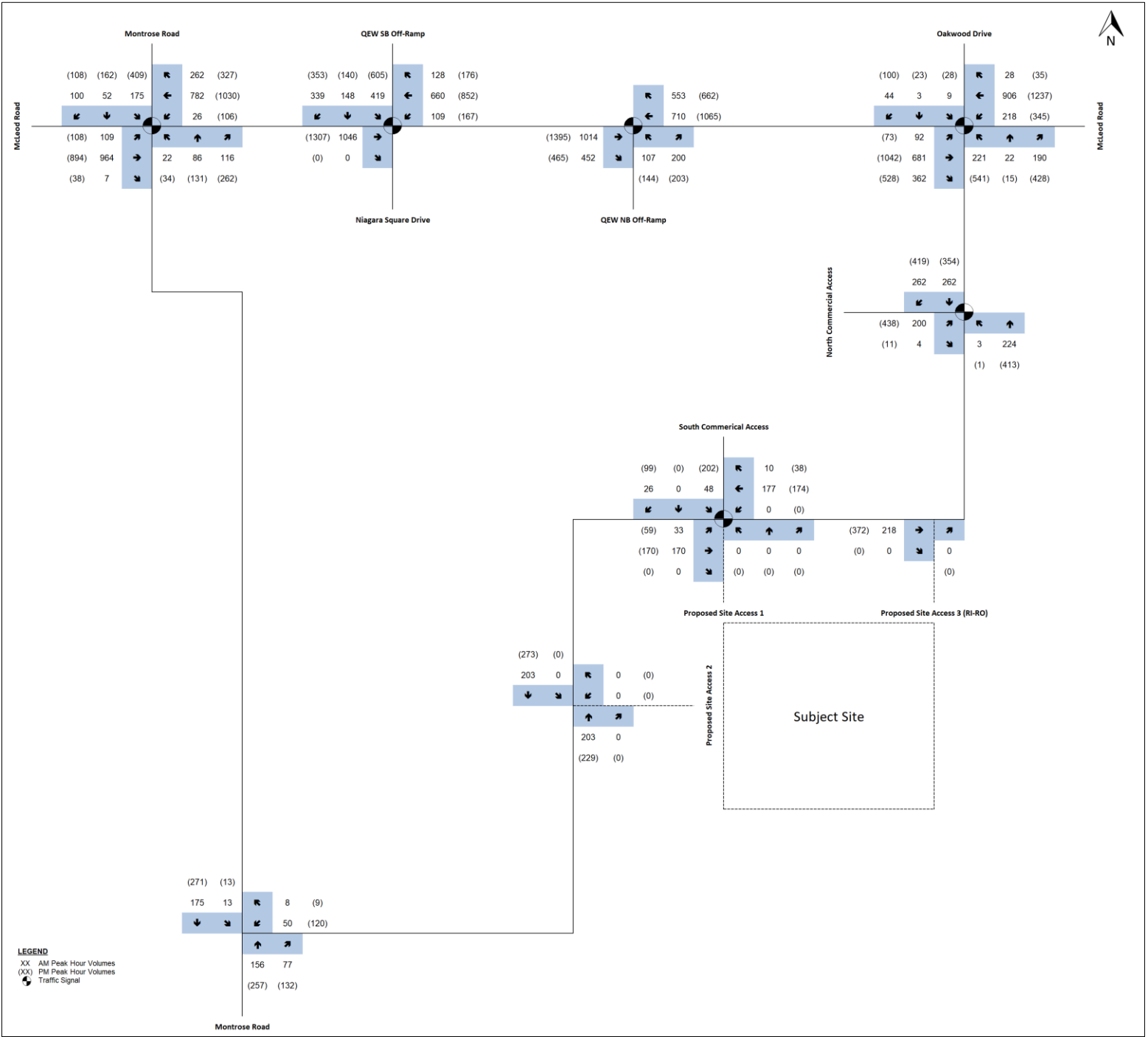


Figure 14 2034 Future Background Traffic Volumes

5. Site Generated Traffic

5.1 Site Traffic Generation

The subject site consists of a total of 236 townhouses based on the following unit breakdown:

- 46 3-Storey Rear-Lane Townhouse (with a secondary unit)
- 67 3-Storey Townhouse
- 54 3-Storey Back-to-Back Townhouses
- 69 2-Storey Townhouses

The trip generation for the residential uses was calculated using rates provided in the Institute of Transportation Engineer’s (ITE) Trip Generation Manual, 11th Edition using Land Use Code (LUC) 215 (Single-Family Attached Housing) and 220 (Multifamily Housing – Low-Rise).

ITE defines Single-Family Attached Housing as any single-family housing unit that shares a wall with an adjoining dwelling unit, whether the walls are for living space, a vehicle garage, or storage space. ITE also defines Multifamily Housing (Low-Rise) as housing that includes at least three other dwelling units and have two or three floors and includes stacked townhouse that not only share a wall with adjoining units, but also share a floor with other units.

As a result, trip generation for the 3-storey townhouse, 3-storey back-to-back townhouses and 2-storey townhouses were estimated based on LUC 215, while the 3-storey rear-lane townhouses with a secondary unit uses LUC 220.

Table 2 below summarizes the estimated trip generation for the proposed subdivision.

Table 2 Estimated Site Trips

Land Uses	GFA (Dwelling Units)	Parameters	Peak Hour					
			Weekday AM			Weekday PM		
			In	Out	Total	In	Out	Total
Townhouses (LUC 215)	190 units	Trip Ratio	31%	69%	100%	57%	43%	100%
		Gross Trips	29	64	93	63	47	110
Multifamily Housing (Low-Rise) (LUC 220)	92 units	Trip Ratio	24%	76%	100%	63%	37%	100%
		Gross Trips	11	41	52	38	23	61
Total Primary Trips			40	105	145	101	70	171

The proposed residential development is expected to generate a total of 145 new two-way trips during the weekday a.m. peak hour consisting of 40 inbound and 105 outbound trips and 171 new two-way trips during the weekday p.m. peak hour consisting of 101 inbound and 70 outbound trips.

5.2 Site Traffic Distribution and Assignment

The distribution of the site-generated traffic was based on a review of the 2016 Transportation Tomorrow Survey (TTS) and the existing traffic patterns extracted from the historic turning movement counts from the study intersections. The proposed trip distribution is summarized in **Table 3** below.

GHD reviewed the proposed site plan and distributed the site traffic between the three proposed site access locations using first principles and best route choice. It was determined that all traffic travelling to/from the south would use Site Access #2. Based on the number of townhouses located in close proximity to Site Access #2 and #3, GHD assigned 5% of all inbound and outbound traffic to Site Access #2 and 2% of inbound and 10% of outbound traffic to Site

Access #3, the right-in/right-out access. All remaining site traffic was assigned to Site Access #1 as the primary access to the development. The total trip distribution for the subject site can be found in **Figure 15** below.

Table 3 *Trip Distribution*

Origin/Destination	AM Peak Hour		PM Peak Hour	
	Percentage of Inbound Trips	Percentage of Outbound Trips	Percentage of Inbound Trips	Percentage of Outbound Trips
North (QEW on/off-ramps)	35%	45%	50%	40%
South (Oakwood Drive towards Montrose Road)	8%	10%	10%	10%
East (along McLeod Road)	28%	20%	20%	25%
West (along McLeod Road)	29%	25%	20%	25%
Total	100%	100%	100%	100%

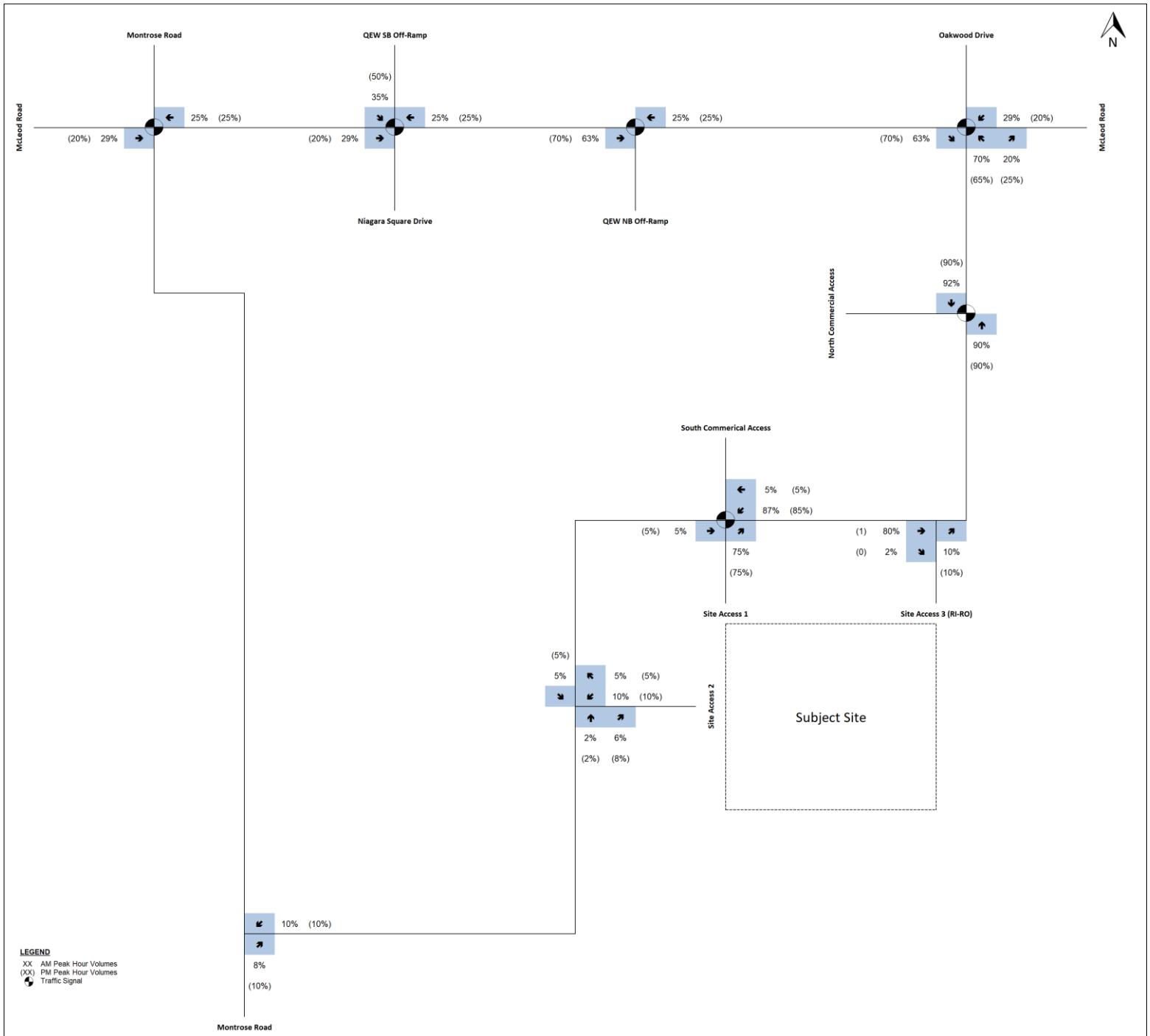


Figure 15 Trip Distribution

The estimated site trips generated by the subdivision and distributed to the study area road network for the weekday a.m. and p.m. peak hours is shown in **Figure 16**.

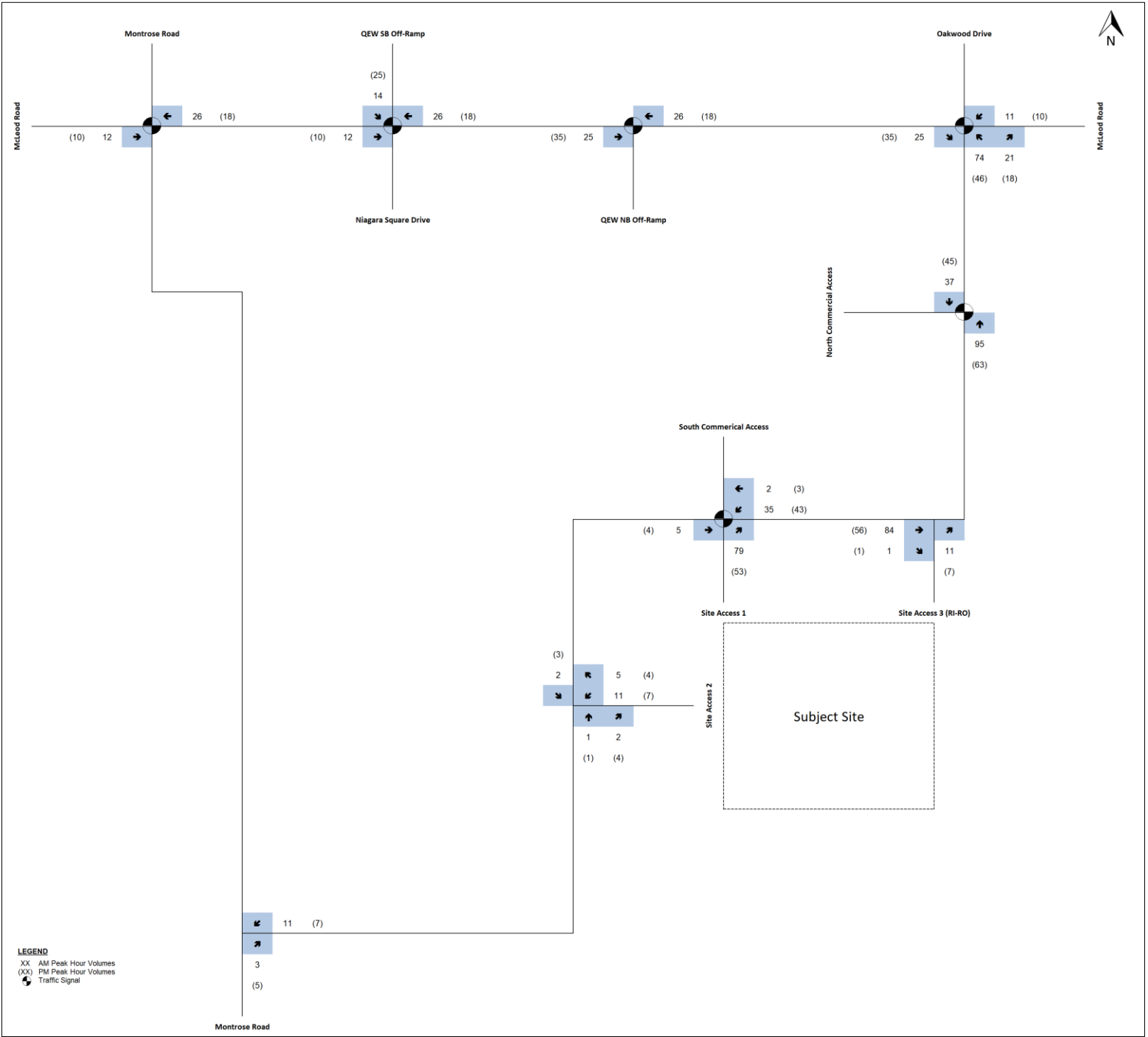


Figure 16 Total Site Trips

6. Future Total Traffic

The future total traffic conditions in the weekday a.m. and p.m. peak hours for the 2024, 2029 and 2034 planning horizons were derived by combining the projected future background traffic with the corresponding estimated site generated traffic. The resulting traffic volumes are presented in **Figure 17**, **Figure 18** and **Figure 19**.

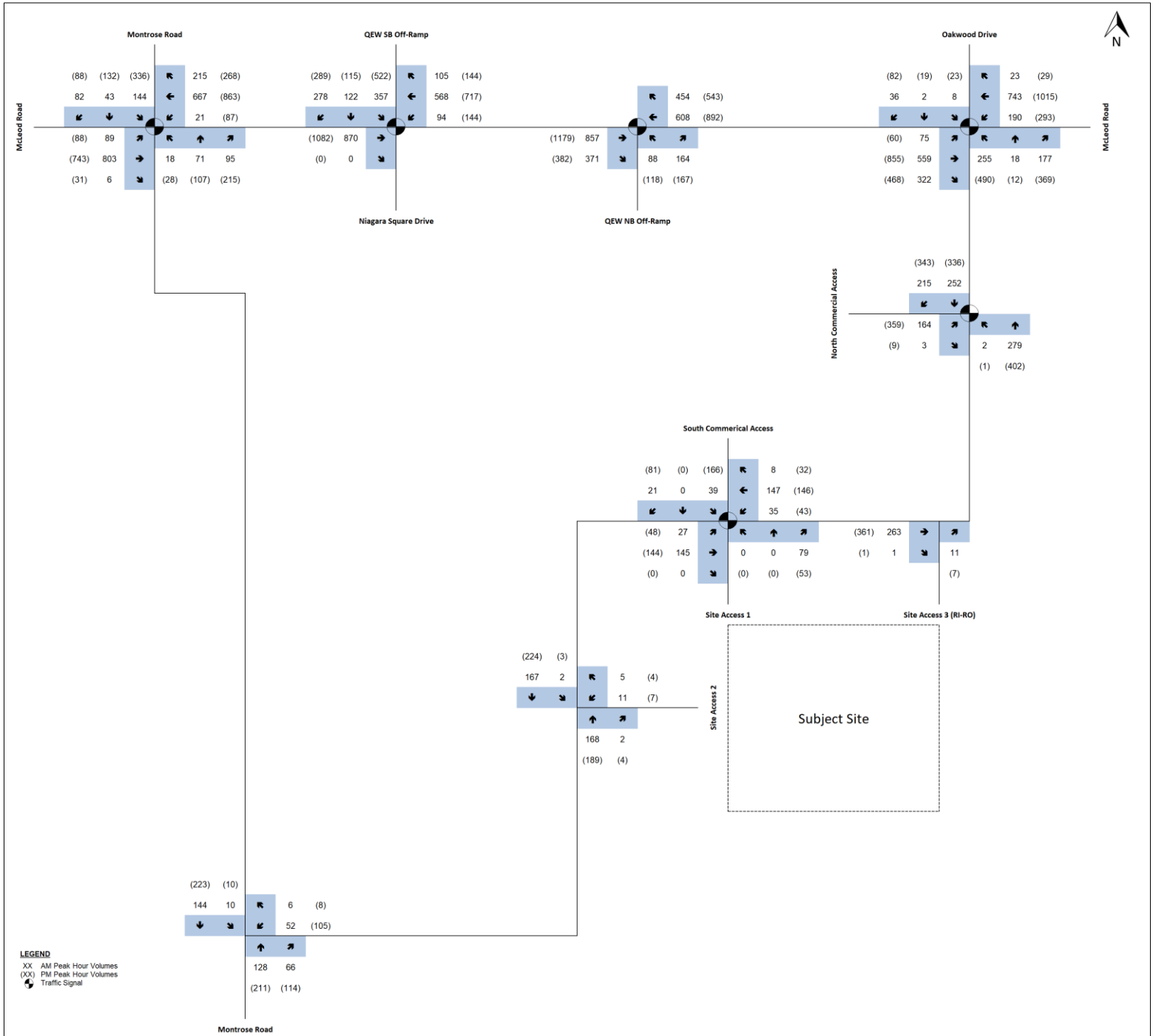


Figure 17 2024 Future Total Traffic Volumes

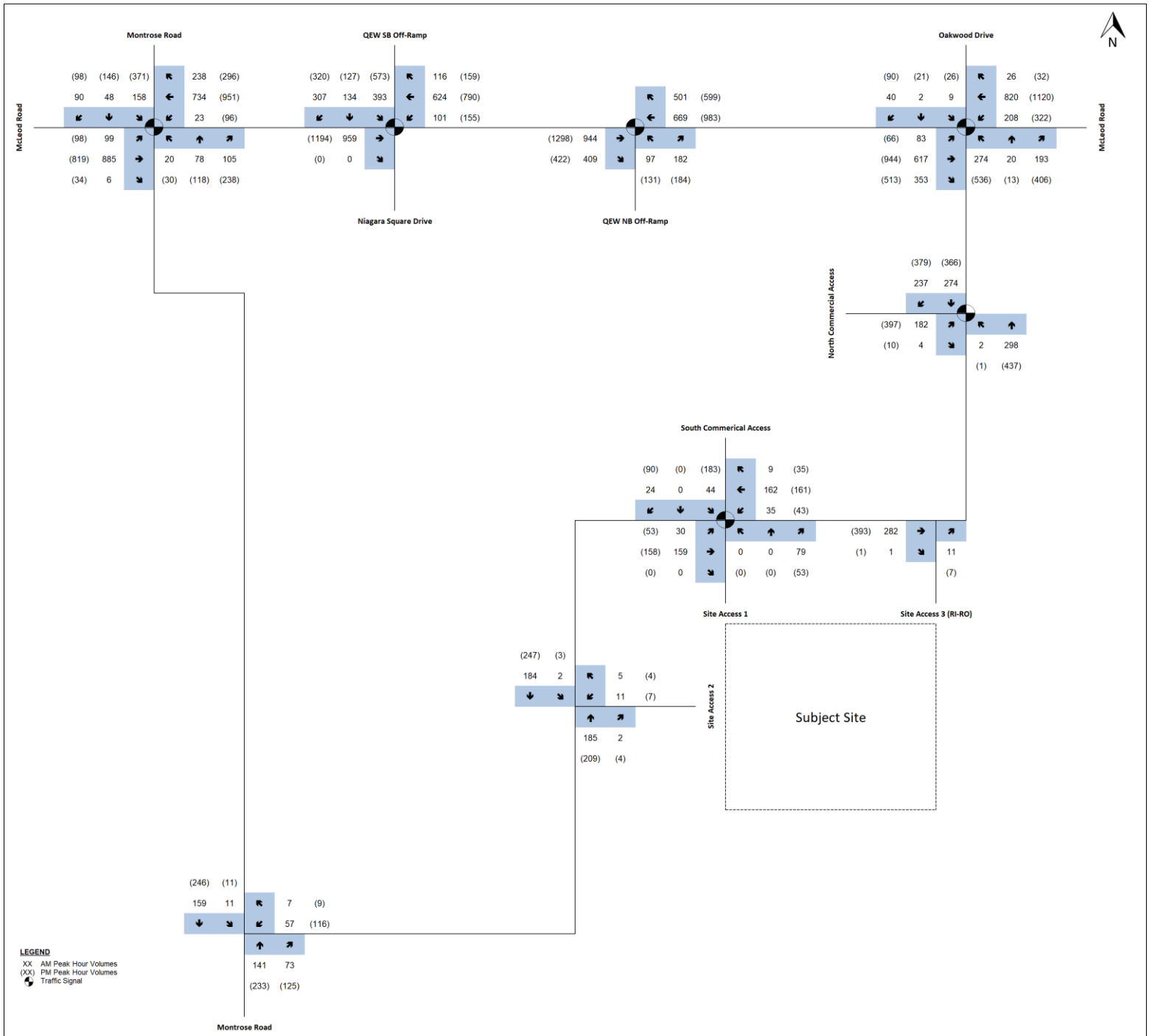


Figure 18 2029 Future Total Traffic Volumes

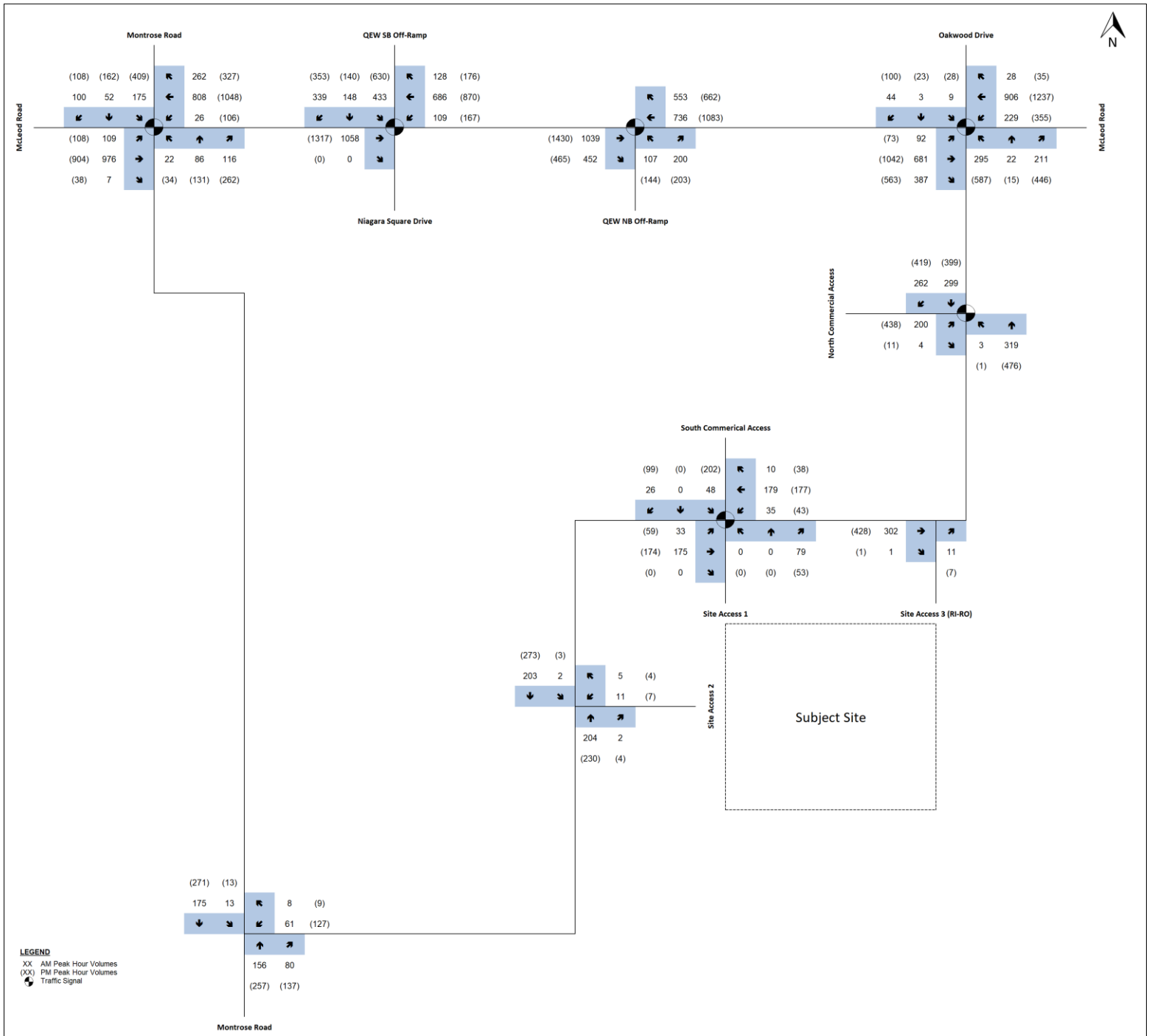


Figure 19 2034 Future Total Traffic Volumes

7. Capacity Analysis

The capacity analysis identifies how well the intersections and driveways are operating. The analysis contained within this report utilized the Highway Capacity Manual (HCM) 2000 procedure within the Synchro Version 10 Software package. The reported intersection volume-to-capacity ratios (v/c) are a measure of the saturation volume for each turning movement, while the levels-of-service (LOS) are a measure of the average delay for each turning movement. Queuing characteristics are reported as the predicted 95th percentile queue for each turning movement. Both pedestrian crossing volumes and heavy vehicle proportions are included in the analyses. The peak hour factors from the traffic counts were used to analyze existing and future traffic conditions.

The analysis includes identification and required modifications and improvements (if any) at intersections where the addition of background growth or background growth plus site-generated traffic volumes causes the following:

'Critical' intersections and movements for a signalized intersection include:

- V/C ratios for overall intersections operations, through movements, or shared through/turning movements increase to 0.85 or above;
- V/C ratios for exclusive movements increase to 0.90 or above; or
- 95th percentile queue length for individual movements that are projected to, or exceed, the storage length.

'Critical' intersections and movements for an unsignalized intersection include:

- Level of Services (LOS), based on average delay per vehicle, on individual movements exceeds LOS "D",
- Queue length for individual movements that exceeds the lesser of 5 vehicles or the available queue storage.

The following tables summarize the HCM capacity results for the study intersections during the weekday a.m. and p.m. peak hours under existing (2022), future background (2024, 2029 & 2034) and future total (2024, 2029 & 2034) traffic conditions. The detailed calculation sheets are provided in **Appendix C**.

7.1 McLeod Road and Montrose Road

Capacity analysis at this intersection during the weekday a.m. and p.m. peak hours for the existing, future background, and future total traffic condition are summarized in the following table.

Table 4 Capacity analysis of McLeod Road and Montrose Road

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Existing 2022	Overall: 0.35 (C) 33		Overall: 0.53 (C) 32	
	EBL = 0.36 (C) 26	EBL = 20 m	EBL = 0.37 (C) 24	EBL = 20 m
	EBTR = 0.52 (C) 34	EBTR = 70 m	EBTR = 0.47 (C) 32	EBTR = 65 m
	WBL = 0.12 (C) 27	WBL = 10 m	WBL = 0.3 (C) 21	WBL = 20 m
	WBT = 0.68 (D) 42	WBT = 95 m	WBT = 0.75 (D) 39	WBT = 120 m
	WBR = 0.16 (C) 34	WBR = 20 m	WBR = 0.2 (C) 29	WBR = 20 m
	NBL = 0.03 (B) 18	NBL = 10 m	NBL = 0.06 (C) 27	NBL = 10 m
	NBT = 0.11 (C) 23	NBT = 25 m	NBT = 0.22 (C) 35	NBT = 45 m
	NBR = 0.08 (C) 23	NBR = 15 m	NBR = 0.16 (C) 34	NBR = 25 m
	SBL = 0.22 (B) 16	SBL = 35 m	SBL = 0.54 (C) 23	SBL = 90 m
	SBT = 0.06 (B) 18	SBT = 15 m	SBT = 0.19 (C) 24	SBT = 45 m
SBR = 0.07 (B) 18	SBR = 10 m	SBR = 0.06 (C) 22	SBR = 15 m	

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Future Background 2024	<u>Overall: 0.37 (C) 32</u>		<u>Overall: 0.55 (C) 32</u>	
	EBL = 0.37 (C) 25	EBL = 20 m	EBL = 0.51 (C) 28	EBL = 25 m
	EBTR = 0.51 (C) 32	EBTR = 70 m	EBTR = 0.51 (C) 33	EBTR = 75 m
	WBL = 0.12 (C) 26	WBL = 10 m	WBL = 0.38 (C) 24	WBL = 25 m
	WBT = 0.69 (D) 40	WBT = 100 m	WBT = 0.80 (D) 41	WBT = 135 m
	WBR = 0.17 (C) 32	WBR = 20 m	WBR = 0.21 (C) 29	WBR = 20 m
	NBL = 0.03 (C) 20	NBL = 10 m	NBL = 0.05 (C) 21	NBL = 10 m
	NBT = 0.12 (C) 25	NBT = 30 m	NBT = 0.18 (C) 28	NBT = 35 m
	NBR = 0.08 (C) 25	NBR = 15 m	NBR = 0.25 (C) 29	NBR = 35 m
	SBL = 0.24 (B) 17	SBL = 40 m	SBL = 0.54 (C) 21	SBL = 80 m
SBT = 0.07 (B) 19	SBT = 20 m	SBT = 0.19 (C) 21	SBT = 40 m	
SBR = 0.07 (B) 19	SBR = 10 m	SBR = 0.07 (B) 20	SBR = 10 m	
Future Total 2024	<u>Overall: 0.37 (C) 32</u>		<u>Overall: 0.55 (C) 32</u>	
	EBL = 0.37 (C) 25	EBL = 20 m	EBL = 0.51 (C) 28	EBL = 25 m
	EBTR = 0.51 (C) 32	EBTR = 70 m	EBTR = 0.51 (C) 33	EBTR = 75 m
	WBL = 0.12 (C) 26	WBL = 10 m	WBL = 0.38 (C) 24	WBL = 25 m
	WBT = 0.69 (D) 40	WBT = 100 m	WBT = 0.80 (D) 41	WBT = 135 m
	WBR = 0.17 (C) 32	WBR = 20 m	WBR = 0.21 (C) 29	WBR = 20 m
	NBL = 0.03 (C) 20	NBL = 10 m	NBL = 0.05 (C) 21	NBL = 10 m
	NBT = 0.12 (C) 25	NBT = 30 m	NBT = 0.18 (C) 28	NBT = 35 m
	NBR = 0.08 (C) 25	NBR = 15 m	NBR = 0.25 (C) 29	NBR = 35 m
	SBL = 0.24 (B) 17	SBL = 40 m	SBL = 0.54 (C) 21	SBL = 80 m
SBT = 0.07 (B) 19	SBT = 20 m	SBT = 0.19 (C) 21	SBT = 40 m	
SBR = 0.07 (B) 19	SBR = 10 m	SBR = 0.07 (B) 20	SBR = 10 m	
Future Background 2029	<u>Overall: 0.40 (C) 31</u>		<u>Overall: 0.61 (C) 32</u>	
	EBL = 0.40 (C) 24	EBL = 25 m	EBL = 0.54 (C) 28	EBL = 25 m
	EBTR = 0.53 (C) 30	EBTR = 75 m	EBTR = 0.51 (C) 31	EBTR = 80 m
	WBL = 0.14 (C) 24	WBL = 10 m	WBL = 0.41 (C) 22	WBL = 25 m
	WBT = 0.70 (D) 39	WBT = 105 m	WBT = 0.82 (D) 41	WBT = 145 m
	WBR = 0.19 (C) 30	WBR = 20 m	WBR = 0.25 (C) 28	WBR = 25 m
	NBL = 0.04 (C) 22	NBL = 10 m	NBL = 0.07 (C) 24	NBL = 10 m
	NBT = 0.15 (C) 28	NBT = 35 m	NBT = 0.23 (C) 32	NBT = 40 m
	NBR = 0.09 (C) 27	NBR = 15 m	NBR = 0.33 (C) 34	NBR = 50 m
	SBL = 0.28 (B) 19	SBL = 45 m	SBL = 0.63 (C) 25	SBL = 95 m
SBT = 0.08 (C) 22	SBT = 20 m	SBT = 0.22 (C) 24	SBT = 45 m	
SBR = 0.07 (C) 22	SBR = 15 m	SBR = 0.07 (C) 22	SBR = 15 m	
Future Total 2029	<u>Overall: 0.41 (C) 31</u>		<u>Overall: 0.62 (C) 32</u>	
	EBL = 0.41 (C) 24	EBL = 20 m	EBL = 0.55 (C) 28	EBL = 25 m
	EBTR = 0.52 (C) 30	EBTR = 75 m	EBTR = 0.52 (C) 31	EBTR = 80 m
	WBL = 0.14 (C) 24	WBL = 10 m	WBL = 0.42 (C) 22	WBL = 25 m
	WBT = 0.70 (D) 39	WBT = 105 m	WBT = 0.83 (D) 41	WBT = 150 m
	WBR = 0.19 (C) 30	WBR = 20 m	WBR = 0.26 (C) 28	WBR = 25 m
	NBL = 0.04 (C) 22	NBL = 10 m	NBL = 0.07 (C) 24	NBL = 10 m
	NBT = 0.15 (C) 29	NBT = 35 m	NBT = 0.23 (C) 32	NBT = 40 m
	NBR = 0.09 (C) 28	NBR = 15 m	NBR = 0.34 (C) 34	NBR = 50 m
	SBL = 0.28 (B) 20	SBL = 45 m	SBL = 0.64 (C) 25	SBL = 95 m
SBT = 0.08 (C) 22	SBT = 20 m	SBT = 0.22 (C) 24	SBT = 45 m	
SBR = 0.07 (C) 22	SBR = 15 m	SBR = 0.07 (C) 22	SBR = 15 m	

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Future Background 2034	Overall: 0.44 (C) 30		Overall: 0.67 (C) 34	
	EBL = 0.44 (C) 23	EBL = 25 m	EBL = 0.64 (C) 33	EBL = 35 m
	EBTR = 0.54 (C) 28	EBTR = 80 m	EBTR = 0.56 (C) 31	EBTR = 85 m
	WBL = 0.15 (C) 22	WBL = 10 m	WBL = 0.46 (C) 22	WBL = 25 m
	WBT = 0.72 (D) 38	WBT = 110 m	WBT = 0.86 (D) 42	WBT = 165 m
	WBR = 0.21 (C) 29	WBR = 20 m	WBR = 0.30 (C) 27	WBR = 30 m
	NBL = 0.04 (C) 25	NBL = 10 m	NBL = 0.08 (C) 25	NBL = 10 m
	NBT = 0.18 (C) 32	NBT = 40 m	NBT = 0.25 (C) 33	NBT = 45 m
	NBR = 0.09 (C) 31	NBR = 20 m	NBR = 0.42 (D) 37	NBR = 60 m
	SBL = 0.32 (C) 22	SBL = 50 m	SBL = 0.75 (C) 31	SBL = 110 m
	SBT = 0.10 (C) 24	SBT = 25 m	SBT = 0.25 (C) 26	SBT = 50 m
SBR = 0.08 (C) 24	SBR = 15 m	SBR = 0.08 (C) 23	SBR = 15 m	
Future Total 2034	Overall: 0.45 (C) 30		Overall: 0.68 (C) 34	
	EBL = 0.44 (C) 22	EBL = 20 m	EBL = 0.66 (C) 34	EBL = 40 m
	EBTR = 0.54 (C) 28	EBTR = 80 m	EBTR = 0.56 (C) 31	EBTR = 90 m
	WBL = 0.15 (C) 22	WBL = 10 m	WBL = 0.47 (C) 22	WBL = 25 m
	WBT = 0.72 (D) 37	WBT = 115 m	WBT = 0.87 (D) 43	WBT = 170 m
	WBR = 0.21 (C) 28	WBR = 20 m	WBR = 0.31 (C) 27	WBR = 35 m
	NBL = 0.05 (C) 26	NBL = 10 m	NBL = 0.08 (C) 25	NBL = 10 m
	NBT = 0.19 (C) 33	NBT = 40 m	NBT = 0.25 (C) 33	NBT = 45 m
	NBR = 0.09 (C) 32	NBR = 20 m	NBR = 0.42 (D) 37	NBR = 60 m
	SBL = 0.33 (C) 23	SBL = 50 m	SBL = 0.75 (C) 31	SBL = 110 m
	SBT = 0.10 (C) 25	SBT = 25 m	SBT = 0.25 (C) 26	SBT = 50 m
SBR = 0.08 (C) 25	SBR = 15 m	SBR = 0.08 (C) 23	SBR = 15 m	

Under existing conditions, the intersection of McLeod Road and Montrose Road is operating at satisfactory levels with an overall v/c ratio of 0.35 LOS C and 0.53 LOS C during the a.m. and p.m. peak hours respectively. There are no critical movements reported during the existing 2022 traffic condition.

Under the 2024 future background horizon year including the addition of corridor growth and signal optimization, the intersection continues to operate at satisfactory levels with the reported overall v/c ratio for the intersection increasing to 0.37 LOS C during the a.m. peak hour and 0.55 LOS C during the p.m. peak hour. The intersection continues to operate without any critical movements.

Under the 2024 future total traffic condition, with the addition of the site generated traffic, the overall intersection continues to operate at a satisfactory level with no change in the intersection overall v/c ratio (0.37 LOS C and 0.55 LOS C).

Under the 2029 future background scenario, which includes corridor growth and signal optimization, the overall v/c ratio of the intersection increased to 0.40 LOS C and 0.61 LOS C during the a.m. and p.m. peak hours respectively. All movements are reported to operate at a satisfactory level of service and below critical levels.

With the addition of site generated traffic under the 2029 future total scenario, the overall intersection v/c ratio increases marginally to 0.41 LOS C during the a.m. peak hour and remains unchanged at 0.62 LOS C during the p.m. peak hour. All approaches continue to report satisfactory levels of service with no critical movements.

Under the 2034 future background condition, the intersection is reported to operate at a satisfactory level of service during the a.m. peak hour (0.44 LOS C) and p.m. peak hour (0.67 LOS C). The westbound approach westbound through movement is reporting a critical level of service increasing to 0.86 LOS D during the p.m. peak hour. With the proposed signal optimization, the reported 42 second delay during the p.m. peak hour for this movement however is only 3 seconds longer than the 39 seconds reported under the existing conditions.

With the addition of site generated traffic under the 2034 future total traffic condition, the overall intersection's v/c ratio increases nominally by 1 second during the a.m. peak hour to 0.45 LOS C and p.m. peak hour to 0.68 LOS C. The overall intersection and each individual movement is reported to operate below critical levels except for the westbound

through movement during the p.m. peak hour which is operating at 0.87 LOS D. Despite operating at a critical level of service, the westbound through movement is expected to continue to operate below the theoretical capacity of this movement with a v/c ratio less than 1.0.

No improvements are recommended at this intersection as a result of the proposed development other than signal optimization.

7.2 McLeod Road and QEW Southbound Off-Ramp/Niagara Square Drive

Capacity analysis for this intersection during the weekday a.m. and p.m. peak hours for the existing, future background, and future total traffic conditions out are summarized in the following table.

Table 5 Capacity analysis of McLeod Road and QEW Southbound Off-Ramp/Niagara Square Drive

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Existing 2022	<u>Overall: 0.41 (B) 12</u> EBT = 0.46 (B) 12 EBR = 0 () 0 WBL = 0.19 (A) 7 WBT = 0.27 (A) 8 SBL = 0.38 (B) 17 SBTR = 0.42 (B) 17 SBR = 0.14 (B) 15	EBT = 50 m EBR = 0 m WBL = 10 m WBT = 25 m SBL = 30 m SBTR = 40 m SBR = 15 m	<u>Overall: 0.50 (B) 14</u> EBT = 0.55 (B) 15 EBR = 0 () 0 WBL = 0.31 (A) 8 WBT = 0.34 (A) 8 SBL = 0.52 (B) 20 SBTR = 0.39 (B) 19 SBR = 0.14 (B) 17	EBT = 65 m EBR = 0 m WBL = 15 m WBT = 35 m SBL = 50 m SBTR = 45 m SBR = 15 m
Future Background 2024	<u>Overall: 0.43 (B) 13</u> EBT = 0.51 (B) 14 EBR = 0 (A) 0 WBL = 0.26 (A) 7 WBT = 0.30 (A) 8 SBL = 0.41 (B) 17 SBTR = 0.42 (B) 18 SBR = 0.21 (B) 16	EBT = 50 m EBR = 0 m WBL = 15 m WBT = 30 m SBL = 35 m SBTR = 40 m SBR = 20 m	<u>Overall: 0.54 (B) 15</u> EBT = 0.62 (B) 18 EBR = 0 (A) 0 WBL = 0.44 (A) 10 WBT = 0.37 (A) 10 SBL = 0.54 (B) 19 SBTR = 0.36 (B) 18 SBR = 0.31 (B) 18	EBT = 70 m EBR = 0 m WBL = 20 m WBT = 40 m SBL = 45 m SBTR = 35 m SBR = 30 m
Future Total 2024	<u>Overall: 0.43 (B) 13</u> EBT = 0.51 (B) 14 EBR = 0 (A) 0 WBL = 0.26 (A) 7 WBT = 0.30 (A) 8 SBL = 0.41 (B) 17 SBTR = 0.42 (B) 18 SBR = 0.21 (B) 16	EBT = 50 m EBR = 0 m WBL = 15 m WBT = 30 m SBL = 35 m SBTR = 40 m SBR = 20 m	<u>Overall: 0.54 (B) 15</u> EBT = 0.62 (B) 18 EBR = 0 (A) 0 WBL = 0.44 (A) 10 WBT = 0.37 (A) 10 SBL = 0.54 (B) 19 SBTR = 0.36 (B) 18 SBR = 0.31 (B) 18	EBT = 70 m EBR = 0 m WBL = 20 m WBT = 40 m SBL = 45 m SBTR = 35 m SBR = 30 m
Future Background 2029	<u>Overall: 0.47 (B) 14</u> EBT = 0.55 (B) 14 EBR = 0 (A) 0 WBL = 0.30 (A) 8 WBT = 0.32 (A) 8 SBL = 0.43 (B) 18 SBTR = 0.46 (B) 18 SBR = 0.29 (B) 17	EBT = 60 m EBR = 0 m WBL = 15 m WBT = 30 m SBL = 35 m SBTR = 45 m SBR = 25 m	<u>Overall: 0.58 (B) 16</u> EBT = 0.69 (B) 19 EBR = 0 (A) 0 WBL = 0.51 (B) 11 WBT = 0.41 (B) 10 SBL = 0.55 (B) 20 SBTR = 0.40 (B) 18 SBR = 0.35 (B) 18	EBT = 85 m EBR = 0 m WBL = 25 m WBT = 45 m SBL = 50 m SBTR = 40 m SBR = 35 m

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Future Total 2029	Overall: 0.47 (B) 14 EBT = 0.55 (B) 14 EBR = 0 (A) 0 WBL = 0.30 (A) 8 WBT = 0.33 (A) 8 SBL = 0.44 (B) 18 SBTR = 0.46 (B) 18 SBR = 0.31 (B) 17	EBT = 60 m EBR = 0 m WBL = 15 m WBT = 35 m SBL = 35 m SBTR = 45 m SBR = 25 m	Overall: 0.60 (B) 17 EBT = 0.70 (B) 20 EBR = 0 (A) 0 WBL = 0.51 (B) 12 WBT = 0.42 (B) 11 SBL = 0.56 (B) 20 SBTR = 0.39 (B) 18 SBR = 0.34 (B) 18	EBT = 85 m EBR = 0 m WBL = 30 m WBT = 50 m SBL = 50 m SBTR = 40 m SBR = 35 m
Future Background 2034	Overall: 0.52 (B) 14 EBT = 0.61 (B) 16 EBR = 0 (A) 0 WBL = 0.35 (A) 9 WBT = 0.36 (A) 9 SBL = 0.45 (B) 18 SBTR = 0.49 (B) 19 SBR = 0.38 (B) 18	EBT = 70 m EBR = 0 m WBL = 20 m WBT = 40 m SBL = 40 m SBTR = 50 m SBR = 35 m	Overall: 0.64 (B) 18 EBT = 0.77 (C) 22 EBR = 0 (A) 0 WBL = 0.57 (B) 14 WBT = 0.46 (B) 12 SBL = 0.57 (C) 20 SBTR = 0.43 (B) 19 SBR = 0.38 (B) 18	EBT = 105 m EBR = 0 m WBL = 35 m WBT = 60 m SBL = 55 m SBTR = 45 m SBR = 35 m
Future Total 2034	Overall: 0.52 (B) 15 EBT = 0.62 (B) 16 EBR = 0 (A) 0 WBL = 0.36 (A) 9 WBT = 0.37 (A) 9 SBL = 0.46 (B) 18 SBTR = 0.49 (B) 19 SBR = 0.39 (B) 18	EBT = 70 m EBR = 0 m WBL = 20 m WBT = 40 m SBL = 40 m SBTR = 50 m SBR = 35 m	Overall: 0.65 (B) 18 EBT = 0.78 (C) 23 EBR = 0 (A) 0 WBL = 0.58 (B) 15 WBT = 0.48 (B) 12 SBL = 0.59 (C) 20 SBTR = 0.43 (B) 19 SBR = 0.38 (B) 18	EBT = 115 m EBR = 0 m WBL = 35 m WBT = 60 m SBL = 55 m SBTR = 45 m SBR = 35 m

Under existing conditions, the intersection of McLeod Road with the southbound QEW off-ramp/Niagara Square Drive is reporting low levels of delay, low levels of queuing and operating at satisfactory levels with an overall v/c ratio of 0.41 LOS B and 0.50 LOS B during the a.m. and p.m. peak hours respectively.

Under the 2024 future background conditions, with the addition of corridor growth to the study intersection and signal optimization, the overall intersection continues to operate satisfactory (0.43 LOS B and 0.54 LOS B during the a.m. and p.m. peak hours respectively). There are no critical movements reported.

Under the 2024 future total traffic condition, the addition of site traffic causes the overall intersection v/c ration and delays to remain unchanged at 0.43 LOS B during the a.m. peak hour and 0.54 LOS B during the p.m. peak hour. There continues to be no critical movements reported for this intersection.

Under the 2029 future background traffic scenario, the overall v/c ratio of the intersection increases to 0.47 LOS B during the a.m. peak hour and 0.58 LOS B during the p.m. peak hour. No individual movement is expected to reach critical levels.

With the addition of site generated trips under the 2029 future total traffic scenario, the intersection continues to operate at a satisfactory level with a v/c ratio of 0.47 LOS B during the a.m. peak hour and 0.60 LOS B during the p.m. peak hour. No critical movements were reported.

The 2034 future background scenario is reporting overall v/c ratios for the intersection of 0.52 LOS B during the a.m. peak hour and 0.64 LOS B during the p.m. peak hour. No critical movements were reported and the intersection is expected to operate with reserve capacity.

Under the 2034 future total traffic condition, the addition of site generated traffic results in no changes to the overall intersection v/c ratio during the a.m. peak hour which continues to operate at a v/c ratio of 0.52 LOS B. During the p.m., peak hour, the overall intersection v/c ratio increases by 0.01 to 0.65 LOS B. There continue to be no critical movements reported at this intersection under the future 2034 total traffic scenario.

There are no geometric improvements recommended for this intersection other than signal timing optimization.

7.3 McLeod Road and QEW Northbound Off-Ramp

Capacity analysis for this intersection during the weekday a.m. and p.m. peak hours for the existing, future background, and future total traffic conditions are summarized in the following table.

Table 6 Capacity analysis of McLeod Road and QEW Northbound Off-Ramp

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Existing 2022	Overall: 0.37 (A) 7 EBT = 0.48 (A) 6 WBT = 0.24 (A) 5 NBL = 0.11 (B) 13 NBR = 0.14 (B) 14	EBT = 25 m WBT = 15 m NBL = 10 m NBR = 15 m	Overall: 0.49 (A) 7 EBT = 0.55 (A) 7 WBT = 0.31 (A) 5 NBL = 0.16 (B) 17 NBR = 0.32 (B) 18	EBT = 50 m WBT = 25 m NBL = 15 m NBR = 30 m
Future Background 2024	Overall: 0.42 (A) 7 EBT = 0.50 (A) 6 WBT = 0.25 (A) 5 NBL = 0.12 (B) 14 NBR = 0.25 (B) 15	EBT = 35 m WBT = 20 m NBL = 10 m NBR = 20 m	Overall: 0.53 (A) 8 EBT = 0.59 (A) 7 WBT = 0.33 (A) 6 NBL = 0.16 (B) 18 NBR = 0.38 (B) 20	EBT = 55 m WBT = 30 m NBL = 15 m NBR = 30 m
Future Total 2024	Overall: 0.42 (A) 7 EBT = 0.50 (A) 6 WBT = 0.25 (A) 5 NBL = 0.12 (B) 14 NBR = 0.25 (B) 15	EBT = 35 m WBT = 20 m NBL = 10 m NBR = 20 m	Overall: 0.53 (A) 8 EBT = 0.59 (A) 7 WBT = 0.33 (A) 6 NBL = 0.16 (B) 18 NBR = 0.38 (B) 20	EBT = 55 m WBT = 30 m NBL = 15 m NBR = 30 m
Future Background 2029	Overall: 0.48 (A) 8 EBT = 0.54 (A) 7 WBT = 0.26 (A) 6 NBL = 0.12 (B) 15 NBR = 0.33 (B) 16	EBT = 40 m WBT = 20 m NBL = 10 m NBR = 30 m	Overall: 0.57 (A) 9 EBT = 0.63 (A) 8 WBT = 0.36 (A) 6 NBL = 0.18 (B) 19 NBR = 0.44 (C) 21	EBT = 70 m WBT = 35 m NBL = 15 m NBR = 35 m
Future Total 2029	Overall: 0.49 (A) 8 EBT = 0.55 (A) 7 WBT = 0.27 (A) 6 NBL = 0.13 (B) 16 NBR = 0.34 (B) 17	EBT = 45 m WBT = 20 m NBL = 10 m NBR = 30 m	Overall: 0.58 (A) 9 EBT = 0.64 (A) 8 WBT = 0.36 (A) 6 NBL = 0.18 (B) 20 NBR = 0.44 (C) 22	EBT = 75 m WBT = 35 m NBL = 15 m NBR = 40 m
Future Background 2034	Overall: 0.53 (A) 8 EBT = 0.59 (A) 8 WBT = 0.29 (A) 6 NBL = 0.14 (B) 17 NBR = 0.40 (B) 18	EBT = 55 m WBT = 25 m NBL = 15 m NBR = 35 m	Overall: 0.64 (A) 10 EBT = 0.69 (A) 9 WBT = 0.39 (A) 6 NBL = 0.19 (C) 20 NBR = 0.51 (C) 23	EBT = 85 m WBT = 40 m NBL = 15 m NBR = 45 m
Future Total 2034	Overall: 0.54 (A) 8 EBT = 0.60 (A) 8 WBT = 0.30 (A) 6 NBL = 0.14 (B) 17 NBR = 0.41 (B) 19	EBT = 55 m WBT = 25 m NBL = 15 m NBR = 35 m	Overall: 0.65 (A) 10 EBT = 0.70 (A) 9 WBT = 0.40 (A) 6 NBL = 0.19 (C) 21 NBR = 0.52 (C) 24	EBT = 90 m WBT = 40 m NBL = 15 m NBR = 45 m

Under existing conditions, the intersection of McLeod Road with the northbound QEW off-ramp is operating at satisfactory levels with an overall v/c ratio of 0.37 LOS A and 0.49 LOS A during the a.m. and p.m. peak hour respectively.

Under the 2024 future background conditions, with the addition of corridor growth to the study intersection and signal optimization, the overall intersection continues to operate satisfactory (0.42 LOS A and 0.53 LOS A during the a.m. and p.m. peak hours respectively). There are no critical movements reported.

Under the 2024 future total traffic condition, including site traffic generated by the development, the overall intersection continues to operate at satisfactory levels with a nominal increase in the v/c ratios (0.42 LOS A during the a.m. peak hour and 0.53 LOS A during the p.m. peak hour). There were no critical movements reported for this intersection.

Under the 2029 future background traffic scenario, the overall v/c ratio of the intersection increases to 0.48 LOS A during the a.m. peak hour and 0.57 LOS A during the p.m. peak hour. However, no individual approach is expected to reach critical levels.

With the addition of all site trips under the 2029 future total traffic scenario, the intersection continues to operate at a satisfactory level with no increase to the v/c ratio during the a.m. peak hour (0.55 LOS B) and a nominal increase in the v/c ratio during the p.m. peak hour to 0.64 LOS B. The intersection continues to operate without critical movements.

The 2034 future background scenario is reporting the overall v/c ratio of the intersection increasing to 0.53 LOS A during the a.m. peak hour and 0.64 LOS A during the p.m. peak hour with no critical movements.

Under the 2034 future total traffic condition, the addition of site traffic does not significantly impact the operation of the intersection which is reported to operate at a satisfactory level with an increase in the overall v/c ratios (0.54 LOS A and 0.65 LOS A during the a.m. and p.m. peak hours). However, the intersection continues to operate without critical movements.

There are no geometric improvements recommended for this intersection other than signal timing optimization.

7.4 McLeod Road and Oakwood Drive

Capacity analysis for this intersection during the weekday a.m. and p.m. peak hours for the existing, future background, and future total traffic conditions out are summarized in the following table.

Table 7 Capacity analysis of McLeod Road and Oakwood Drive

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Existing 2022	<u>Overall: 0.42 (B) 18</u>		<u>Overall: 0.63 (C) 31</u>	
	EBL = 0.21 (B) 11	EBL = 15 m	EBL = 0.25 (B) 19	EBL = 15 m
	EBT = 0.49 (B) 19	EBT = 60 m	EBT = 0.74 (C) 33	EBT = 130 m
	EBR = 0.22 (B) 17	EBR = 20 m	EBR = 0.31 (C) 25	EBR = 25 m
	WBL = 0.37 (B) 10	WBL = 25 m	WBL = 0.76 (C) 28	WBL = 75 m
	WBTR = 0.59 (B) 18	WBTR = 80 m	WBTR = 0.72 (C) 26	WBTR = 150 m
	NBL = 0.32 (C) 26	NBL = 35 m	NBL = 0.63 (D) 42	NBL = 85 m
	NBTL = 0.32 (C) 26	NBTL = 35 m	NBTL = 0.64 (D) 42	NBTL = 85 m
	NBR = 0.11 (C) 25	NBR = 15 m	NBR = 0.25 (D) 35	NBR = 25 m
	SBL = 0.05 (C) 30	SBL = 5 m	SBL = 0.13 (D) 45	SBL = 15 m
	SBTR = 0.04 (C) 30	SBTR = 10 m	SBTR = 0.18 (D) 46	SBTR = 25 m
Future Background 2024	<u>Overall: 0.43 (C) 21</u>		<u>Overall: 0.63 (C) 34</u>	
	EBL = 0.23 (B) 12	EBL = 15 m	EBL = 0.28 (B) 20	EBL = 15 m
	EBT = 0.53 (C) 21	EBT = 70 m	EBT = 0.75 (C) 34	EBT = 135 m
	EBR = 0.25 (B) 19	EBR = 20 m	EBR = 0.35 (C) 26	EBR = 25 m
	WBL = 0.36 (C) 29	WBL = 30 m	WBL = 0.63 (D) 48	WBL = 55 m
	WBT = 0.59 (B) 18	WBT = 85 m	WBT = 0.73 (C) 27	WBT = 150 m
	WBR = 0.02 (B) 14	WBR = 0 m	WBR = 0.02 (B) 17	WBR = 0 m
	NBL = 0.42 (C) 27	NBL = 45 m	NBL = 0.67 (D) 43	NBL = 95 m
	NBTL = 0.41 (C) 27	NBTL = 45 m	NBTL = 0.68 (D) 43	NBTL = 95 m
	NBR = 0.13 (C) 25	NBR = 20 m	NBR = 0.38 (D) 36	NBR = 40 m
	SBL = 0.05 (C) 32	SBL = 5 m	SBL = 0.14 (D) 48	SBL = 15 m
SBTR = 0.04 (C) 32	SBTR = 10 m	SBTR = 0.19 (D) 48	SBTR = 25 m	

Future Total 2024	<u>Overall: 0.43 (C) 21</u> EBL = 0.23 (B) 12 EBT = 0.53 (C) 21 EBR = 0.25 (B) 19 WBL = 0.36 (C) 29 WBT = 0.59 (B) 18 WBR = 0.02 (B) 14 NBL = 0.42 (C) 27 NBTL = 0.41 (C) 27 NBR = 0.13 (C) 25 SBL = 0.05 (C) 32 SBTR = 0.04 (C) 32	EBL = 15 m EBT = 70 m EBR = 20 m WBL = 30 m WBT = 85 m WBR = 0 m NBL = 45 m NBTL = 45 m NBR = 20 m SBL = 5 m SBTR = 10 m	<u>Overall: 0.63 (C) 34</u> EBL = 0.28 (B) 20 EBT = 0.75 (C) 34 EBR = 0.35 (C) 26 WBL = 0.63 (D) 48 WBT = 0.73 (C) 27 WBR = 0.02 (B) 17 NBL = 0.67 (D) 43 NBTL = 0.68 (D) 43 NBR = 0.38 (D) 36 SBL = 0.14 (D) 48 SBTR = 0.19 (D) 48	EBL = 15 m EBT = 135 m EBR = 25 m WBL = 55 m WBT = 150 m WBR = 0 m NBL = 95 m NBTL = 95 m NBR = 40 m SBL = 15 m SBTR = 25 m
Future Background 2029	<u>Overall: 0.44 (C) 21</u> EBL = 0.26 (B) 12 EBT = 0.55 (C) 20 EBR = 0.25 (B) 18 WBL = 0.37 (C) 29 WBT = 0.61 (B) 18 WBR = 0.02 (B) 13 NBL = 0.37 (C) 28 NBTL = 0.37 (C) 28 NBR = 0.13 (C) 26 SBL = 0.05 (C) 33 SBTR = 0.04 (C) 33	EBL = 15 m EBT = 70 m EBR = 20 m WBL = 35 m WBT = 90 m WBR = 0 m NBL = 40 m NBTL = 40 m NBR = 20 m SBL = 10 m SBTR = 10 m	<u>Overall: 0.68 (D) 36</u> EBL = 0.35 (C) 21 EBT = 0.80 (D) 36 EBR = 0.36 (C) 26 WBL = 0.72 (D) 53 WBT = 0.80 (C) 30 WBR = 0.02 (B) 18 NBL = 0.67 (D) 43 NBTL = 0.67 (D) 44 NBR = 0.49 (D) 38 SBL = 0.15 (D) 48 SBTR = 0.21 (D) 49	EBL = 20 m EBT = 155 m EBR = 25 m WBL = 65 m WBT = 180 m WBR = 0 m NBL = 95 m NBTL = 95 m NBR = 60 m SBL = 15 m SBTR = 25 m
Future Total 2029	<u>Overall: 0.47 (C) 22</u> EBL = 0.27 (B) 13 EBT = 0.56 (C) 22 EBR = 0.27 (B) 19 WBL = 0.40 (C) 31 WBT = 0.62 (B) 19 WBR = 0.02 (B) 14 NBL = 0.45 (C) 29 NBTL = 0.45 (C) 29 NBR = 0.14 (C) 26 SBL = 0.06 (C) 35 SBTR = 0.04 (C) 35	EBL = 15 m EBT = 80 m EBR = 20 m WBL = 35 m WBT = 100 m WBR = 0 m NBL = 50 m NBTL = 55 m NBR = 20 m SBL = 10 m SBTR = 15 m	<u>Overall: 0.7 (D) 37</u> EBL = 0.36 (C) 22 EBT = 0.81 (D) 37 EBR = 0.38 (C) 27 WBL = 0.75 (E) 56 WBT = 0.81 (C) 32 WBR = 0.02 (B) 18 NBL = 0.71 (D) 45 NBTL = 0.71 (D) 45 NBR = 0.53 (D) 39 SBL = 0.15 (D) 50 SBTR = 0.21 (D) 50	EBL = 20 m EBT = 155 m EBR = 25 m WBL = 70 m WBT = 180 m WBR = 0 m NBL = 105 m NBTL = 105 m NBR = 65 m SBL = 15 m SBTR = 25 m
Future Background 2034	<u>Overall: 0.48 (C) 23</u> EBL = 0.33 (B) 13 EBT = 0.60 (C) 22 EBR = 0.28 (B) 19 WBL = 0.43 (C) 33 WBT = 0.66 (B) 20 WBR = 0.02 (B) 13 NBL = 0.42 (C) 31 NBTL = 0.41 (C) 31 NBR = 0.14 (C) 29 SBL = 0.05 (C) 35 SBTR = 0.04 (C) 35	EBL = 15 m EBT = 80 m EBR = 20 m WBL = 40 m WBT = 105 m WBR = 0 m NBL = 45 m NBTL = 45 m NBR = 20 m SBL = 10 m SBTR = 15 m	<u>Overall: 0.74 (D) 40</u> EBL = 0.44 (C) 24 EBT = 0.87 (D) 40 EBR = 0.39 (C) 27 WBL = 0.78 (E) 59 WBT = 0.86 (C) 34 WBR = 0.03 (B) 17 NBL = 0.75 (D) 50 NBTL = 0.75 (D) 50 NBR = 0.62 (D) 44 SBL = 0.18 (D) 52 SBTR = 0.24 (D) 52	EBL = 20 m EBT = 175 m EBR = 25 m WBL = 70 m WBT = 205 m WBR = 0 m NBL = 110 m NBTL = 110 m NBR = 80 m SBL = 20 m SBTR = 25 m
Future Total 2034	<u>Overall: 0.51 (C) 24</u> EBL = 0.34 (B) 14 EBT = 0.60 (C) 24 EBR = 0.30 (C) 20 WBL = 0.47 (D) 35 WBT = 0.67 (C) 21 WBR = 0.02 (B) 14	EBL = 20 m EBT = 90 m EBR = 20 m WBL = 45 m WBT = 115 m WBR = 0 m NBL = 60 m	<u>Overall: 0.76 (D) 41</u> EBL = 0.44 (C) 24 EBT = 0.87 (D) 42 EBR = 0.42 (C) 28 WBL = 0.81 (E) 62 WBT = 0.86 (C) 35 WBR = 0.03 (B) 18	EBL = 20 m EBT = 175 m EBR = 30 m WBL = 75 m WBT = 205 m WBR = 0 m NBL = 120 m

	NBL = 0.49 (C) 32 NBTL = 0.49 (C) 32 NBR = 0.16 (C) 29 SBL = 0.06 (D) 37 SBTR = 0.05 (D) 37	NBTL = 60 m NBR = 20 m SBL = 10 m SBTR = 15 m	NBL = 0.79 (D) 53 NBTL = 0.79 (D) 53 NBR = 0.67 (D) 46 SBL = 0.18 (D) 52 SBTR = 0.24 (D) 53	NBTL = 125 m NBR = 90 m SBL = 20 m SBTR = 25 m
Future Total 2034 (Eastbound Dual Left-Turn Lane)	<u>Overall: 0.51 (C) 24</u> EBL = 0.36 (B) 16 EBT = 0.61 (C) 25 EBR = 0.28 (A) 9 WBL = 0.48 (D) 37 WBT = 0.68 (C) 23 WBR = 0.02 (B) 15 NBL = 0.45 (C) 31 NBTL = 0.45 (C) 31 NBR = 0.16 (C) 28 SBL = 0.06 (D) 38 SBTR = 0.05 (D) 38	EBL = 20 m EBT = 95 m EBR = 25 m WBL = 45 m WBT = 125 m WBR = 0 m NBL = 60 m NBTL = 60 m NBR = 20 m SBL = 10 m SBTR = 15 m	<u>Overall: 0.76 (D) 40</u> EBL = 0.45 (C) 25 EBT = 0.89 (D) 44 EBR = 0.36 (A) 10 WBL = 0.81 (E) 62 WBT = 0.87 (D) 36 WBR = 0.03 (B) 18 NBL = 0.77 (D) 51 NBTL = 0.77 (D) 51 NBR = 0.66 (D) 45 SBL = 0.18 (D) 53 SBTR = 0.24 (D) 53	EBL = 20 m EBT = 175 m EBR = 45 m WBL = 75 m WBT = 205 m WBR = 0 m NBL = 120 m NBTL = 125 m NBR = 90 m SBL = 20 m SBTR = 25 m

Under existing conditions, the intersection of McLeod Road and Oakwood Drive is reported to operate at satisfactory levels with an overall v/c ratio of 0.42 LOS B and 0.63 LOS C during the a.m. and p.m. peak hours, respectively. There are no individual movements operating at critical levels.

Under all future traffic scenarios, the Region's planned improvements to this intersection have been included in the analysis which includes the eastbound approach consisting of one left-turn lane, two through lanes, and at a minimum one right-turn lane. The westbound approach will consist of 1 right-turn lane, two through lanes and two left-turn lanes. With the addition of corridor growth, the new alignment and signal optimization under the 2024 future background scenario, the overall v/c ratio of the intersection increases marginally to 0.43 LOS C during the a.m. peak hour and remains unchanged at 0.63 LOS C during the p.m. peak hour. There are no critical movements reported under the 2024 future background traffic condition.

Under the 2024 future total traffic condition, the addition of site traffic results in the overall intersection continuing to operate at satisfactory levels with an increase in the v/c ratio to 0.43 LOS C during the a.m. peak hour and 0.63 LOS C during the p.m. peak hour. No critical movements were reported at this intersection.

Under the 2029 future background scenario, the overall v/c ratio of the intersection increases to 0.44 LOS C during the a.m. peak hour and 0.68 LOS D during the p.m. peak hour and all individual movements are expected to operate below critical levels.

With the addition of all site trips under the 2029 future total traffic scenario, the intersection continues to operate at a satisfactory level with an increase to the v/c ratio during the a.m. peak hour (0.47 LOS C) and during the p.m. peak hour (0.70 LOS B). The intersection continues to operate with no critical movements.

The 2034 future background scenario is reporting an overall v/c ratio for the intersection 0.48 LOS C during the a.m. peak hour and 0.74 LOS D during the p.m. peak hour. During the p.m. peak hour, the eastbound through and westbound left movements are at a critical level but remain below the theoretical capacity level. No other individual movements are reported to reach critical levels.

Under the 2034 future total traffic condition, with the addition of all site trips generated by the proposed residential development, the intersection continues to operate at a satisfactory level with a slight increase in the overall v/c ratios (0.51 LOS C and 0.76 LOS D during the a.m. and p.m. peak hours respectively). During the p.m. peak hour, the eastbound through and westbound through movements continue to operate at a critical level, however both approaches are still operating below theoretical capacity with v/c ratio below 1.0.

The Region requested an analysis assuming that a dual right turn lane was provided in the eastbound direction. As a result, GHD assessed the Future Total 2034 traffic scenario with the dual right-turn lane option. Under the new lane alignment, the signal timing plan was updated to include a permitted and overlap phase (with the northbound phase) for the eastbound right-turn lane direction with no right-turns on red permitted. Under this scenario, the intersection operates with an overall reported v/c ratio of 0.51 LOS C and 0.76 LOS D during the a.m. and p.m. peak hours respectively which is relatively unchanged from the single right-turn lane option.

There are no geometric improvements recommended for this intersection other than the ones being proposed by the Niagara Region.

7.5 Oakwood Drive and Montrose Road

Table 8 Capacity analysis of Oakwood Drive and Montrose Road

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Existing 2022	WBLR = 0.07 (B) 11 NBTR = 0.12 () 0 SBTL = 0.01 (A) 0	WBLR = 5 m NBTR = 0 m SBTL = 5 m	WBLR = 0.21 (C) 14 NBTR = 0.20 () 0 SBTL = 0.01 (A) 0	WBLR = 10 m NBTR = 0 m SBTL = 5 m
Future Background 2024	WBLR = 0.10 (B) 11 NBTR = 0.12 () 0 SBTL = 0.01 (A) 1	WBLR = 5 m NBTR = 0 m SBTL = 5 m	WBLR = 0.24 (B) 14 NBTR = 0.21 () 0 SBTL = 0.01 (A) 0	WBLR = 10 m NBTR = 0 m SBTL = 5 m
Future Total 2024	WBLR = 0.10 (B) 11 NBTR = 0.12 () 0 SBTL = 0.01 (A) 1	WBLR = 5 m NBTR = 0 m SBTL = 5 m	WBLR = 0.24 (B) 14 NBTR = 0.21 () 0 SBTL = 0.01 (A) 0	WBLR = 10 m NBTR = 0 m SBTL = 5 m
Future Background 2029	WBLR = 0.09 (B) 11 NBTR = 0.13 () 0 SBTL = 0.01 (A) 1	WBLR = 5 m NBTR = 0 m SBTL = 5 m	WBLR = 0.27 (C) 15 NBTR = 0.22 () 0 SBTL = 0.01 (A) 0	WBLR = 10 m NBTR = 0 m SBTL = 5 m
Future Total 2029	WBLR = 0.11 (B) 11 NBTR = 0.14 () 0 SBTL = 0.01 (A) 1	WBLR = 5 m NBTR = 0 m SBTL = 5 m	WBLR = 0.29 (C) 16 NBTR = 0.23 () 0 SBTL = 0.01 (A) 0	WBLR = 10 m NBTR = 0 m SBTL = 5 m
Future Background 2034	WBLR = 0.10 (B) 12 NBTR = 0.15 () 0 SBTL = 0.01 (A) 1	WBLR = 5 m NBTR = 0 m SBTL = 5 m	WBLR = 0.32 (C) 17 NBTR = 0.25 () 0 SBTL = 0.01 (A) 0	WBLR = 10 m NBTR = 0 m SBTL = 5 m
Future Total 2034	WBLR = 0.12 (B) 12 NBTR = 0.15 () 0 SBTL = 0.01 (A) 1	WBLR = 5 m NBTR = 0 m SBTL = 5 m	WBLR = 0.34 (C) 18 NBTR = 0.25 () 0 SBTL = 0.01 (A) 0	WBLR = 15 m NBTR = 0 m SBTL = 5 m

Under existing, future background and future total traffic conditions, the intersection of Oakwood Drive and Montrose Road is reported to operate satisfactorily with substantial reserve capacity, low levels of delay and negligible queueing. All approaches are operating with delays of 12 seconds or less during the a.m. peak and 18 seconds or less during the p.m. peak.

There are no geometric improvements recommended for this study intersection.

7.6 Oakwood Drive and North Commercial Access

Capacity analysis for this intersection during the weekday a.m. and p.m. peak hours for the existing, future background, and future total traffic conditions out are summarized in the following table.

Table 9 Capacity analysis of Oakwood Drive and North Commercial Access

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Existing 2022	Overall: <u>0.25 (A) 8</u> EBLR = 0.42 (C) 21 NBTL = 0.1 (A) 4 SBTR = 0.19 (A) 4	EBLR = 30 m NBTL = 10 m SBTR = 10 m	Overall: <u>0.43 (B) 11</u> EBLR = 0.66 (C) 22 NBTL = 0.2 (A) 7 SBTR = 0.29 (A) 8	EBLR = 65 m NBTL = 20 m SBTR = 20 m
Future Background 2024	Overall: <u>0.29 (A) 8</u> EBLR = 0.46 (C) 20 NBTL = 0.12 (A) 4 SBTR = 0.22 (A) 5	EBLR = 35 m NBTL = 10 m SBTR = 15 m	Overall: <u>0.49 (B) 13</u> EBLR = 0.72 (C) 23 NBTL = 0.24 (A) 8 SBTR = 0.34 (A) 9	EBLR = 80 m NBTL = 25 m SBTR = 25 m
Future Total 2024	Overall: <u>0.3 (A) 8</u> EBLR = 0.46 (C) 20 NBTL = 0.17 (A) 4 SBTR = 0.24 (A) 5	EBLR = 35 m NBTL = 15 m SBTR = 15 m	Overall: <u>0.5 (B) 12</u> EBLR = 0.72 (C) 23 NBTL = 0.27 (A) 8 SBTR = 0.37 (A) 9	EBLR = 80 m NBTL = 30 m SBTR = 25 m
Future Background 2029	Overall: <u>0.32 (A) 8</u> EBLR = 0.49 (C) 20 NBTL = 0.13 (A) 5 SBTR = 0.25 (A) 5	EBLR = 40 m NBTL = 15 m SBTR = 15 m	Overall: <u>0.53 (B) 14</u> EBLR = 0.77 (C) 25 NBTL = 0.26 (A) 9 SBTR = 0.38 (A) 10	EBLR = 90 m NBTL = 25 m SBTR = 25 m
Future Total 2029	Overall: <u>0.33 (A) 8</u> EBLR = 0.49 (C) 20 NBTL = 0.19 (A) 5 SBTR = 0.27 (A) 5	EBLR = 40 m NBTL = 15 m SBTR = 20 m	Overall: <u>0.55 (B) 14</u> EBLR = 0.77 (C) 25 NBTL = 0.30 (A) 9 SBTR = 0.41 (A) 10	EBLR = 90 m NBTL = 30 m SBTR = 30 m
Future Background 2034	Overall: <u>0.33 (B) 11</u> EBLR = 0.60 (C) 26 NBTL = 0.13 (A) 6 SBTR = 0.24 (A) 7	EBLR = 40 m NBTL = 15 m SBTR = 20 m	Overall: <u>0.56 (B) 18</u> EBLR = 0.85 (C) 34 NBTL = 0.27 (B) 11 SBTR = 0.37 (B) 12	EBLR = 105 m NBTL = 30 m SBTR = 30 m
Future Total 2034	Overall: <u>0.35 (B) 10</u> EBLR = 0.60 (C) 26 NBTL = 0.19 (A) 6 SBTR = 0.26 (A) 7	EBLR = 40 m NBTL = 20 m SBTR = 20 m	Overall: <u>0.57 (B) 17</u> EBLR = 0.85 (C) 34 NBTL = 0.31 (B) 11 SBTR = 0.40 (B) 12	EBLR = 105 m NBTL = 35 m SBTR = 30 m

Under existing conditions, the intersection of Oakwood Drive and North Commercial Access is operating at satisfactory levels with an overall v/c ratio of 0.25 LOS A and 0.43 LOS B during the a.m. and p.m. peak hours respectively. There are no individual movements operating at critical levels.

With the addition of corridor growth under the future background 2024 scenario, the overall intersection v/c ratio increases to 0.29 LOS A during the a.m. peak hour and 0.49 LOS B during the p.m. peak hour. There continues to be no reported critical movements at this intersection.

Under the 2024 future total traffic condition, with the addition of the development's site trips, the overall intersection continues to operate below critical levels, reporting a v/c ratio of 0.30 LOS A during the a.m. peak hour and 0.50 LOS C during the p.m. peak hour.

Under the future background 2029 scenario, the overall intersection v/c ratios increase to 0.32 LOS A during the a.m. peak hour and to 0.53 LOS B during the p.m. peak hour. There continues to be no reported critical movements.

Under the 2029 future total traffic condition, the addition of site trips results in the overall intersection operating below critical levels with a v/c ratio of 0.33 LOS A during the a.m. peak hour and 0.55 LOS C during the p.m. peak hour.

The future background 2034 scenario is reporting overall intersection v/c ratios increasing to 0.33 LOS A during the a.m. peak hour and to 0.56 LOS B during the p.m. peak hour, however, there continues to be no reported critical movements.

Under the 2034 total future traffic condition, the intersection overall continues to operate below critical levels, reporting a v/c ratio of 0.35 LOS A during the a.m. peak hour and 0.57 LOS C during the p.m. peak hour.

There are no geometric improvements recommended for this intersection in response to the proposed development.

7.7 Oakwood Drive and South Commercial Access/Site Access #1

Capacity analysis for this intersection during the weekday a.m. and p.m. peak hours for the existing, future background, and future total traffic conditions out are summarized in the following table.

Table 10 Capacity analysis of Oakwood Drive and South Commercial Access/Site Access #1

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Existing 2022	Overall: 0.14 (B) 16 EBL = 0.04 (A) 9 EBT = 0.15 (B) 10 WBT = 0.23 (C) 21 WBR = 0.01 (B) 18 SBL = 0.04 (C) 21 SBR = 0.01 (C) 21	EBL = 5 m EBT = 25 m WBT = 35 m WBR = 5 m SBL = 10 m SBR = 5 m	Overall: 0.18 (B) 18 EBL = 0.07 (A) 9 EBT = 0.15 (B) 10 WBT = 0.22 (C) 21 WBR = 0.02 (B) 18 SBL = 0.16 (C) 22 SBR = 0.06 (C) 21	EBL = 10 m EBT = 25 m WBT = 35 m WBR = 5 m SBL = 20 m SBR = 10 m
Future Background 2024	Overall: 0.16 (C) 24 EBL = 0.04 (B) 12 EBTR = 0.18 (B) 13 WBL = 0.09 (C) 23 WBT = 0.26 (C) 25 WBR = 0.01 (C) 22 SBL = 0.08 (C) 25 SBT = 0 (A) 0 SBR = 0.02 (C) 24	EBL = 10 m EBTR = 30 m WBL = 15 m WBT = 40 m WBR = 0 m SBL = 15 m SBT = 0 m SBR = 0 m	Overall: 0.25 (C) 24 EBL = 0.08 (B) 13 EBTR = 0.17 (B) 14 WBL = 0.11 (C) 23 WBT = 0.26 (C) 25 WBR = 0.02 (C) 22 SBL = 0.35 (C) 30 SBT = 0 (A) 0 SBR = 0.06 (C) 25	EBL = 10 m EBTR = 30 m WBL = 15 m WBT = 40 m WBR = 0 m SBL = 50 m SBT = 0 m SBR = 0 m
Future Total 2024	Overall: 0.16 (C) 24 EBL = 0.04 (B) 12 EBTR = 0.18 (B) 13 WBL = 0.09 (C) 23 WBT = 0.26 (C) 25 WBR = 0.01 (C) 22 SBL = 0.08 (C) 25 SBT = 0 (A) 0 SBR = 0.02 (C) 24	EBL = 10 m EBTR = 30 m WBL = 15 m WBT = 40 m WBR = 0 m SBL = 15 m SBT = 0 m SBR = 0 m	Overall: 0.25 (C) 24 EBL = 0.08 (B) 13 EBTR = 0.17 (B) 14 WBL = 0.11 (C) 23 WBT = 0.26 (C) 25 WBR = 0.02 (C) 22 SBL = 0.35 (C) 30 SBT = 0 (A) 0 SBR = 0.06 (C) 25	EBL = 10 m EBTR = 30 m WBL = 15 m WBT = 40 m WBR = 0 m SBL = 50 m SBT = 0 m SBR = 0 m
Future Background 2029	Overall: 0.18 (B) 16 EBL = 0.05 (A) 9 EBTR = 0.18 (B) 10 WBL = 0 (A) 0 WBT = 0.26 (C) 21 WBR = 0.01 (B) 18 SBL = 0.09 (C) 22 SBT = 0 (A) 0 SBR = 0.02 (C) 21	EBL = 5 m EBTR = 25 m WBL = 0 m WBT = 40 m WBR = 0 m SBL = 15 m SBT = 0 m SBR = 0 m	Overall: 0.27 (C) 23 EBL = 0.09 (B) 13 EBTR = 0.18 (B) 14 WBL = 0 (A) 0 WBT = 0.27 (C) 25 WBR = 0.03 (C) 22 SBL = 0.38 (C) 30 SBT = 0 (A) 0 SBR = 0.06 (C) 25	EBL = 10 m EBTR = 30 m WBL = 0 m WBT = 45 m WBR = 0 m SBL = 55 m SBT = 0 m SBR = 0 m

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Future Total 2029	Overall: 0.18 (C) 24 EBL = 0.05 (B) 12 EBTR = 0.2 (B) 13 WBL = 0.09 (C) 23 WBT = 0.29 (C) 25 WBR = 0.01 (C) 22 SBL = 0.09 (C) 25 SBT = 0 (A) 0 SBR = 0.02 (C) 24	EBL = 10 m EBTR = 30 m WBL = 15 m WBT = 45 m WBR = 0 m SBL = 15 m SBT = 0 m SBR = 0 m	Overall: 0.27 (C) 24 EBL = 0.09 (B) 13 EBTR = 0.19 (B) 14 WBL = 0.12 (C) 23 WBT = 0.28 (C) 26 WBR = 0.03 (C) 22 SBL = 0.38 (C) 30 SBT = 0 (A) 0 SBR = 0.06 (C) 25	EBL = 10 m EBTR = 30 m WBL = 15 m WBT = 45 m WBR = 0 m SBL = 55 m SBT = 0 m SBR = 0 m
Future Background 2034	Overall: 0.19 (B) 17 EBL = 0.05 (A) 9 EBTR = 0.20 (B) 10 WBL = 0 (A) 0 WBT = 0.29 (C) 22 WBR = 0.01 (B) 18 SBL = 0.1 (C) 22 SBT = 0 (A) 0 SBR = 0.02 (C) 21	EBL = 10 m EBTR = 30 m WBL = 0 m WBT = 45 m WBR = 0 m SBL = 15 m SBT = 0 m SBR = 0 m	Overall: 0.30 (C) 23 EBL = 0.1 (B) 13 EBTR = 0.2 (B) 14 WBL = 0 (A) 0 WBT = 0.30 (C) 26 WBR = 0.03 (C) 22 SBL = 0.42 (C) 31 SBT = 0 (A) 0 SBR = 0.07 (C) 25	EBL = 15 m EBTR = 35 m WBL = 0 m WBT = 45 m WBR = 0 m SBL = 60 m SBT = 0 m SBR = 0 m
Future Total 2034	Overall: 0.20 (C) 24 EBL = 0.06 (B) 12 EBTR = 0.22 (B) 14 WBL = 0.09 (C) 23 WBT = 0.32 (C) 26 WBR = 0.01 (C) 22 SBL = 0.10 (C) 25 SBT = 0 (A) 0 SBR = 0.02 (C) 24	EBL = 10 m EBTR = 35 m WBL = 15 m WBT = 50 m WBR = 0 m SBL = 20 m SBT = 0 m SBR = 0 m	Overall: 0.30 (C) 25 EBL = 0.10 (B) 13 EBTR = 0.21 (B) 14 WBL = 0.12 (C) 24 WBT = 0.31 (C) 26 WBR = 0.03 (C) 22 SBL = 0.42 (C) 31 SBT = 0 (A) 0 SBR = 0.07 (C) 25	EBL = 15 m EBTR = 35 m WBL = 15 m WBT = 50 m WBR = 0 m SBL = 60 m SBT = 0 m SBR = 0 m

Under existing conditions, the intersection of Oakwood Drive and South Commercial Access is operating at satisfactory levels with an overall v/c ratio of 0.14 LOS B and 0.18 LOS B during the a.m. and p.m. peak hours respectively. There are no individual movements operating at critical levels.

With the addition of corridor growth under the future background 2024 scenario, the overall intersection v/c ratios increase to 0.16 LOS C and 0.25 LOS C during the a.m. and p.m. peak hours respectively. There continues to be no reported critical movements.

Under the 2024 future total traffic condition, with the addition of the south approach (Site Access #1), the overall intersection is reported to operate below critical levels, reporting a v/c ratio of 0.16 LOS C during the a.m. peak hour and 0.25 LOS C during the p.m. peak hour.

Under the future background 2029 scenario, the overall intersection v/c ratios increase to 0.32 LOS A during the a.m. peak hour and to 0.53 LOS B during the p.m. peak hour. There continues to be no reported critical movements at this intersection.

Under the 2029 future total traffic condition, the overall intersection continues to operate below critical levels, reporting a v/c ratio of 0.33 LOS A during the a.m. peak hour and 0.55 LOS C during the p.m. peak hour.

The future background 2034 scenario results in the overall intersection v/c ratios increasing to 0.33 LOS A during the a.m. peak hour and to 0.56 LOS B during the p.m. peak hour. There continues to be no reported critical movements.

Under the 2034 future total traffic condition, the overall intersection continues to operate below critical levels, reporting a v/c ratio of 0.35 LOS A during the a.m. peak hour and 0.57 LOS C during the p.m. peak hour.

There are no geometric improvements recommended for this intersection in response to the addition of site generated traffic to this study intersection.

7.8 Oakwood Drive and Site Access #2

Capacity analysis for this intersection during the weekday a.m. and p.m. peak hours for the existing, future background, and future total traffic conditions out are summarized in the following table.

Table 11 Capacity analysis of Oakwood Drive and Site Access #2

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Future Total 2024	WBLR = 0.02 (B) 10 NBT = 0.11 (A) 0 SBT = 0 (A) 0	WBLR = 5 m NBT = 0 m SBT = 0 m	WBLR = 0.02 (B) 11 NBT = 0.12 (A) 0 SBT = 0 (A) 0	WBLR = 5 m NBT = 0 m SBT = 5 m
Future Total 2029	WBLR = 0.03 (B) 10 NBT = 0.12 (A) 0 SBT = 0 (A) 0	WBLR = 5 m NBT = 0 m SBT = 0 m	WBLR = 0.02 (B) 11 NBT = 0.13 (A) 0 SBT = 0 (A) 0	WBLR = 5 m NBT = 0 m SBT = 5 m
Future Total 2034	WBLR = 0.03 (B) 11 NBT = 0.13 (A) 0 SBT = 0 (A) 0	WBLR = 5 m NBT = 0 m SBT = 0 m	WBLR = 0.02 (B) 11 NBT = 0.15 (A) 0 SBT = 0 (A) 0	WBLR = 5 m NBT = 0 m SBT = 5 m

Under existing, future background and future total traffic conditions, Site Access #2 along Oakwood Drive is reported to operate satisfactorily with substantial reserve capacity, low levels of delay and negligible queueing. All approaches are operating with delays of 11 seconds or less during both peak hours

7.9 Oakwood Drive and Right-In/Right-Out Access

Capacity analysis for this intersection during the weekday a.m. and p.m. peak hours for the existing, future background, and future total traffic conditions out are summarized in the following table.

Table 12 Capacity analysis of Oakwood Drive and Right-In/Right-Out Access

Scenario	AM Peak Hour		PM Peak Hour	
	V/C (LOS) seconds	95 th % Que.	V/C (LOS) seconds	95 th % Que
Future Total 2024	EBT = 0.11 (A) 0 EBTR = 0.06 (A) 0 WBT = 0.06 (A) 0 WBT = 0.06 (A) 0 NBR = 0.01 (A) 9	EBT = 0 m EBTR = 0 m WBT = 0 m WBT = 0 m NBR = 5 m	EBT = 0.15 (A) 0 EBTR = 0.08 (A) 0 WBT = 0.07 (A) 0 WBT = 0.07 (A) 0 NBR = 0.01 (A) 10	EBT = 0 m EBTR = 0 m WBT = 0 m WBT = 0 m NBR = 5 m
Future Total 2029	EBT = 0.12 (A) 0 EBTR = 0.06 (A) 0 WBT = 0.07 (A) 0 WBT = 0.07 (A) 0 NBR = 0.01 (A) 9	EBT = 0 m EBTR = 0 m WBT = 0 m WBT = 0 m NBR = 5 m	EBT = 0.17 (A) 0 EBTR = 0.08 (A) 0 WBT = 0.08 (A) 0 WBT = 0.08 (A) 0 NBR = 0.01 (A) 10	EBT = 0 m EBTR = 0 m WBT = 0 m WBT = 0 m NBR = 5 m
Future Total 2034	EBT = 0.13 (A) 0 EBTR = 0.06 (A) 0 WBT = 0.07 (A) 0 WBT = 0.07 (A) 0 NBR = 0.01 (A) 9	EBT = 0 m EBTR = 0 m WBT = 0 m WBT = 0 m NBR = 5 m	EBT = 0.18 (A) 0 EBTR = 0.09 (A) 0 WBT = 0.08 (A) 0 WBT = 0.08 (A) 0 NBR = 0.01 (A) 10	EBT = 0 m EBTR = 0 m WBT = 0 m WBT = 0 m NBR = 5 m

Under the future total traffic conditions, Site Access #2 along Oakwood Drive is reported to operate satisfactorily with substantial reserve capacity, low levels of delay and negligible queueing. The northbound approach (right-out) is reporting a delay of 9 second during the a.m. peak hour and 10 seconds during the p.m. peak hour.

8. Parking Review

8.1 Zoning By-Law Requirement

The proposed development is subject to the City of Niagara Falls Zoning By-law 79-200, which requires 1.4 parking spaces per dwelling unit. Additionally, the By-law states in Section 5.13 that secondary units within accessory buildings are required to provide 1 additional parking space for the occupant of the second units.

For the main dwelling units, parking spaces can be tandem. Despite no indication provided within the City's By-law states prohibiting tandem parking for the secondary units' parking space, City staff have indicated that the additional parking space cannot be tandem.

As per the City's Zoning By-Law, the proposed development requires a minimum of 377 parking spaces for a proposed supply of 282 dwelling units (236 townhouses, 46 secondary units). The subject site provides a total of 630 parking spaces, resulting in a surplus of 253 parking spaces compared to the City's By-law requirement.

9. Proposed Right-In/Right-Out Access

The right-in/right-out access on Oakwood Drive is proposed be located near the northwest limit of the property, immediately west of an existing access to the High Lift Pumping Station located at 7606 Oakwood Drive. TAC provides suggested minimum spacing for driveways for residential, commercial, and industrial land uses in Section 8.9.9, Spacing of Adjacent Driveways. The pumping station that is located on the property adjacent to the subject site does not fall under those typical land uses, however similar vehicle types as commercial and industrial land uses typically service pumping stations and the traffic volumes using this driveway are extremely low.

The minimum spacing recommendation provided by TAC in Figure 8.9.2 recommends providing 1 metre of spacing between residential driveways and 3 metres between commercial/industrial driveways. Due to the typical design vehicles that may require access to the pumping station, the 3 metre spacing for commercial/industrial land uses is appropriate.

With 18.65 metres of spacing provided between each driveway (from the end of the curb return of the right-out access to the start of the curb return for the adjacent driveway), sufficient driveway spacing is proposed that exceeds the TAC suggested minimum spacing.

The proposed design for the right-in/right-out access includes an extension of the existing median that exists along Oakwood Drive. A standard practice is to provide a median island along the main road that extends on either side of a right-in/out driveway to enforce the turning restrictions. Given the proximity of the existing access to the High Lift Pumping Station, it is proposed to extend the median 25 metres to the east so that it does not restrict egress and ingress movements for the adjacent driveway.

It is expected that the proposed median island extension will provide sufficient deterrent for residents turning left from Oakwood Drive to the development as it would require a vehicle to travel some 50 metres in the eastbound lanes to avoid the median island.

The proposed right-in/out also provides another access point to the external road network, relieving some traffic from the signalized intersection and provides another means for emergency access to and from the site.

10. Sightline Assessment

Adjacent to the proposed site, Oakwood Drive has a posted speed limit of 50 km/h and a vertical curve to the west of the proposed access located at the commercial plaza’s existing south access. A sightline assessment was undertaken to determine if there is sufficient sight distance for a northbound vehicle to turn right on a red light or for a westbound left-turning vehicle to turn into the site access. For the purpose of Stopping Sight Distance requirements a design speed of 60 km/h was used for the assessment on Oakwood Drive based on the 50 km/h posted speed limit.

Section 9.9 of the TAC GDCR provides intersection sight distances for different scenarios, with the following scenarios used to complete the intersection sight distance analysis:

- Case B2 – Right turn from the minor road
- Case F – Left turns from the major road

For the purpose of the assessment, the minor road is assumed to be the site driveway on the south approach of the signalized intersection.

A vehicle entering the major road (Oakwood Drive) from the site access is assumed to stop a distance of approximately 4.4 metres to the pavement edge of Oakwood Drive as recommended by TAC (4.4 metres from the outside line of the projected bicycle lane through the intersection). In this stopped position, the driver will be required to look left in order to perceive and react to approaching vehicles prior to initiating a turning movement onto the main road.

The required intersection sight distances are provided in TAC GDGCR Tables 9.9.6 and 9.9.12 for passenger vehicles turning right from stop, or turning left from the major road, respectively, and are summarized in the following table. The required intersection sight distances summarized in the tables below are based on a 60 km/h design speed along the major road.

Table 13 Intersection Sight Distance Requirement

Case (Design Speed of 60 km/h)	Required Intersection Sight Distance for Passenger Cars (TAC 2017)	Available Intersection Sight Distance, from the Western Limit of the Property	TAC Reference
Case B2: Vehicles turning right from stop	110 m	110 m to the west	Table 9.9.6
Case F: Left turns from the major road	95 m	124 m to the west	Table 9.9.12

The available sight distances for cases B2 and F can be found in **Figure 20** and **Figure 21** below. It was confirmed that there is 110 metres of available sight distance to the west of the intersection for a vehicle turning right onto Oakwood Drive which meets the required distance. However, it should be noted that a right-turning vehicle will be turning into its own lane, as Oakwood Drive is widened from one lane to two eastbound lanes east of the intersection. As a result, there is little conflict with vehicles travelling through the intersection and a right turning vehicle.

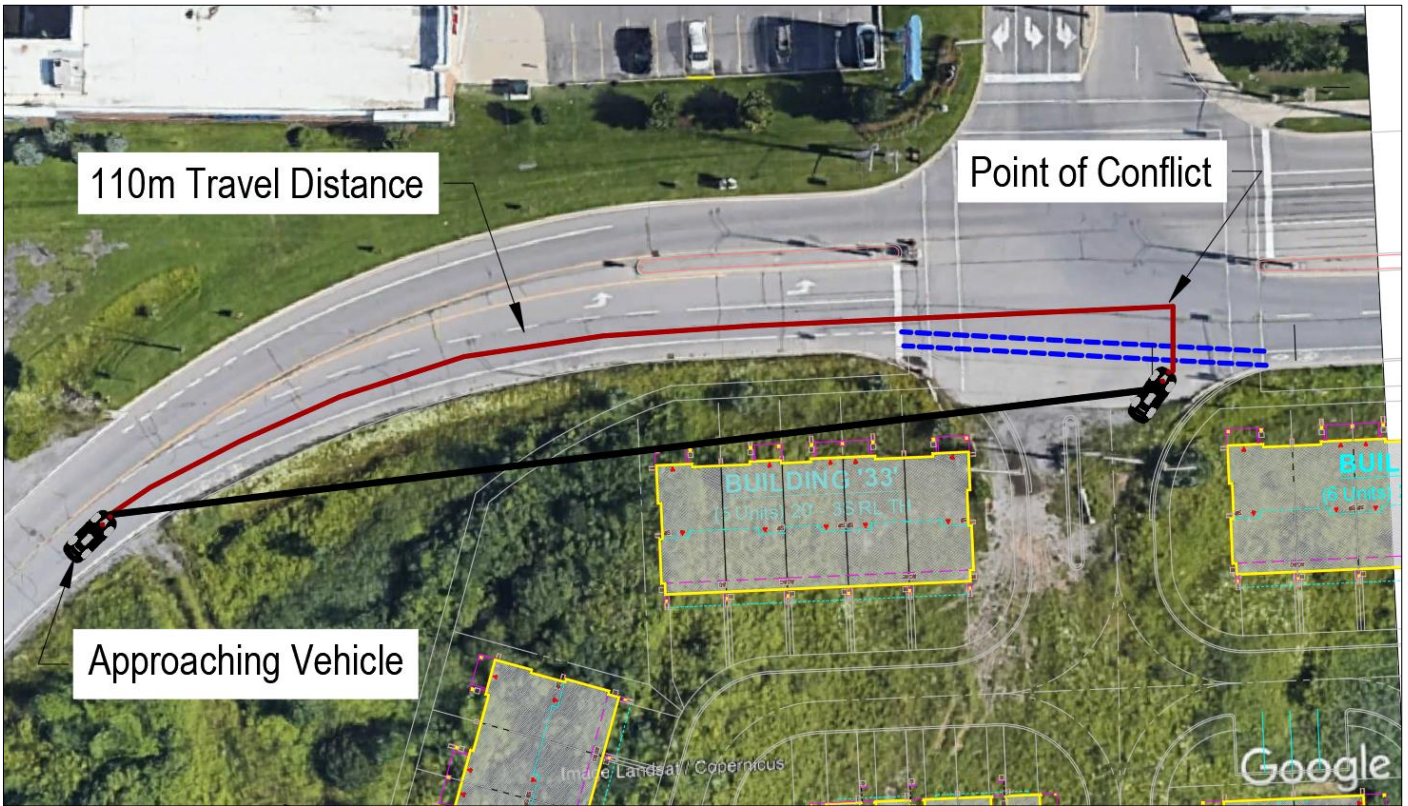


Figure 20 Available Sightlines to the West from the Minor Road (Case B2)

As for the left turn from the major road, as shown in Figure 14 below, there is approximately 124 metres of sight distance available which exceeds the 95 metres required.

Both the City and MTO will have to ensure that the boulevard areas are clear of oversized vegetation that would impede a drivers eyesight and ensure the sightlines are kept clear.

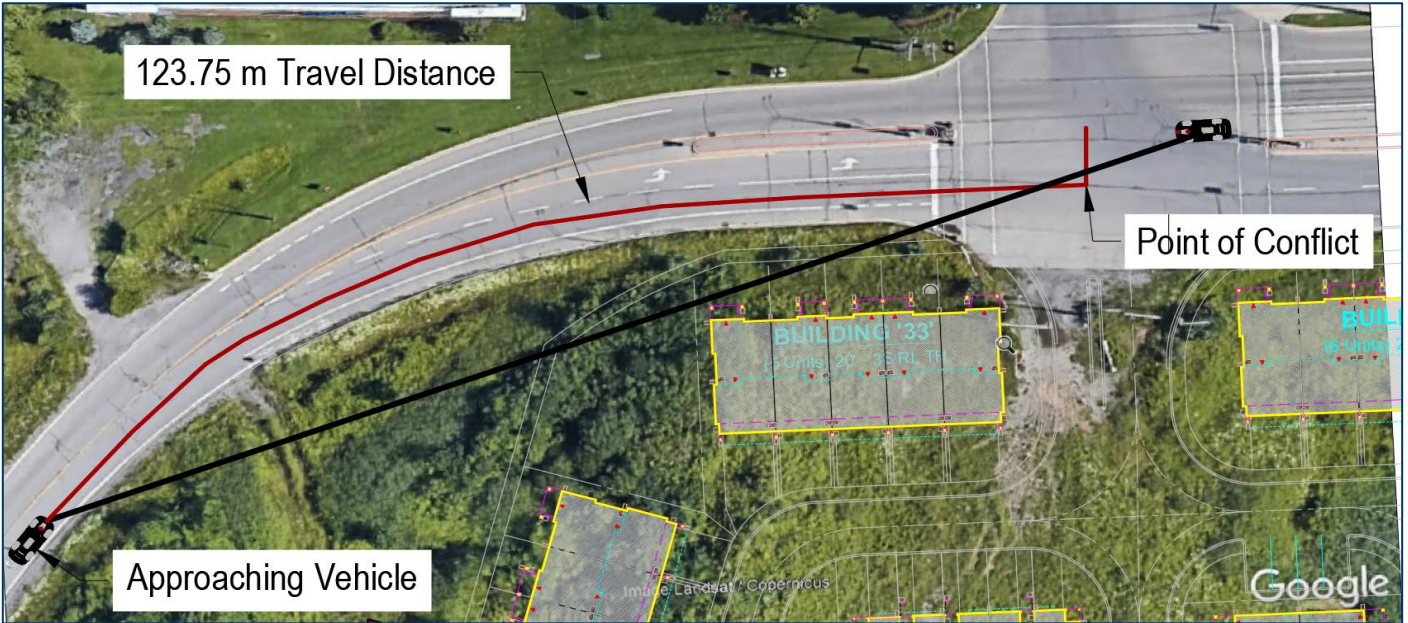


Figure 21 Available Sightlines to the West from the Left-Turn Lane on the Major Road (Case F)

11. Conclusion

The proposed site plan prepared by Orchard Design Studio Inc., dated May 2022 consists of a total of 236 townhouses. The development is located on the east side of Oakwood Drive, south of the commercial plaza at Oakwood Drive and McLeod Road in the City of Niagara Falls.

Access to the residential development from Oakwood Drive is proposed via three accesses. The first access will be located on the south approach of the existing commercial plaza's south access. The second access will be located along Oakwood Drive near the southern limit of the property and will be unsignalized. The third access is proposed to be a right-in/right-out access and will be located near the northeast limit of the subject site

The proposed subdivision is expected to generate a total of 145 new two-way trips consisting of 40 inbound and 105 outbound trips during weekday a.m. peak hour and 171 new two-way trips consisting of 101 inbound and 70 outbound trips during the weekday p.m. peak hour.

With the proposed reconfiguration of the intersection of McLeod Road and Oakwood Drive, the overall impact of the development generated traffic is negligible to the operation of the study area intersections and traffic flow along the study area road network with no additional geometric improvements required.

Under future total traffic conditions, the signal timings for all signalized intersections along McLeod Road were optimized to reduce v/c ratios and delays.

A sightline assessment was conducted at the south leg of the existing south commercial plaza's signalized intersection (the proposed location for Site Access #1). The assessment was undertaken per TAC Guidelines for two scenarios: a right-turn from the minor road and a left-turn from the major road (Cases B2 and F respectively). The result of the sightline assessment concluded that there is sufficient available sightline to accommodate the expected design vehicle.

Application of the current City of Niagara Falls By-Law parking rates to the subject site results in a requirement of 377 parking spaces. The subject site provides a total of 630 spaces, exceeding the City's By-law requirement

Appendices

Appendix A

Terms of Reference

Raf Andrenacci

From: John Grubich <jgrubich@niagarafalls.ca>
Sent: Tuesday, March 29, 2022 9:44 AM
To: Will Maria; Lagakos, Ted (MTO); Nunes, Paul (MTO); Dunsmore, Susan
Cc: Raf Andrenacci; Mathew Bilodeau
Subject: RE: [EXTERNAL]-Oakwood Drive Residential Development Terms of Reference

Will;

Thank you for providing your terms of reference for the traffic study supporting this development. City Staff has the following comments:

There are no significant background developments on Oakwood Drive, between McLeod Road and Montrose Road. There are no planned road improvements on this section of Oakwood Drive to increase capacity. However, there are background developments that affect the McLeod Road and Montrose Road corridors. Details will be provided in a follow up e-mail, within the next week.

An easement for the traffic signals exist on the subject lands and is denoted through dashed lines on the conceptual plan. One townhouse unit is within the easement. The site driveway needs to respect the lane arrangements that exist on the north side of the intersection (i.e.; the existing middle southbound lane out of the plaza which is the outside left turn lane will be converted to a through lane and it must line up directly to the entry lane into this development). The south side (entrance to the subject lands) has been planned with two inbound lanes and two outbound lanes with a raised centre median separating the inbound and outbound lanes to protect the middle signal pole. It appears from the concept plan that the entrance is one inbound lane and one outbound lane. Any intersection and/or signal modifications will require the preparation of a functional plan for City approval. If granted, all works will be at the sole cost of the developer. All physical work related to the signals must only be carried out by the City's contractor.

City Staff is not supportive of the proposed right-in-right-out access at the eastern end of the subject lands. We have concerns that drivers may shortcut into the site by proceeding the wrong way into the eastbound lanes prior to encountering the centre median and entering the site through the exit lane. City Staff requests an analysis that all traffic uses the other two accesses only to verify if they can function adequately without the proposed RIRO driveway.

City Staff does not support defaulting to a 1.0 PHF for future conditions.

Staff is assuming the Oakwood Drive and the commercial access location refers to the northern signal to the Walmart plaza. If not, please clarify, and add the northern signal to the Walmart plaza in the study area.

Due to the curvature of Oakwood Drive west of the existing signals, please include a review of driver visibility approaching the traffic signals if the proposed townhouses along the north side of the lands, and from a stopped position at the exit for drivers wishing to carry out a right turn movement on a red signal. Please provide mitigation measures as warranted.

In terms of parking, a 236-unit townhouse complex requires 330 parking spaces, at a rate of 1.4 parking spaces per unit. A total of 312 parking spaces are proposed (1 car driveway for each unit, plus 76 visitor spaces), at a rate of 1.32 parking spaces per unit rate. Three visitor parking spaces to be accessible parking. There is space to provide the additional spaces along the south property line to meet the parking requirement. Please advise if garages are planned for the townhouses.

City Staff is OK with the remainder of your work plan. Please wait for MTO and Regional comments.

From: Will Maria <William.Maria@ghd.com>

Sent: Wednesday, March 23, 2022 12:56 PM

To: Lagakos, Ted (MTO) <Ted.Lagakos@ontario.ca>; Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; John Grubich <jgrubich@niagarafalls.ca>

Cc: Raf Andrenacci <Raf.Andrenacci@ghd.com>

Subject: [EXTERNAL]-Oakwood Drive Residential Development Terms of Reference

Hello,

GHD has been retained to prepare a Traffic Impact Study in support of a proposed residential development located on Oakwood Drive in Niagara Falls.

In order to properly scope this project we ask that the MTO, Region and City review and provide comments on the following scope and confirm if there are any additional items required as part of the study.

The location of the subject is shown in the figure below as is the proposed site plan.





The proposed development includes up to 236 townhouse dwelling units.

A traffic assessment for the following horizon years will be included: 2022 (existing), 2024 (Build-out), 2029 (five years post build-out) and 2034 (ten years post build-out 3) for both future background and future total traffic will be undertaken as per MTO guidelines.

Based on the site plan, access to the site is provided via an existing signalized intersection opposite the SmartCentres access, a proposed full moves access on Oakwood Drive at the south limit of the site and a right-in/out driveway on Oakwood Drive at the easterly limit of the site.

Study analysis to include the weekday a.m. and p.m. peak hours.

The following study intersections have been selected:

- McLeod Road and Oakwood Drive
- McLeod Road and QEW ramps
- Oakwood Drive and the commercial access
- Oakwood Drive and Montrose Road
- Oakwood Drive and all site accesses

Updated traffic counts at the existing study intersections and driveways will be undertaken during the a.m. and p.m. peak hours.

Signal timings for signalized intersections to be requested from the appropriate municipality.

GHD will reach out to staff to determine if there are any developments within the planning horizon that would generate additional traffic along the study intersections and to obtain required information for those developments.

GHD will reach out to staff to determine the appropriate growths to be applied along the study area roads in order to estimate the future traffic volumes to the study horizon years.

Any potential/committed future road / intersection / other transportation infrastructure improvements within the study area that could affect local traffic distribution or assignments will be included in the study.

Trip generation estimates will be prepared for the weekday a.m. and p.m. peak hours for the subject site. ITE trip generation data will be reviewed and the appropriate rates used in the analysis.

The directional distribution of traffic approaching and departing the site (via the driveways) will be determined based upon a review of existing traffic patterns and the Toronto Tomorrow Survey 2016 (TTS). The site traffic will be assigned to the study area roadway network in accordance with our interpretation of these various patterns.

Analysis of existing conditions will use existing peak hour factor. Future conditions will use a peak hour factor of 1.0. Please confirm if this is acceptable.

GHD will review the proposed site plan with respect to the acceptability of the following:

- Review site access geometry including existing accesses adjacent to and /or directly opposite of the site;
- review of the site plan circulation using AutoTurn analysis for emergency vehicles and waste
- Review sightline for the site access;
- review site access including driveway width, radii, grades, etc. conform to the City standards;
- review the proposed parking supply in accordance with the current by-law requirements
- review TDM options for the site

If the above scope is acceptable it will form the basis of our scope of work along with any comments.

Sincerely,

Will

William C. Maria, P.Eng.
Transportation Planning Lead

GHD Ltd.

T: 905 814 4397 | C: 647 229 8541 | V: 881397 | F: 905 890 8499 | E: will.maria@ghd.com
6705 Millcreek Drive Unit 1 Mississauga ON L5N 5M4 | www.ghd.com

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Raf Andrenacci

From: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Sent: Monday, April 4, 2022 11:10 AM
To: Will Maria
Cc: Raf Andrenacci; Lagakos, Ted (MTO); Nunes, Paul (MTO); John Grubich; Shanks, Amy; Alguire, Robert
Subject: RE: Oakwood Drive Residential Development Terms of Reference

Hi Will

Regional transportation staff have reviewed the Terms of reference and have provided the following comments. If you require Regional transportation data please submit a request through the Regional website using the following link. <https://www.niagararegion.ca/living/roads/permits/traffic-data-requests.aspx>. If the TIS recommends improvements to the Regional road network or intersection please include functional designs as part of the TIS for review and approval by Regional transportation staff.

If you require anything further please contact me at your convenience.

Thank you,

Susan M. Dunsmore, P. Eng.
Manager, Development Engineering
Planning and Development Services

Phone: (905) 980-6000 or 1-800-263-7215 ext 3661
Address: 1815 Sir Isaac Brock Way, Thorold ON, L2V4T7



From: Will Maria <William.Maria@ghd.com>
Sent: Wednesday, March 23, 2022 12:56 PM
To: Lagakos, Ted (MTO) <Ted.Lagakos@ontario.ca>; Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; John Grubich <jgrubich@niagarafalls.ca>
Cc: Raf Andrenacci <Raf.Andrenacci@ghd.com>
Subject: Oakwood Drive Residential Development Terms of Reference

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Hello,

GHD has been retained to prepare a Traffic Impact Study in support of a proposed residential development located on Oakwood Drive in Niagara Falls.

In order to properly scope this project we ask that the MTO, Region and City review and provide comments on the following scope and confirm if there are any additional items required as part of the study.

The location of the subject is shown in the figure below as is the proposed site plan.





The proposed development includes up to 236 townhouse dwelling units.

A traffic assessment for the following horizon years will be included: 2022 (existing), 2024 (Build-out), 2029 (five years post build-out) and 2034 (ten years post build-out 3) for both future background and future total traffic will be undertaken as per MTO guidelines. **Accepted**

Based on the site plan, access to the site is provided via an existing signalized intersection opposite the SmartCentres access, a proposed full moves access on Oakwood Drive at the south limit of the site and a right-in/out driveway on Oakwood Drive at the easterly limit of the site.

Study analysis to include the weekday a.m. and p.m. peak hours.

The following study intersections have been selected:

- McLeod Road and Oakwood Drive
- McLeod Road and QEW ramps
- Oakwood Drive and the commercial access
- Oakwood Drive and Montrose Road
- Oakwood Drive and all site accesses
- **McLeod Road and Montrose Road**

Updated traffic counts at the existing study intersections and driveways will be undertaken during the a.m. and p.m. peak hours.

Given the COVID-19 conditions (remote working/study conditions), any traffic counts at this time wouldn't represent typical conditions. Please utilize available traffic counts carried out before the pandemic (March 2020), as to be approved by MTO. For unavailable historic traffic counts, an adjustment factor is to be applied to the carried counts and to be justified in the TIS report.

For Regional intersections, please factor historical count data to a baseline condition (Year 2022) using a growth rate of 2% per annum

Signal timings for signalized intersections to be requested from the appropriate municipality.

GHD will reach out to staff to determine if there are any developments within the planning horizon that would generate additional traffic along the study intersections and to obtain required information for those developments.

GHD will reach out to staff to determine the appropriate growths to be applied along the study area roads in order to estimate the future traffic volumes to the study horizon years. **The Region usually requests 2% for Regional roads/intersections.**

Any potential/committed future road / intersection / other transportation infrastructure improvements within the study area that could affect local traffic distribution or assignments will be included in the study.

Trip generation estimates will be prepared for the weekday a.m. and p.m. peak hours for the subject site. ITE trip generation data will be reviewed and the appropriate rates used in the analysis.

The directional distribution of traffic approaching and departing the site (via the driveways) will be determined based upon a review of existing traffic patterns and the Toronto Tomorrow Survey 2016 (TTS). The site traffic will be assigned to the study area roadway network in accordance with our interpretation of these various patterns.

Analysis of existing conditions will use existing peak hour factor. Future conditions will use a peak hour factor of 1.0. Please confirm if this is acceptable. **For Regional intersections, please follow the Region's TIA Guidelines for the required PHF.**

GHD will review the proposed site plan with respect to the acceptability of the following:

- Review site access geometry including existing accesses adjacent to and /or directly opposite of the site;
- review of the site plan circulation using AutoTurn analysis for emergency vehicles and waste
- Review sightline for the site access;
- review site access including driveway width, radii, grades, etc. conform to the City standards;
- review the proposed parking supply in accordance with the current by-law requirements
- review TDM options for the site

If the above scope is acceptable it will form the basis of our scope of work along with any comments.

Sincerely,

Will

William C. Maria, P.Eng.
Transportation Planning Lead

GHD Ltd.

T: 905 814 4397 | C: 647 229 8541 | V: 881397 | F: 905 890 8499 | E: will.maria@ghd.com

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RE: Oakwood Drive Residential Development - Future Growth

Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>

Tue 5/17/2022 7:27 PM

To: Raf Andrenacci <Raf.Andrenacci@ghd.com>

Cc: Will Maria <William.Maria@ghd.com>; John Grubich (jgrubich@niagarafalls.ca) <jgrubich@niagarafalls.ca>

 1 attachments (595 KB)

Pages from 5328-IF60-1.0-.pdf;

Hello

Regional staff have reviewed the model and information we have to answer the outstanding comments that were raised at yesterday's meeting.

- Growth rate – after the reviewing the Region's model it was noted that the Grand Niagara and Thundering waters secondary plans were already included therefore your study should not include additional trips from those two development and continue to use the 2% growth rate as previously noted
- I have attached the lane configuration on the east leg of the Oakwood/McLeod Road intersection, the west leg will have a left turn lane, two thru lanes and at a minimum 1 right turn lane – we ask that this configuration as well as one with two right turn lanes on the west leg be included in your analysis
 - o This will be the ultimate lane configuration so there are less than desirable outcomes we ask that you just note this in your report
- As noted in the meeting the cycle time should be changed to 130 sec

If you require anything further please let me know.

Thank you

Susan M. Dunsmore, P. Eng.
Manager, Development Engineering
Planning and Development Services

Phone: (905) 980-6000 or 1-800-263-7215 ext 3661

Address: 1815 Sir Isaac Brock Way, Thorold ON, L2V4T7

Appendix B

Traffic Data

Oakwood Dr @ Walmart Plaza

Morning Peak Diagram

Specified Period

From: 8:00:00
To: 10:00:00

One Hour Peak

From: 9:00:00
To: 10:00:00

Municipality: Niagara Falls
Site #: 0000000030
Intersection: Oakwood Dr & Walmart Plaza
TFR File #: 30
Count date: 23-May-2018

Weather conditions:
Clear/Dry
Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Oakwood Dr runs N/S

North Leg Total: 691
North Entering: 382
North Peds: 0
Peds Cross: ∇

Cyclists	0	1	1
Trucks	0	19	19
Cars	191	171	362
Totals	191	191	



Cyclists	0
Trucks	20
Cars	289
Totals	309

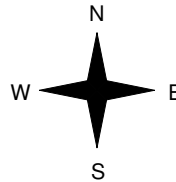
Cyclists	Trucks	Cars	Totals
0	0	193	193



Oakwood Dr



Walmart Plaza



Cyclists	Trucks	Cars	Totals
0	3	143	146
0	0	3	3
0	3	146	



Oakwood Dr

Peds Cross: ∇
West Peds: 0
West Entering: 149
West Leg Total: 342

Cars	174
Trucks	19
Cyclists	1
Totals	194



Cars	2	146	148
Trucks	0	17	17
Cyclists	0	0	0
Totals	2	163	

Peds Cross: ∇
South Peds: 0
South Entering: 165
South Leg Total: 359

Comments

Oakwood Dr @ Walmart Plaza

Mid-day Peak Diagram

Specified Period

From: 11:00:00
To: 14:00:00

One Hour Peak

From: 12:00:00
To: 13:00:00

Municipality: Niagara Falls
Site #: 000000030
Intersection: Oakwood Dr & Walmart Plaza
TFR File #: 30
Count date: 23-May-2018

Weather conditions:
Clear/Dry
Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Oakwood Dr runs N/S

North Leg Total: 1029
North Entering: 511
North Peds: 0
Peds Cross: ∇

Cyclists	0	0	0
Trucks	0	13	13
Cars	288	210	498
Totals	288	223	

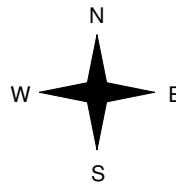
Cyclists	1
Trucks	19
Cars	498
Totals	518

Cyclists	Trucks	Cars	Totals
0	0	288	288



Walmart Plaza

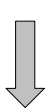
Cyclists	Trucks	Cars	Totals
1	9	294	304
0	0	5	5
1	9	299	



Oakwood Dr

Peds Cross: ∇
West Peds: 0
West Entering: 309
West Leg Total: 597

Cars	215
Trucks	13
Cyclists	0
Totals	228



Cars	0	204	204
Trucks	0	10	10
Cyclists	0	0	0
Totals	0	214	

Peds Cross: ∇
South Peds: 0
South Entering: 214
South Leg Total: 442

Comments

Oakwood Dr @ Walmart Plaza

Afternoon Peak Diagram

Specified Period

From: 15:00:00
To: 18:00:00

One Hour Peak

From: 16:45:00
To: 17:45:00

Municipality: Niagara Falls
Site #: 0000000030
Intersection: Oakwood Dr & Walmart Plaza
TFR File #: 30
Count date: 23-May-2018

Weather conditions:

Clear/Dry

Person(s) who counted:

Cam

** Signalized Intersection **

Major Road: Oakwood Dr runs N/S

North Leg Total: 1183
North Entering: 563
North Peds: 0
Peds Cross: ∇

Cyclists	0	1	1		
Trucks	0	9	9		
Cars	305	248	553		
Totals	305	258			



Cyclists	1		
Trucks	14		
Cars	605		
Totals	620		

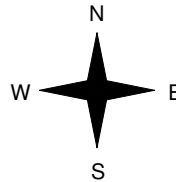
Cyclists	Trucks	Cars	Totals
0	0	306	306



Oakwood Dr



Walmart Plaza



Cyclists	Trucks	Cars	Totals
0	1	318	319
0	0	8	8
0	1	326	



Oakwood Dr



Peds Cross: ∇
West Peds: 0
West Entering: 327
West Leg Total: 633

Cars	256		
Trucks	9		
Cyclists	1		
Totals	266		



Cars	1	287	288
Trucks	0	13	13
Cyclists	0	1	1
Totals	1	301	

Peds Cross: ∇
South Peds: 0
South Entering: 302
South Leg Total: 568

Comments

Oakwood Dr @ Walmart Plaza

Total Count Diagram

Municipality: Niagara Falls
Site #: 0000000030
Intersection: Oakwood Dr & Walmart Plaza
TFR File #: 30
Count date: 23-May-2018

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Signalized Intersection ****

Major Road: Oakwood Dr runs N/S

North Leg Total: 7297
 North Entering: 3658
 North Peds: 0
 Peds Cross: ∇

Cyclists	0	2	2
Trucks	2	117	119
Cars	2006	1531	3537
Totals	2008	1650	



Cyclists	6
Trucks	148
Cars	3485
Totals	3639

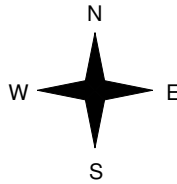
Cyclists	Trucks	Cars	Totals
0	2	2012	2014



Oakwood Dr



Walmart Plaza



Cyclists	Trucks	Cars	Totals
2	23	1942	1967
0	2	43	45
2	25	1985	



Oakwood Dr

Peds Cross: ∇
 West Peds: 3
 West Entering: 2012
 West Leg Total: 4026

Cars	1574
Trucks	119
Cyclists	2
Totals	1695



Cars	6	1543	1549
Trucks	0	125	125
Cyclists	0	4	4
Totals	6	1672	

Peds Cross: ∇
 South Peds: 0
 South Entering: 1678
 South Leg Total: 3373

Comments

Oakwood Dr @ Walmart Plaza

Morning Peak Diagram

Specified Period

From: 8:00:00
To: 10:00:00

One Hour Peak

From: 8:45:00
To: 9:45:00

Municipality: Niagara Falls
Site #: 000000031
Intersection: Oakwood Dr & Walmart Plaza
TFR File #: 31
Count date: 23-May-2018

Weather conditions:
Clear/Dry
Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Oakwood Dr runs W/E

North Leg Total: 85
North Entering: 54
North Peds: 0
Peds Cross: \times

Cyclists	0	0	0
Trucks	0	9	9
Cars	19	26	45
Totals	19	35	



Cyclists	0
Trucks	2
Cars	29
Totals	31

East Leg Total: 295
East Entering: 136
East Peds: 0
Peds Cross: \times

Cyclists	Trucks	Cars	Totals
0	8	140	148



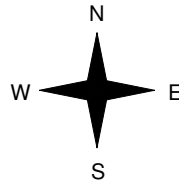
Walmart Plaza



Cars	Trucks	Cyclists	Totals
6	1	0	7
121	8	0	129
127	9	0	



Oakwood Dr



Cyclists	Trucks	Cars	Totals
0	1	23	24
0	10	114	124
0	11	137	



Oakwood Dr



Cars	Trucks	Cyclists	Totals
140	19	0	159

Peds Cross: \times
West Peds: 0
West Entering: 148
West Leg Total: 296

Comments

Oakwood Dr @ Walmart Plaza

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 12:30:00

To: 13:30:00

Municipality: Niagara Falls
Site #: 000000031
Intersection: Oakwood Dr & Walmart Plaza
TFR File #: 31
Count date: 23-May-2018

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Signalized Intersection ****

Major Road: Oakwood Dr runs W/E

North Leg Total: 231

North Entering: 163

North Peds: 0

Peds Cross: \times

Cyclists	0	0	0
Trucks	0	9	9
Cars	49	105	154
Totals	49	114	



Cyclists 0

Trucks 2

Cars 66

Totals 68

East Leg Total: 367

East Entering: 145

East Peds: 0

Peds Cross: \times

Cyclists	Trucks	Cars	Totals
0	5	170	175



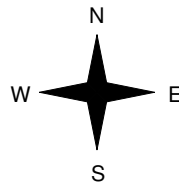
Walmart Plaza



Cars	Trucks	Cyclists	Totals
18	1	0	19
121	5	0	126
139	6	0	



Oakwood Dr



Cyclists	Trucks	Cars	Totals
0	1	48	49
0	6	102	108
0	7	150	



Oakwood Dr



Cars	Trucks	Cyclists	Totals
207	15	0	222

Peds Cross: \times

West Peds: 0

West Entering: 157

West Leg Total: 332

Comments

Oakwood Dr @ Walmart Plaza

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Niagara Falls
Site #: 000000031
Intersection: Oakwood Dr & Walmart Plaza
TFR File #: 31
Count date: 23-May-2018

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Signalized Intersection ****

Major Road: Oakwood Dr runs W/E

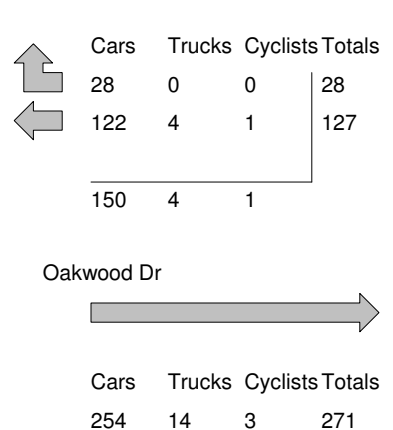
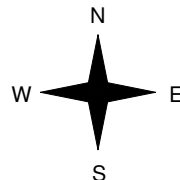
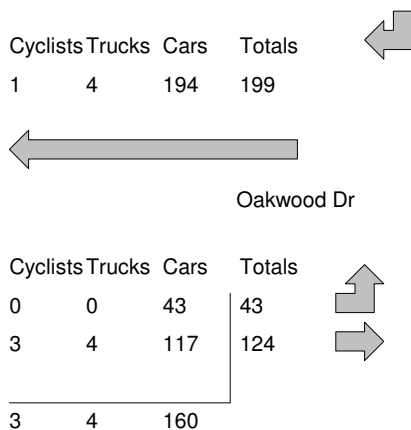
North Leg Total: 290
 North Entering: 219
 North Peds: 1
 Peds Cross: \times

Cyclists	0	0	0
Trucks	0	10	10
Cars	72	137	209
Totals	72	147	



Cyclists	0
Trucks	0
Cars	71
Totals	71

East Leg Total: 426
 East Entering: 155
 East Peds: 0
 Peds Cross: \times



Peds Cross: \times
 West Peds: 0
 West Entering: 167
 West Leg Total: 366

Comments

Oakwood Dr @ Walmart Plaza

Total Count Diagram

Municipality: Niagara Falls
Site #: 000000031
Intersection: Oakwood Dr & Walmart Plaza
TFR File #: 31
Count date: 23-May-2018

Weather conditions:
 Clear/Dry
Person(s) who counted:
 Cam

**** Signalized Intersection ****

Major Road: Oakwood Dr runs W/E

North Leg Total: 1566
 North Entering: 1114
 North Peds: 2
 Peds Cross: \times

Cyclists	1	0	1	
Trucks	3	67	70	
Cars	380	663	1043	
Totals	384	730		



Cyclists	1
Trucks	10
Cars	441
Totals	452

East Leg Total: 2657
 East Entering: 999
 East Peds: 0
 Peds Cross: \times

Cyclists	Trucks	Cars	Totals
2	56	1187	1245



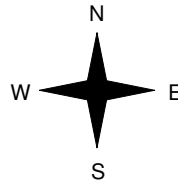
Walmart Plaza



Cars	Trucks	Cyclists	Totals
133	5	0	138
807	53	1	861
<hr/>			
940	58	1	



Oakwood Dr



Cyclists	Trucks	Cars	Totals
1	5	308	314
3	60	865	928
<hr/>			
4	65	1173	



Oakwood Dr



Cars	Trucks	Cyclists	Totals
1528	127	3	1658

Peds Cross: \times
 West Peds: 0
 West Entering: 1242
 West Leg Total: 2487

Comments



Intersection Layout Sheet

Contract # 9015-E-0009
Work Order # 010

Date: Nov 6 2018 Day: Tue 1 Hrs: 7-9 + 11-14 + 15-18

Location: QEW @ McLeod Rd IC-24 Ramps: ERT 1

Reg/Mun: CR Town/City: Allanburg Area: _____

File Name: 3100320000 Device: Gretch / Jamar Unit # 121 Interval 1: (AM) NN / PM

Observer: Rendat Shuliko Weather: Rain/Clear Road Condition: Wet / Wet

LHRS & OIS: 10032 0.00 Comments: _____

GPS: G-Star IV

Datum: WGS 84 (N)

Lat: 43.070310

Long: -79.119186

SIGNALIZED (Y) N

If intersection is unsignalized;
Sign Type: Stop / Yield

Sign Size: _____ cm x _____ cm

Sign Condition:

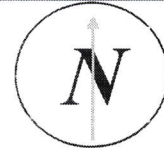
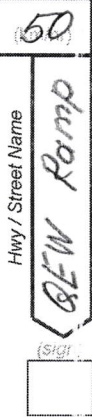
NA: New / Good / Poor / Missing

SA: New / Good / Poor / Missing

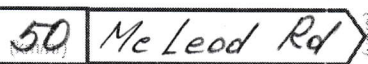
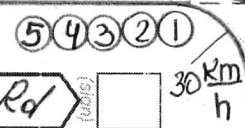
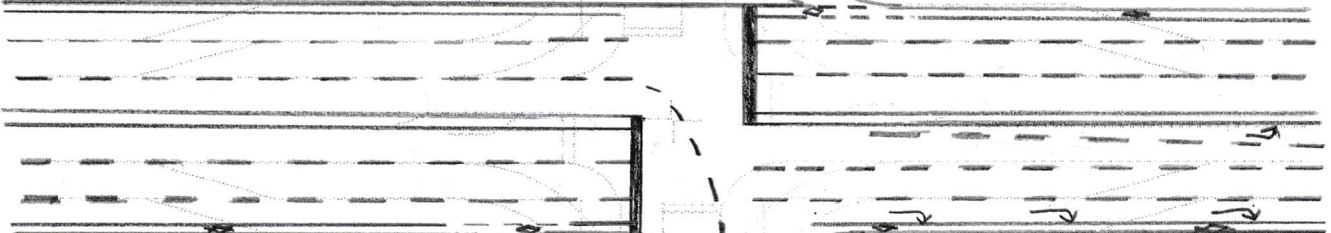
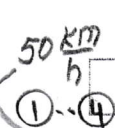
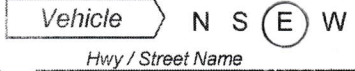
WA: New / Good / Poor / Missing

EA: New / Good / Poor / Missing

Photograph all approach's
including all Signs (Y) / N



INDICATE LOCATION & DIRECTION OF VEHICLE



Note: Hwy / Street Name

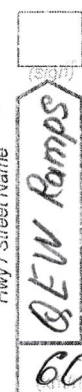
Show all lanes approaching and
leaving the intersection.

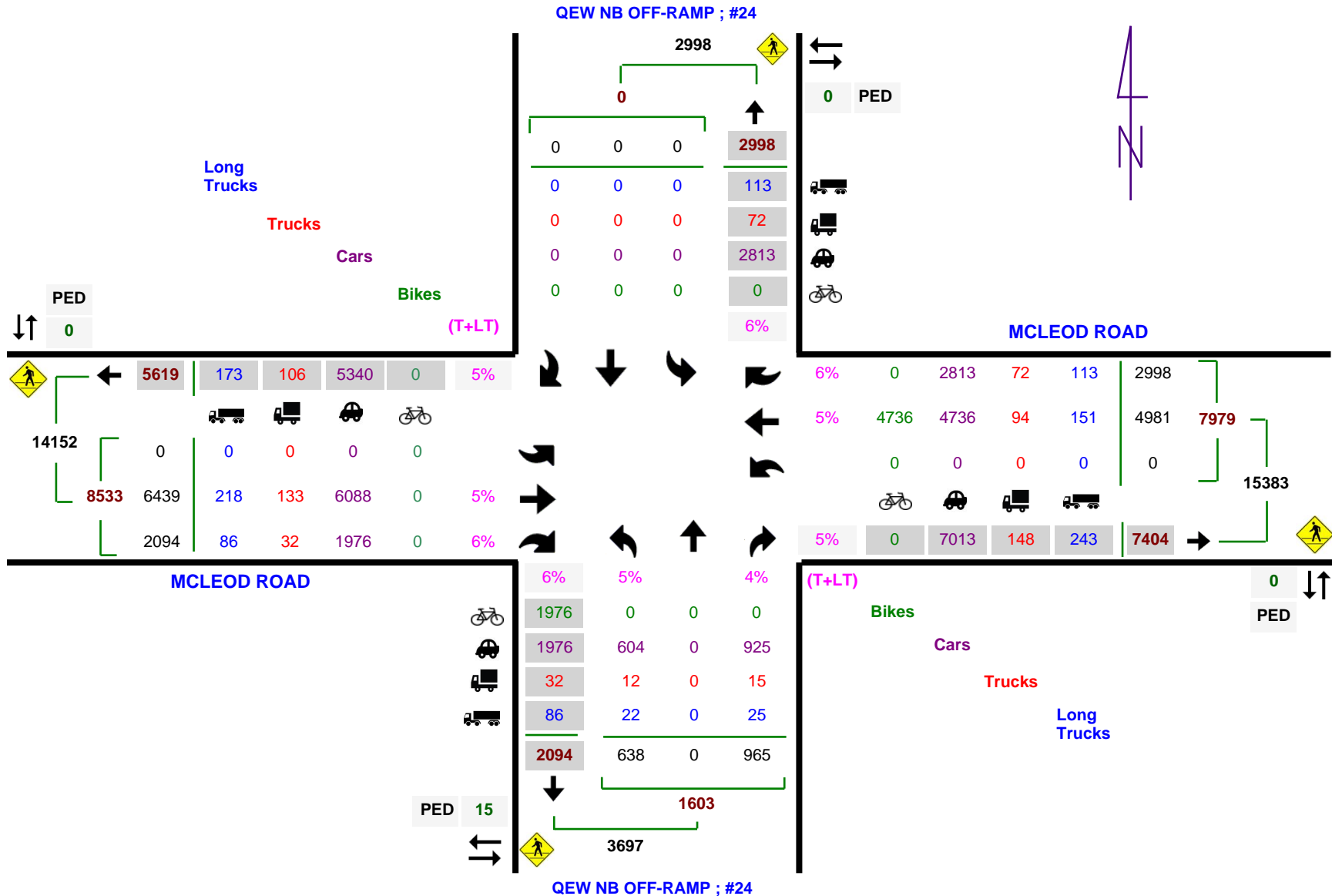
Show all channelization

If there are two or more through
lane in one direction, indicate
if these lanes are not continuous

Show pedestrian crosswalks

Layout of "Special Condition"







TVIS II - Traffic Volume Information System
Turning Movement 15 Minute Report

Description: **QEW @ McLEOD RD IC-27 EAST RAMP TERMINAL, 24, 52, 62**
 Region: **CENTRAL** Survey Type: **TM – Interchange** Hwy: **QEW**
 Start Date: **06-Nov-2018 (Tue)** I/C Side: **E** LHRs: **10032**
 End Date: **06-Nov-2018 (Tue)** Int. Type: **T - S** Offset: **0**
 Schedule Summary: **TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00**

Start Time	Major Road Approaches										Minor Road Approaches										Total Veh.																				
	East					West					South					Not Configured																									
	MCLEOD ROAD					MCLEOD ROAD					QEW NB OFF-RAMP : Ramp(s): #24																														
	Cars	Trucks	Long Trucks	Ped	Cars	Trucks	Long Trucks	Ped	Cars	Trucks	Long Trucks	Ped	Cars	Trucks	Long Trucks	Ped	Cars	Trucks	Heavy Trucks	Ped																					
Period 1																																									
07:00	0	59	98	0	1	6	0	4	2	0	0	69	52	0	3	1	0	7	2	0	7	0	20	0	0	0	1	0	2	0											334
07:15	0	99	76	0	1	2	0	5	3	0	0	114	48	0	3	1	0	8	1	0	21	0	34	0	0	1	2	0	1	0											420
07:30	0	129	101	0	6	3	0	10	4	0	0	135	79	0	5	1	0	10	2	0	33	0	27	0	0	0	3	0	0	0											548
07:45	0	124	81	0	1	0	0	8	2	0	0	188	85	0	2	0	0	12	11	0	32	0	41	0	0	1	0	0	2	0											590
08:00	0	112	99	0	3	6	0	8	5	0	0	155	81	0	5	2	0	5	8	0	14	0	28	1	0	0	1	0	0	1											533
08:15	0	125	93	0	3	0	0	6	8	0	0	159	69	0	4	2	0	8	0	0	15	0	40	0	0	1	0	0	0	0											533
08:30	0	117	100	0	5	1	0	5	8	0	0	180	66	0	10	3	0	11	2	0	15	0	31	0	0	0	0	0	2	0											556
08:45	0	114	86	0	2	1	0	6	3	0	0	165	48	0	6	0	0	9	3	0	26	0	30	1	0	0	1	0	0	0											501
Period 2																																									
11:00	0	130	79	0	3	0	0	4	2	0	0	148	49	0	2	0	0	5	2	0	18	0	29	0	0	0	2	0	1	3											474
11:15	0	134	59	0	5	3	0	5	6	0	0	189	42	0	8	3	0	11	0	0	18	0	25	1	0	0	0	0	0	0											509
11:30	0	138	69	0	5	1	0	3	6	0	0	163	52	0	8	2	0	5	2	0	14	0	21	1	0	0	0	0	0	2											490
11:45	0	147	58	0	3	2	0	4	3	0	0	171	65	0	8	3	0	7	1	0	25	0	22	0	0	2	0	0	3	0											524
12:00	0	163	74	0	2	7	0	7	1	0	0	202	50	0	6	2	0	8	4	0	17	0	28	0	0	0	1	0	0	0											572
12:15	0	144	73	0	7	0	0	3	2	0	0	178	57	0	2	1	0	9	3	0	11	0	17	1	0	3	3	0	1	0											515
12:30	0	147	69	0	2	2	0	6	3	0	0	161	51	0	4	1	0	7	3	0	10	0	21	0	0	0	0	0	1	0											488
12:45	0	161	77	0	1	3	0	2	4	0	0	189	54	0	5	2	0	4	3	0	12	0	20	1	0	0	0	0	1	1											539
13:00	0	134	77	0	2	2	0	2	3	0	0	179	56	0	5	0	0	4	3	0	21	0	23	1	0	1	0	0	1	0											514
13:15	0	138	66	0	2	2	0	2	5	0	0	180	41	0	3	0	0	6	2	0	15	0	28	1	0	2	1	0	2	1											496
13:30	0	140	76	0	5	2	0	5	1	0	0	189	46	0	2	1	0	5	2	0	10	0	22	0	0	0	1	0	1	0											508
13:45	0	131	62	0	4	2	0	6	4	0	0	202	29	0	3	2	0	6	3	0	12	0	29	0	0	0	1	0	3	0											499
Period 3																																									
15:00	0	175	101	0	4	2	0	2	3	0	0	242	64	0	6	0	0	11	3	0	10	0	33	1	0	0	1	0	0	0											658
15:15	0	165	105	0	3	1	0	5	7	0	0	209	72	0	5	0	0	7	2	0	25	0	34	0	0	2	0	0	1	0											643



TVIS II - Traffic Volume Information System
Turning Movement 15 Minute Report

Description: **QEW @ McLEOD RD IC-27 EAST RAMP TERMINAL, 24, 52, 62**
 Region: **CENTRAL** Survey Type: **TM – Interchange** Hwy: **QEW**
 Start Date: **06-Nov-2018 (Tue)** I/C Side: **E** LHRS: **10032**
 End Date: **06-Nov-2018 (Tue)** Int. Type: **T - S** Offset: **0**
 Schedule Summary: **TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00**

Start Time	Major Road Approaches													Minor Road Approaches											Total Veh.									
	East						West						South						Not Configured															
	MCLEOD ROAD						MCLEOD ROAD						QEW NB OFF-RAMP : Ramp(s): #24																					
	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks		Heavy Trucks		Ped						
	←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←	↑	→		←	↑	→	←	↑	→	←		↑	→	←	↑	→	
15:30	0	181	95	0	5	7	0	10	5	0	0	209	59	0	7	1	0	6	2	0	19	0	25	0	0	0	0	0	0	0	0	0	2	631
15:45	0	180	90	0	5	4	0	7	10	0	0	225	71	0	3	1	0	5	9	0	26	0	35	1	0	1	0	0	0	0	0	0	1	673
16:00	0	179	111	0	3	2	0	0	4	0	0	229	73	0	2	2	0	10	3	0	21	0	24	0	0	0	2	0	0	0	0	0	0	665
16:15	0	189	114	0	3	3	0	3	1	0	0	231	57	0	5	1	0	6	3	0	31	0	35	2	0	0	0	0	0	0	0	0	0	684
16:30	0	182	134	0	4	2	0	6	0	0	0	256	105	0	5	0	0	9	1	0	26	0	34	0	0	0	0	0	0	0	0	0	1	764
16:45	0	185	93	0	1	1	0	7	4	0	0	262	72	0	0	0	0	3	1	0	24	0	49	0	0	0	0	0	0	0	0	0	0	702
17:00	0	193	127	0	2	2	0	1	1	0	0	231	97	0	3	0	0	5	2	0	22	0	28	0	0	0	0	0	0	2	2	2	2	716
17:15	0	192	88	0	0	2	0	3	3	0	0	229	68	0	1	0	0	4	1	0	26	0	41	0	0	0	1	0	0	0	0	0	1	659
17:30	0	174	97	0	0	1	0	3	0	0	0	215	79	0	2	0	0	4	2	0	18	0	26	0	0	0	0	0	0	0	0	0	0	621
17:45	0	155	85	0	1	0	0	3	0	0	0	234	39	0	0	0	0	1	0	0	10	0	25	0	0	1	1	0	1	0	0	0	556	



Ministry of Transportation

TVIS II - Traffic Volume Information System Turning Movement Total Count and Peak Summary Report

Description: **QEW @ MCLEOD RD IC-27 EAST RAMP TERMINAL, 24, 52, 62**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date: **06-Nov-2018 (Tue)**

IC Side: **E**

LHRS: **10032**

End Date: **06-Nov-2018 (Tue)**

Int. Type: **T - S**

Offset: **0**

Schedule Summary: **TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00**

Total Count		Number of hours: 8	
QEW NB OFF-RAMP ; #24			
Ped. 0	Total Vehicles	0% (T +LT)	0% (T +LT)
0	0	0	0
			↑ Ped. 0
			MCLEOD ROAD
← 5619	↙ ↓ ↘	↕	↑ 2998
			6% (T +LT)
0	↗	← 4981	
			5% (T +LT)
5% (T +LT)	6439 →	↓ 0	
			0% (T+LT)
6% (T +LT)	2094 ↘	↙ ↗	
			7404 →
MCLEOD ROAD			Total Vehicles
Ped. 15	↓ 2094	638	0
			965
			Ped. 0
			QEW NB OFF-RAMP ; #24

AM Peak Hour Report		Start Time: 07:45	
Not Configured			
Ped. 0	Total Vehicles	0% (T +LT)	0% (T +LT)
0	0	0	0
			↑ Ped. 0
			MCLEOD ROAD
← 595	↙ ↓ ↘	↕	↑ 403
			7% (T +LT)
0	↗	← 517	
			8% (T +LT)
0% (T +LT)	739 →	↓ 0	
			0% (T+LT)
8% (T +LT)	329 ↘	↙ ↗	
			885 →
MCLEOD ROAD			Total Vehicles
Ped. 1	↓ 329	78	0
			146
			Ped. 0
			QEW NB OFF-RAMP ; #24

Midday Peak Hour Report		Start Time: 12:00	
Not Configured			
Ped. 0	Total Vehicles	0% (T +LT)	0% (T +LT)
0	0	0	0
			↑ Ped. 0
			MCLEOD ROAD
← 701	↙ ↓ ↘	↕	↑ 315
			7% (T +LT)
0	↗	← 645	
			5% (T +LT)
0% (T +LT)	775 →	↓ 0	
			0% (T+LT)
6% (T +LT)	231 ↘	↙ ↗	
			867 →
MCLEOD ROAD			Total Vehicles
Ped. 1	↓ 231	56	0
			92
			Ped. 0
			QEW NB OFF-RAMP ; #24

PM Peak Hour Report		Start Time: 16:15	
Not Configured			
Ped. 0	Total Vehicles	0% (T +LT)	0% (T +LT)
0	0	0	0
			↑ Ped. 0
			MCLEOD ROAD
← 881	↙ ↓ ↘	↕	↑ 482
			3% (T +LT)
0	↗	← 776	
			3% (T +LT)
0% (T +LT)	1016 →	↓ 0	
			0% (T+LT)
4% (T +LT)	339 ↘	↙ ↗	
			1164 →
MCLEOD ROAD			Total Vehicles
Ped. 3	↓ 339	105	0
			148
			Ped. 0
			QEW NB OFF-RAMP ; #24



TVIS II - Traffic Volume Information System
Traffic Signal Warrant

Description: **QEW @ McLEOD RD IC-27 EAST RAMP TERMINAL, 24, 52, 62**

Region: **CENTRAL**

Survey Type: **TM - Interchange**

Hwy: **QEW**

Start Date:

I/C Side: **E**

LHRS: **10032**

End Date:

Intersection Type: **T - S**

Offset: **0**

Schedule Summary: **Tuesday, Wednesday, Thursday AM 07:00-09:00, Midday 11:00-14:00, PM 15:00-18:00**
 Default as defined in 2016 Provincial Data Collection Contract

MAJOR ROADS				MINOR ROADS				Intersection Type	
Approach	Name	Channel Right	Pattern	Approach	Name	Channel Right	Pattern		
E	MCLEOD ROAD	□	UNCL	S	QEW NB OFF-RAMP	□	IC	T - S	
W	MCLEOD ROAD	□	UNCL		Ramps #24			Traffic Control	
								Traffic Signal	
					Ramps			Flow Condition	
	□ 2 or more approach Lanes							Restricted	
								□ 2 or more approach Lanes	

Justification 1 - Minimum Vehicle Volume:												Calculated using raw data							
1A: All approach lanes: 1B: Minor road approaches:												1A		1B					
												Min. Req.	%	Min. Req.	%				
												900	100	255	100				
												720	80	204	80				
												Total	%	Total	%				
Time	Major Road Approaches				Minor Road Approaches														
	East Approach	West Approach		South Approach	Not configured														
	←	↑	→	←	↑	→	←	↑	→	←	↑	→							
07:00	0	447	0	0	556	0	99	0	129	0	0	0	1231	100	228	80			
08:00	0	506	0	0	717	0	74	0	132	0	0	0	1429	100	206	80			
11:00	0	581	0	0	725	0	79	0	103	0	0	0	1488	100	182	80			
12:00	0	645	0	0	775	0	56	0	92	0	0	0	1568	100	148	80			
13:00	0	571	0	0	784	0	63	0	112	0	0	0	1530	100	175	80			
15:00	0	742	0	0	935	0	83	0	131	0	0	0	1891	100	214	80			
16:00	0	762	0	0	1018	0	106	0	142	0	0	0	2028	100	248	80			
17:00	0	727	0	0	929	0	78	0	124	0	0	0	1858	100	202	80			
TotalsTM	0	4981	0	0	6439	0	638	0	965	0	0	0	13023	800	1603	597			
Approach	4981				6439				1603				0		Section % 75				

Justification 1 Minimum Compliance: 75 %



TVIS II - Traffic Volume Information System
Traffic Signal Warrant

Description: **QEW @ McLEOD RD IC-27 EAST RAMP TERMINAL, 24, 52, 62**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date:

I/C Side: **E**

LHRS: **10032**

End Date:

Intersection Type: **T - S**

Offset: **0**

Schedule Summary: **Tuesday, Wednesday, Thursday AM 07:00-09:00, Midday 11:00-14:00, PM 15:00-18:00**
 Default as defined in 2016 Provincial Data Collection Contract

Justification 2 - Delay to Cross Traffic:

Calculated using raw data

2A: Major road approaches:

2B: Minor road approaches:

Time	Major Road Approaches				Minor Road Approaches				Pedestrians				
	East Approach	West Approach	South Approach	Not configured	South Approach	Not configured	South Approach	Not configured					
07:00	0	447	0	0	556	0	99	0	129	0	0	0	0
08:00	0	506	0	0	717	0	74	0	132	0	0	0	0
11:00	0	581	0	0	725	0	79	0	103	0	0	0	0
12:00	0	645	0	0	775	0	56	0	92	0	0	0	0
13:00	0	571	0	0	784	0	63	0	112	0	0	0	0
15:00	0	742	0	0	935	0	83	0	131	0	0	0	0
16:00	0	762	0	0	1018	0	106	0	142	0	0	0	0
17:00	0	727	0	0	929	0	78	0	124	0	0	0	0
Totals: TM	0	4981	0	0	6439	0	638	0	965	0	0	0	0
Approach	4981		6439		1603		0						

2A	
Min. Req.	%
900	100
720	80
Total	%
1003	100
1223	100
1306	100
1420	100
1355	100
1677	100
1780	100
1656	100
11420	800
Section %	100

2B	
Min. Req.	%
75	100
60	80
Total	%
99	100
74	80
79	100
56	75
63	80
83	100
106	100
78	100
638	735
Section %	92

* Pedestrians crossing major road

Justification 2 Minimum Compliance: %

Justification 3 - Volume / Delay Combination:

Calculated using raw data

Minimum Compliance (%)

Justification 1 - Minimum Vehicle Volume: %

Justification 2 - Delay to Cross Traffic: %

Justification 3 Minimum Compliance: %

TVIS II - Traffic Volume Information System
Traffic Signal Warrant

Description: **QEW @ McLEOD RD IC-27 EAST RAMP TERMINAL, 24, 52, 62**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date:

I/C Side: **E**

LHRS: **10032**

End Date:

Intersection Type: **T - S**

Offset: **0**

Schedule Summary: **Tuesday, Wednesday, Thursday AM 07:00-09:00, Midday 11:00-14:00, PM 15:00-18:00**
 Default as defined in 2016 Provincial Data Collection Contract

Justification 5 - Collision Experience

		Warrant Threshold *	
		5	100
Preceding Months	Number of Collisions **		%
1 - 12	0		0
13 - 24	0		0
25 - 36	0		0
Totals	0		0

Justification 5 Compliance: %

* Per twelve-month period.
 ** Include only collisions that are susceptible to correction

Calculation Options - Use raw data

Factors for major road approaches

East Approach	West Approach
Factor <input type="text" value="1.0"/>	Factor <input type="text" value="1.0"/>

Factor for pedestrian crossing major road

Factors for minor road approaches

South Approach	Not Configured
Factor <input type="text" value="1.0"/>	Factor <input type="text"/>

CONCLUSION: TRAFFIC SIGNALS ARE



Intersection Layout Sheet

Contract # 9015-E-009

Work Order # 009

Date: Nov 6 2018 Day: Tue 1 Hrs: 7-9 + 11-14 + 15-18

Location: QEW @ McLeod Rd TC-27 Ramps: WRT1

Reg/Mun: CR Town/City: Allanburg Area: _____

File Name: 4100320000 Device: Gretch / Jamar Unit # 121 Interval 1: AM NN / PM

Observer: Renat Shuliro Weather: Rain/ Clear Road Condition: Wet/ Wet

LHRS & OIS: 10032 0.00 Comments: _____

GPS: G-Star IV

Datum: WGS 84 (N)

Lat: 43.070236

Long: -79.122815

SIGNALIZED **N**

If intersection is unsignalized;

Sign Type: Stop / Yield

Sign Size: _____ cm x _____ cm

Sign Condition:

NA: New / Good / Poor / Missing

SA: New / Good / Poor / Missing

WA: New / Good / Poor / Missing

EA: New / Good / Poor / Missing

Photograph all approach's including all Signs / **N**

60 (km/h)

Hwy / Street Name
QEW Ramps

(sign)



INDICATE LOCATION & DIRECTION OF VEHICLE

Vehicle N S E W

Hwy / Street Name

McLeod Rd 50 (km/h)

5 4 3 2 1

50 (km/h) McLeod Rd (sign)

Note: Hwy / Street Name

Show all lanes approaching and leaving the intersection.

Show all channelization

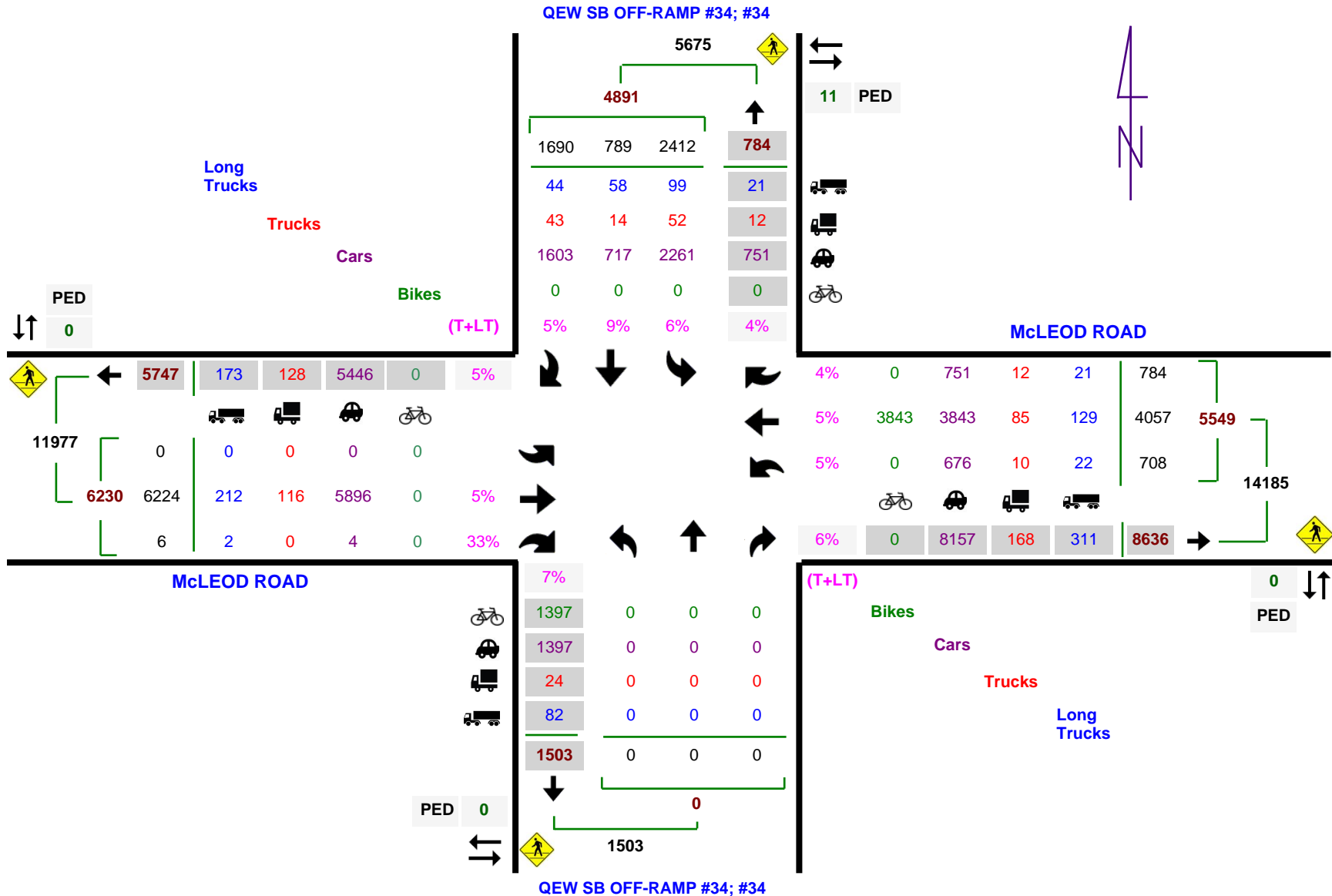
If there are two or more through lane in one direction, indicate if these lanes are not continuous

Show pedestrian crosswalks

Hwy / Street Name
Niagara Square Dr

N/A

Layout of "Special Condition"





TVIS II - Traffic Volume Information System
Turning Movement 15 Minute Report

Description: **QEW @ MCLEOD ROAD IC-27 WEST RAMP TERMINAL, 34, 53, 63**

Region: **CENTRAL**

Survey Type: **TM - Interchange**

Hwy: **QEW**

Start Date: **06-Nov-2018 (Tue)**

I/C Side: **W**

LHRS: **10032**

End Date: **06-Nov-2018 (Tue)**

Int. Type: **T - N**

Offset: **0**

Schedule Summary: **TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00**

Start Time	Major Road Approaches										Minor Road Approaches										Total Veh.																				
	East					West					North					Not Configured																									
	McLEOD ROAD					McLEOD ROAD					QEW SB OFF-RAMP #34: Ramp(s): #34																														
	Cars	Trucks	Long Trucks	Ped	Cars	Trucks	Long Trucks	Ped	Cars	Trucks	Long Trucks	Ped	Cars	Trucks	Long Trucks	Ped	Cars	Trucks	Heavy Trucks	Ped																					
Period 1																																									
07:00	3	53	15	0	0	0	1	4	0	0	0	88	0	0	3	0	0	9	0	0	29	14	24	1	0	2	0	1	1	0											248
07:15	9	82	22	0	1	0	2	5	0	0	0	109	0	0	3	0	0	5	0	0	49	14	45	1	0	1	3	2	2	0											355
07:30	22	105	28	1	3	0	0	10	2	0	0	173	0	0	3	0	0	9	0	0	62	23	54	2	0	2	6	4	3	0											512
07:45	12	131	13	0	2	0	0	9	0	0	0	198	0	0	1	0	0	18	0	0	85	30	77	2	1	3	3	1	1	0											587
08:00	8	98	28	1	5	0	1	5	1	0	0	173	0	0	7	0	0	13	0	0	67	17	43	1	0	1	1	3	1	0											474
08:15	17	106	19	0	2	1	1	5	1	0	0	158	0	0	5	0	0	4	0	0	70	27	62	1	0	0	5	2	0	0											486
08:30	22	85	23	0	5	0	0	5	0	0	0	191	0	0	8	0	0	9	0	0	54	18	57	3	1	1	3	2	2	0											489
08:45	16	111	9	1	2	1	1	4	1	0	0	155	1	0	4	0	0	9	0	0	59	23	82	0	3	1	4	1	0	1											488
Period 2																																									
11:00	18	110	14	0	3	1	0	5	0	0	0	167	0	0	2	0	0	3	0	0	42	21	18	2	1	1	4	1	0	1											413
11:15	22	122	15	0	4	1	1	2	3	0	0	174	0	0	6	0	0	3	0	0	56	17	42	5	0	0	7	0	1	0											481
11:30	25	104	17	0	4	2	0	2	1	0	0	149	0	0	9	0	0	4	0	0	58	15	45	2	1	3	3	6	5	0											455
11:45	15	128	23	0	3	0	1	2	1	0	0	191	0	0	10	0	0	7	0	0	56	17	54	1	1	1	3	2	1	1											517
12:00	24	135	22	1	1	0	2	4	2	0	0	193	0	0	6	0	0	8	0	0	60	18	34	2	0	3	2	1	1	0											519
12:15	33	115	11	0	7	1	2	4	0	0	0	170	0	0	1	0	0	7	0	0	54	19	40	1	0	1	5	4	1	0											476
12:30	20	114	18	0	1	1	0	5	1	0	0	162	0	0	3	0	0	6	0	0	61	17	48	2	0	2	3	1	2	0											467
12:45	22	122	28	0	2	0	0	2	0	0	0	181	0	0	7	0	0	5	0	0	60	15	40	2	1	1	1	2	4	1											495
13:00	26	110	27	0	2	0	1	1	0	0	0	192	0	0	4	0	0	5	0	0	45	23	35	1	1	1	3	4	1	0											482
13:15	18	118	21	0	3	0	0	3	0	0	0	149	1	0	3	0	0	6	1	0	66	22	44	0	0	1	2	2	2	0											462
13:30	23	109	19	0	3	1	2	4	0	0	0	190	0	0	1	0	0	8	0	0	55	13	41	2	0	0	1	2	4	1											478
13:45	17	109	14	1	2	0	0	6	2	0	0	172	1	0	5	0	0	7	0	0	71	21	39	0	0	2	3	2	4	0											478
Period 3																																									
15:00	28	128	33	0	6	0	0	4	0	0	0	227	0	0	6	0	0	10	0	0	79	26	47	1	1	0	5	2	0	1											603
15:15	24	133	28	2	2	0	1	4	0	0	0	207	0	0	3	0	0	6	1	0	83	31	51	2	1	0	4	1	0	0											584



TVIS II - Traffic Volume Information System
Turning Movement 15 Minute Report

Description: **QEW @ MCLEOD ROAD IC-27 WEST RAMP TERMINAL, 34, 53, 63**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date: **06-Nov-2018 (Tue)**

I/C Side: **W**

LHRS: **10032**

End Date: **06-Nov-2018 (Tue)**

Int. Type: **T - N**

Offset: **0**

Schedule Summary: **TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00**

Start Time	Major Road Approaches													Minor Road Approaches													Total Veh.				
	East						West						North						Not Configured												
	McLEOD ROAD						McLEOD ROAD						QEW SB OFF-RAMP #34: Ramp(s): #34																		
	Cars			Trucks			Long Trucks			Ped	Cars			Trucks			Long Trucks			Ped	Cars			Trucks				Heavy Trucks			Ped
←	↑	→	←	↑	→	←	↑	→	←		↑	→	←	↑	→	←	↑	→	←		↑	→	←	↑	→	←	↑	→			
15:30	28	140	30	0	5	0	2	7	1	0	0	186	0	0	5	0	0	6	0	0	73	28	41	3	0	0	3	3	1	0	562
15:45	31	140	30	1	5	0	1	4	1	0	0	216	0	0	1	0	0	12	0	0	82	28	52	2	0	4	2	1	1	0	614
16:00	28	131	33	1	2	0	0	2	0	0	0	214	0	0	5	0	0	8	0	0	98	37	65	1	0	6	5	2	1	1	639
16:15	32	155	34	0	5	0	0	3	0	0	0	204	1	0	1	0	0	4	0	0	98	30	55	5	0	2	4	0	2	0	635
16:30	17	146	26	1	2	1	2	4	0	0	0	268	0	0	1	0	0	5	0	0	96	24	64	4	0	1	5	0	0	0	667
16:45	33	161	31	0	1	1	1	3	2	0	0	217	0	0	1	0	0	2	0	0	107	16	56	0	0	0	2	0	1	1	635
17:00	26	139	37	0	1	1	0	1	1	0	0	244	0	0	1	0	0	5	0	0	99	25	63	1	0	0	2	1	2	1	649
17:15	15	159	28	0	0	0	0	4	0	0	0	202	0	0	0	0	0	6	0	0	123	34	70	1	1	0	1	1	0	1	645
17:30	19	137	36	0	0	0	0	2	1	0	0	195	0	0	1	0	0	2	0	0	81	30	52	1	0	3	3	2	0	1	565
17:45	23	107	19	0	1	0	0	4	0	0	0	181	0	0	0	0	0	1	0	0	83	24	63	0	1	0	1	2	0	0	510



TVIS II - Traffic Volume Information System

Turning Movement Total Count and Peak Summary Report

Description: **QEW @ MCLEOD ROAD IC-27 WEST RAMP TERMINAL, 34, 53, 63**

Region: **CENTRAL**

Survey Type: **TM - Interchange**

Hwy: **QEW**

Start Date: **06-Nov-2018 (Tue)**

IC Side: **W**

LHRS: **10032**

End Date: **06-Nov-2018 (Tue)**

Int. Type: **T - N**

Offset: **0**

Schedule Summary: **TUES-THURS, 07:00-09:00, 11:00-14:00, 15:00-18:00**

Total Count		Number of hours: 8									
QEW SB OFF-RAMP #34; #34											
Ped. 0	Total Vehicles	5% (T +LT)	9% (T +LT)	6% (T +LT)	↑	Ped. 11	McLEOD ROAD				
	1690	789	2412	784							
←	5747	↙	↓	↘	↑	784	4% (T +LT)				
		↗			←	4057	5% (T +LT)				
	0	↖			↘	708	5% (T +LT)				
	6224	→			↖	6	33% (T +LT)				
	6	↙	↗	↖	↘	8636	→				
McLEOD ROAD		↓	0	0	0	Total Vehicles		Ped. 0			
Ped. 0	1503	↓	0%	0%	0%						
			(T +LT)	(T +LT)	(T +LT)						
QEW SB OFF-RAMP #34; #34											

AM Peak Hour Report		Start Time: 07:30									
QEW SB OFF-RAMP #34; #34											
Ped. 0	Total Vehicles	4% (T +LT)	10% (T +LT)	7% (T +LT)	↑	Ped. 0	McLEOD ROAD				
	247	108	305	93							
←	728	↙	↓	↘	↑	93	5% (T +LT)				
		↗			←	481	9% (T +LT)				
	0	↖			↘	63	6% (T +LT)				
	762	→			↖	0	0%				
	0	↙	↗	↖	↘	1067	→				
	0	↙	↗	↖	↘	0	0%				
McLEOD ROAD		↓	0	0	0	Total Vehicles		Ped. 0			
Ped. 1	171	↓	0%	0%	0%						
			(T +LT)	(T +LT)	(T +LT)						
Not Configured											

Midday Peak Hour Report		Start Time: 11:45									
QEW SB OFF-RAMP #34; #34											
Ped. 0	Total Vehicles	6% (T +LT)	11% (T +LT)	8% (T +LT)	↑	Ped. 1	McLEOD ROAD				
	188	80	250	80							
←	707	↙	↓	↘	↑	80	8% (T +LT)				
		↗			←	519	5% (T +LT)				
	0	↖			↘	98	6% (T +LT)				
	764	→			↖	0	0%				
	0	↙	↗	↖	↘	1014	→				
	0	↙	↗	↖	↘	0	0%				
McLEOD ROAD		↓	0	0	0	Total Vehicles		Ped. 0			
Ped. 0	178	↓	0%	0%	0%						
			(T +LT)	(T +LT)	(T +LT)						
Not Configured											

PM Peak Hour Report		Start Time: 16:30									
QEW SB OFF-RAMP #34; #34											
Ped. 0	Total Vehicles	2% (T +LT)	3% (T +LT)	4% (T +LT)	↑	Ped. 3	McLEOD ROAD				
	257	102	441	128							
←	878	↙	↓	↘	↑	128	5% (T +LT)				
		↗			←	621	3% (T +LT)				
	0	↖			↘	95	4% (T +LT)				
	952	→			↖	0	0%				
	0	↙	↗	↖	↘	1393	→				
	0	↙	↗	↖	↘	0	0%				
McLEOD ROAD		↓	0	0	0	Total Vehicles		Ped. 0			
Ped. 3	197	↓	0%	0%	0%						
			(T +LT)	(T +LT)	(T +LT)						
Not Configured											



TVIS II - Traffic Volume Information System
Traffic Signal Warrant

Description: **QEW @ MCLEOD ROAD IC-27 WEST RAMP TERMINAL, 34, 53, 63**

Region: **CENTRAL**

Survey Type: **TM - Interchange**

Hwy: **QEW**

Start Date:

I/C Side: **W**

LHRS: **10032**

End Date:

Intersection Type: **T - N**

Offset: **0**

Schedule Summary: **Tuesday, Wednesday, Thursday AM 07:00-09:00, Midday 11:00-14:00, PM 15:00-18:00**
 Default as defined in 2016 Provincial Data Collection Contract

MAJOR ROADS				MINOR ROADS				Intersection Type	
Approach	Name	Channel Right	Pattern	Approach	Name	Channel Right	Pattern		
E	McLEOD ROAD	▮	UNCL	N	QEW SB OFF-RAMP #34	▮	IC	T - N	
W	McLEOD ROAD	▮	UNCL		Ramps #34			Traffic Control	
								Traffic Signal	
					Ramps			Flow Condition	
	▮ 2 or more approach Lanes							Restricted	
					▮ 2 or more approach Lanes				

Justification 1 - Minimum Vehicle Volume:													Calculated using raw data							
1A: All approach lanes: 1B: Minor road approaches:													1A		1B					
													Min. Req.	%	Min. Req.	%				
													900	100	255	100				
													720	80	204	80				
													Total	%	Total	%				
Time	Major Road Approaches				Minor Road Approaches															
	East Approach	West Approach	North Approach	Not configured																
07:00	50	405	0	0	619	0	243	90	215	0	0	0	1622	100	548	100				
08:00	68	433	0	0	736	1	268	97	250	0	0	0	1853	100	615	100				
11:00	82	489	0	0	725	0	239	82	171	0	0	0	1788	100	492	100				
12:00	104	512	0	0	749	0	253	78	177	0	0	0	1873	100	508	100				
13:00	88	470	0	0	742	3	249	90	174	0	0	0	1816	100	513	100				
15:00	118	578	0	0	885	1	339	122	197	0	0	0	2240	100	658	100				
16:00	115	615	0	0	930	1	425	109	253	0	0	0	2448	100	787	100				
17:00	83	555	0	0	838	0	396	121	253	0	0	0	2246	100	770	100				
TotalsTM	708	4057	0	0	6224	6	2412	789	1690	0	0	0	15886	800	4891	800				
Approach	4765				6230				4891				0				Section %	100	Section %	100

Justification 1 Minimum Compliance: 100 %

TVIS II - Traffic Volume Information System
Traffic Signal Warrant

Description: **QEW @ MCLEOD ROAD IC-27 WEST RAMP TERMINAL, 34, 53, 63**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date:

I/C Side: **W**

LHRS: **10032**

End Date:

Intersection Type: **T - N**

Offset: **0**

Schedule Summary: **Tuesday, Wednesday, Thursday AM 07:00-09:00, Midday 11:00-14:00, PM 15:00-18:00**
 Default as defined in 2016 Provincial Data Collection Contract

Justification 2 - Delay to Cross Traffic:

Calculated using raw data

2A: Major road approaches:

2B: Minor road approaches:

Time	Major Road Approaches				Minor Road Approaches				Pedestrians				
	East Approach		West Approach		North Approach		Not configured						
	←	→	←	→	←	→	←	→					
07:00	50	405	0	0	619	0	243	90	215	0	0	0	0
08:00	68	433	0	0	736	1	268	97	250	0	0	0	0
11:00	82	489	0	0	725	0	239	82	171	0	0	0	0
12:00	104	512	0	0	749	0	253	78	177	0	0	0	0
13:00	88	470	0	0	742	3	249	90	174	0	0	0	0
15:00	118	578	0	0	885	1	339	122	197	0	0	0	0
16:00	115	615	0	0	930	1	425	109	253	0	0	0	0
17:00	83	555	0	0	838	0	396	121	253	0	0	0	0
Totals: TM	708	4057	0	0	6224	6	2412	789	1690	0	0	0	0
Approach	4765		6230		4891		0						

2A	
Min. Req.	%
900	100
720	80
Total	%
1074	100
1238	100
1296	100
1365	100
1303	100
1582	100
1661	100
1476	100
10995	800
Section %	100

2B	
Min. Req.	%
75	100
60	80
Total	%
333	100
365	100
321	100
331	100
339	100
461	100
534	100
517	100
3201	800
Section %	100

* Pedestrians crossing major road

Justification 2 Minimum Compliance: 100 %

Justification 3 - Volume / Delay Combination:

Calculated using raw data

Minimum Compliance (%)

Justification 1 - Minimum Vehicle Volume: 100 %

Justification 2 - Delay to Cross Traffic: 100 %

Justification 3 Minimum Compliance: 100 %



TVIS II - Traffic Volume Information System
Traffic Signal Warrant

Description: **QEW @ MCLEOD ROAD IC-27 WEST RAMP TERMINAL, 34, 53, 63**

Region: **CENTRAL**

Survey Type: **TM – Interchange**

Hwy: **QEW**

Start Date:

I/C Side: **W**

LHRS: **10032**

End Date:

Intersection Type: **T - N**

Offset: **0**

Schedule Summary: **Tuesday, Wednesday, Thursday AM 07:00-09:00, Midday 11:00-14:00, PM 15:00-18:00**
Default as defined in 2016 Provincial Data Collection Contract

Justification 5 - Collision Experience

		Warrant Threshold *	
		5	100
Preceding Months	Number of Collisions **		%
1 - 12	0		0
13 - 24	0		0
25 - 36	0		0
Totals	0		0

Justification 5 Compliance: %

* Per twelve-month period.

** Include only collisions that are susceptible to correction

Calculation Options - Use raw data

Factors for major road approaches

East Approach	West Approach
Factor <input type="text" value="1.0"/>	Factor <input type="text" value="1.0"/>
Factor for pedestrian crossing major road <input type="text" value="1.0"/>	

Factors for minor road approaches

North Approach	Not Configured
Factor <input type="text" value="1.0"/>	Factor <input type="text"/>

CONCLUSION: TRAFFIC SIGNALS ARE WARRANTED

Location..... McLeod Road @ Montrose Road

GeoID..... 01563

Municipality. NIAGARA FALLS

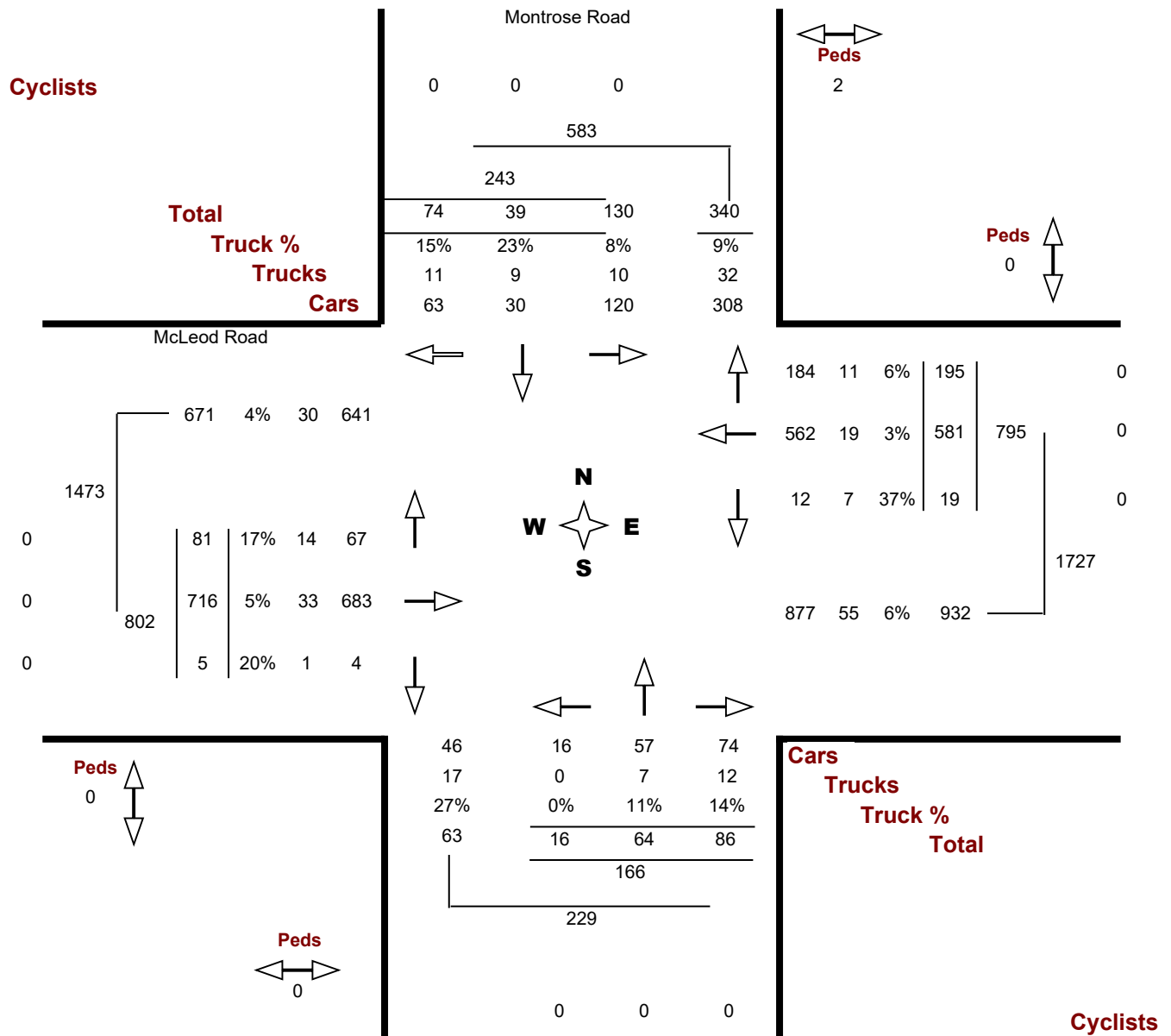
Count Date. Wednesday, 29 May, 2019

Traffic Cont.

Count Time. 07:00 AM — 09:00 AM

Major Dir..... North south

Peak Hour.. 08:00 AM — 09:00 AM



Location..... McLeod Road @ Montrose Road

GeoID..... 01563

Municipality. NIAGARA FALLS

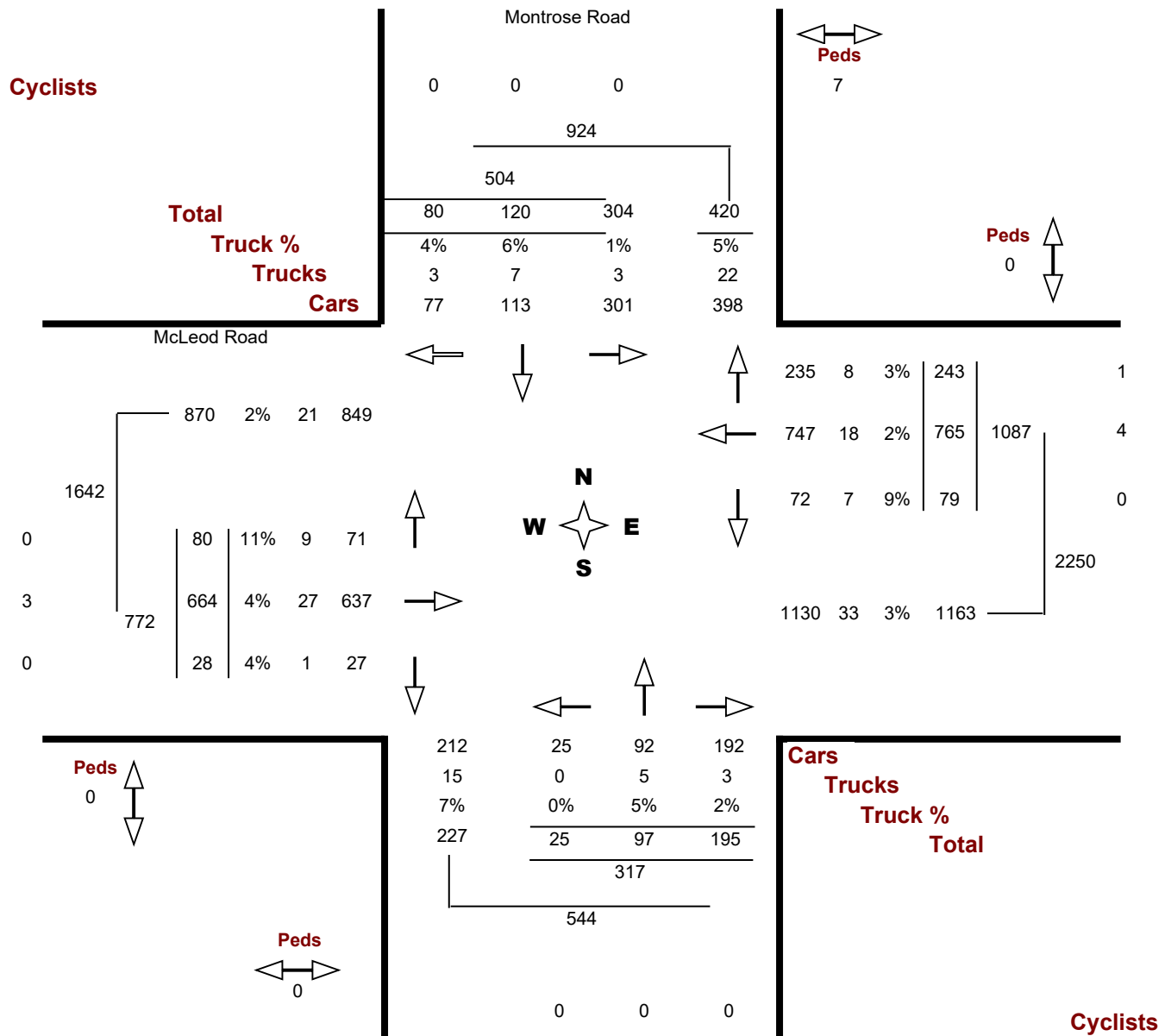
Count Date. Wednesday, 29 May, 2019

Traffic Cont.

Count Time. 03:00 PM — 06:00 PM

Major Dir..... North south

Peak Hour.. 04:30 PM — 05:30 PM

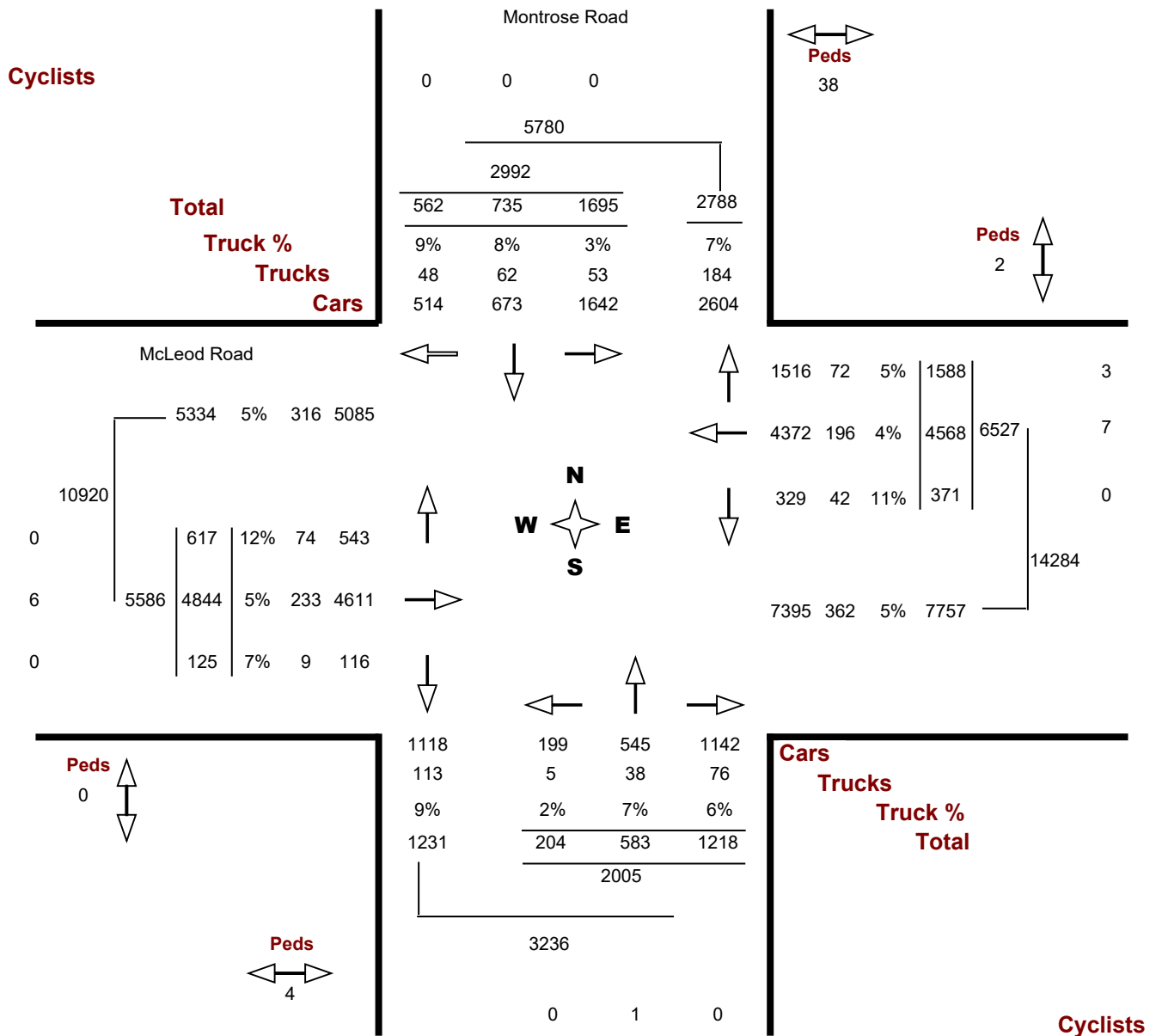


Location..... McLeod Road @ Montrose Road

Municipality..... NIAGARA FALLS

GeoID..... 01563

Count Date..... Wednesday, 29 May, 2019



Turning Movement Count - Details Report (15 min)

Location..... McLeod Road @ Montrose Road

Municipality..... NIAGARA FALLS

Count Date..... Wednesday, May 29, 2019

Montrose Road

McLeod Road

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00 07:15	16	9	12	0	37	1	2	23	0	26	2	71	30	0	103	9	101	2	0	112
07:15 07:30	21	10	13	0	44	1	11	11	0	23	2	99	36	0	137	10	99	0	0	109
07:30 07:45	26	12	11	0	49	3	9	16	0	28	3	114	22	0	139	14	151	0	0	165
07:45 08:00	31	11	22	0	64	4	19	20	0	43	2	168	56	0	226	15	150	0	0	165
Hourly Total	94	42	58	0	194	9	41	70	0	120	9	452	144	0	605	48	501	2	0	551
08:00 08:15	34	12	15	0	61	1	9	22	0	32	3	154	37	0	194	19	184	2	0	205
08:15 08:30	35	7	20	0	62	3	21	22	0	46	4	143	59	0	206	17	172	1	0	190
08:30 08:45	31	11	17	0	59	6	15	23	0	44	6	120	45	0	171	21	192	0	0	213
08:45 09:00	30	9	22	0	61	6	19	19	0	44	6	164	54	0	224	24	168	2	0	194
Hourly Total	130	39	74	0	243	16	64	86	0	166	19	581	195	0	795	81	716	5	0	802
11:00 11:15	33	19	14	0	66	7	12	32	0	51	9	133	39	0	181	24	136	7	0	167
11:15 11:30	49	26	14	0	89	7	18	37	0	62	9	122	36	0	167	13	129	5	0	147
11:30 11:45	61	26	22	0	109	14	13	43	0	70	16	112	49	0	177	17	119	4	0	140
11:45 12:00	67	17	17	0	101	10	15	36	0	61	13	131	49	0	193	15	135	5	0	155
Hourly Total	210	88	67	0	365	38	58	148	0	244	47	498	173	0	718	69	519	21	0	609
12:00 12:15	63	32	25	0	120	8	20	34	0	62	12	135	48	0	195	16	161	4	0	181
12:15 12:30	53	26	25	0	104	7	17	37	0	61	8	124	41	0	173	22	139	6	0	167
12:30 12:45	69	29	17	0	115	4	13	37	0	54	23	118	37	0	178	20	133	4	0	157
12:45 13:00	52	24	17	0	93	8	25	39	0	72	22	133	46	0	201	16	135	3	0	154
Hourly Total	237	111	84	0	432	27	75	147	0	249	65	510	172	0	747	74	568	17	0	659
13:00 13:15	58	23	15	0	96	7	30	41	0	78	14	122	40	0	176	22	134	3	0	159
13:15 13:30	45	31	17	0	93	8	15	58	0	81	12	103	40	0	155	14	124	1	0	139
13:30 13:45	64	36	21	0	121	10	20	41	0	71	9	115	49	0	173	16	113	2	0	131
13:45 14:00	38	26	10	0	74	5	11	45	0	61	16	142	35	0	193	20	162	4	0	186
Hourly Total	205	116	63	0	384	30	76	185	0	291	51	482	164	0	697	72	533	10	0	615
15:00 15:15	63	26	15	0	104	6	16	39	0	61	12	137	59	0	208	30	199	6	0	235
15:15 15:30	59	29	14	0	102	5	18	47	0	70	8	171	67	0	246	29	178	8	0	215
15:30 15:45	57	25	16	0	98	14	21	62	0	97	8	151	61	0	220	26	165	4	0	195
15:45 16:00	58	26	20	0	104	5	18	35	0	58	10	156	73	0	239	22	152	3	0	177
Hourly Total	237	106	65	0	408	30	73	183	0	286	38	615	260	0	913	107	694	21	0	822
16:00 16:15	58	23	16	0	97	5	28	50	0	83	13	165	72	0	250	26	187	5	0	218

Montrose Road

McLeod Road

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:15 16:30	85	32	23	0	140	8	23	49	0	80	13	177	67	0	257	20	154	3	0	177
16:30 16:45	105	41	17	0	163	9	25	42	0	76	19	184	68	0	271	18	171	3	0	192
16:45 17:00	70	29	22	0	121	9	24	54	0	87	24	189	56	0	269	25	141	5	0	171
Hourly Total	318	125	78	0	521	31	100	195	0	326	69	715	263	0	1047	89	653	16	0	758
17:00 17:15	69	24	23	0	116	3	24	52	0	79	10	186	59	0	255	21	172	11	0	204
17:15 17:30	60	26	18	0	104	4	24	47	0	75	26	206	60	0	292	16	180	9	0	205
17:30 17:45	73	28	20	0	121	7	28	51	0	86	23	170	49	0	242	27	146	9	0	182
17:45 18:00	62	30	12	0	104	9	20	54	0	83	14	153	49	0	216	13	162	4	0	179
Hourly Total	264	108	73	0	445	23	96	204	0	323	73	715	217	0	1005	77	660	33	0	770
Grand Total	1695	735	562	0	2992	204	583	1218	0	2005	371	4568	1588	0	6527	617	4844	125	0	5586
Truck %	3%	8%	9%	0%	5%	2%	7%	6%	0%	6%	11%	4%	5%	0%	5%	12%	5%	7%	0%	6%

Location..... McLeod Road @ Oakwood Drive/Ramp

GeoID..... 01564

Municipality. NIAGARA FALLS

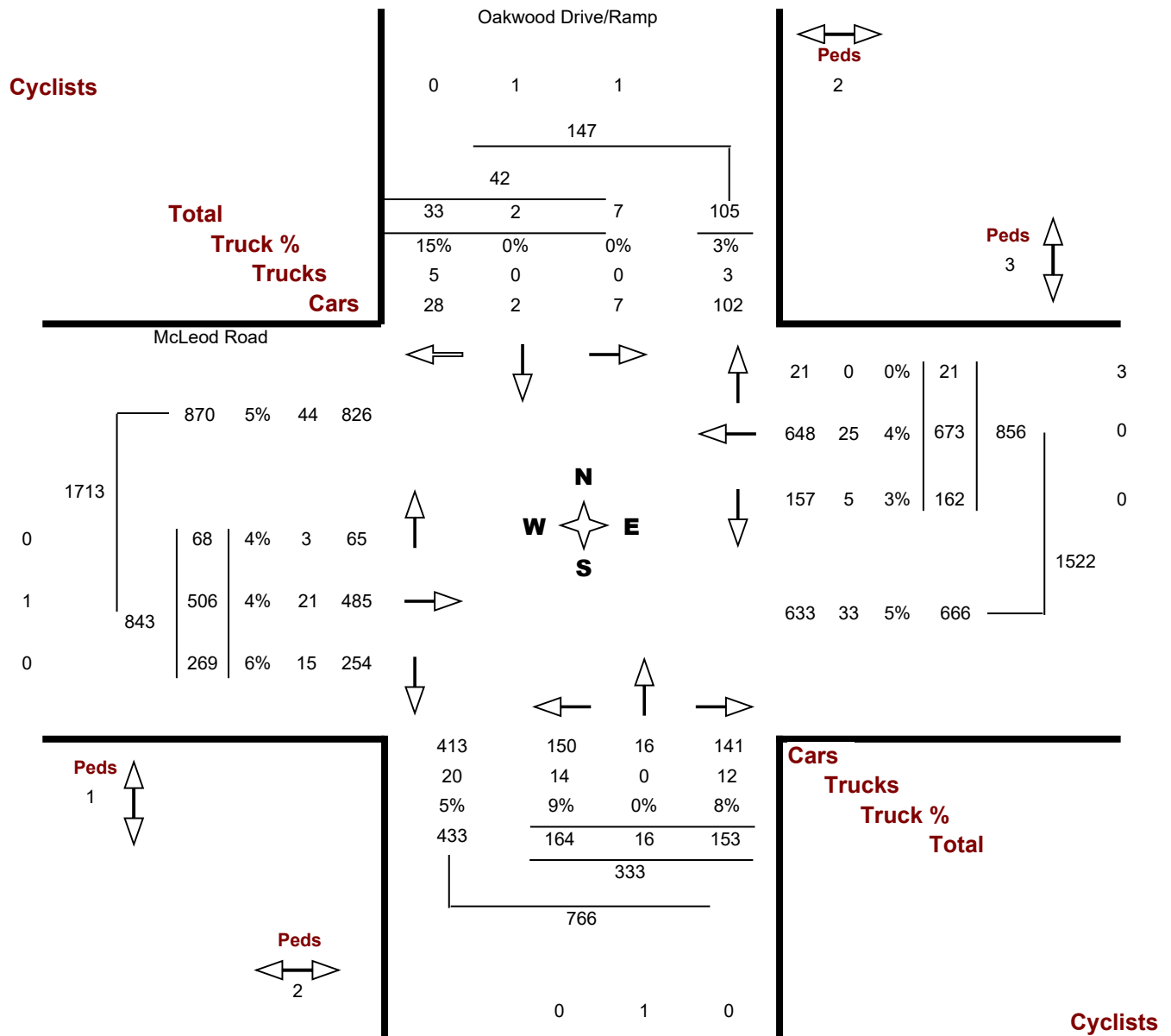
Count Date. Wednesday, 17 July, 2019

Traffic Cont.

Count Time. 07:00 AM — 09:00 AM

Major Dir..... East west

Peak Hour.. 08:00 AM — 09:00 AM



Location..... McLeod Road @ Oakwood Drive/Ramp

GeoID..... 01564

Municipality. NIAGARA FALLS

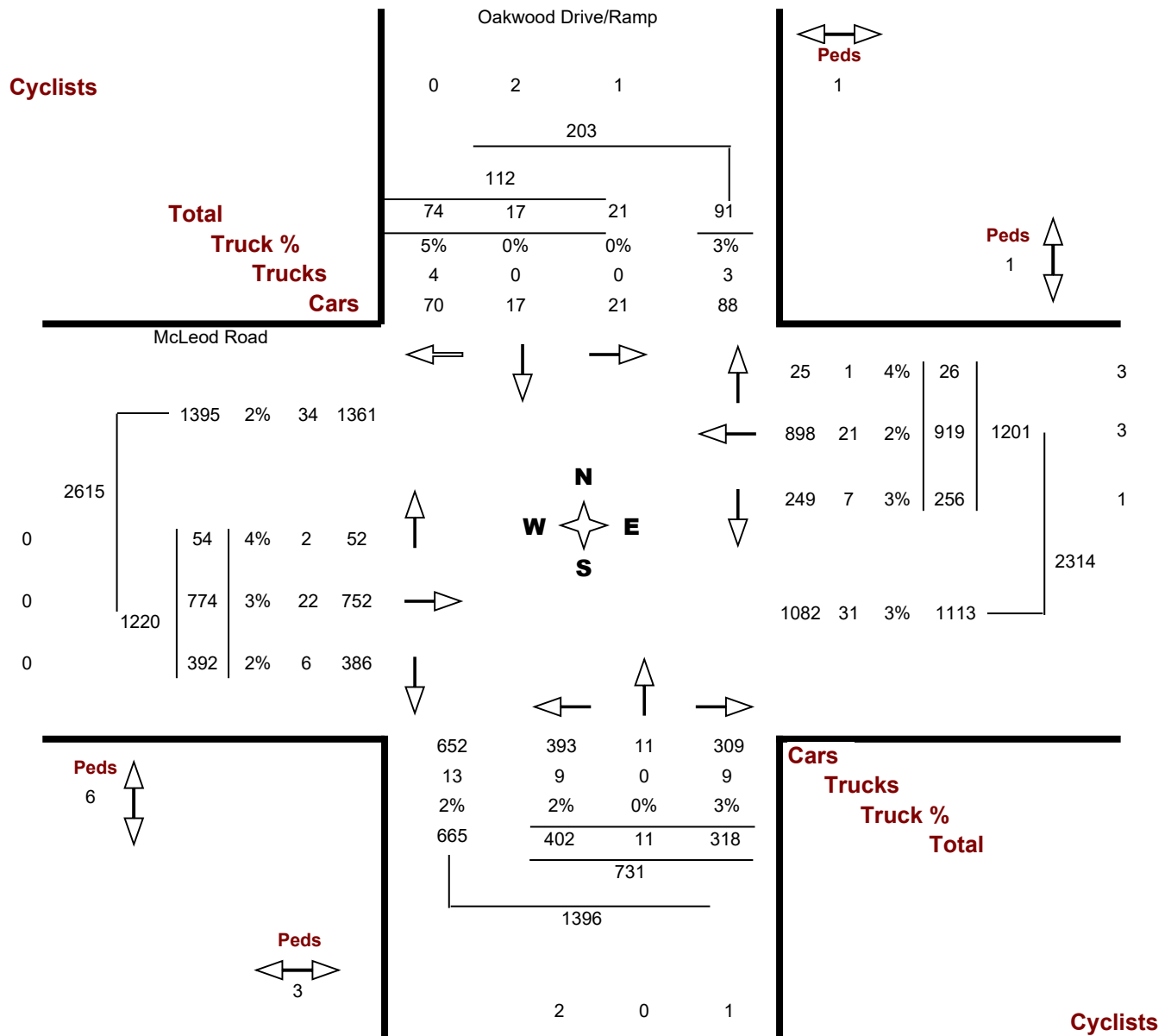
Count Date. Wednesday, 17 July, 2019

Traffic Cont.

Count Time. 03:00 PM — 06:00 PM

Major Dir..... East west

Peak Hour.. 03:45 PM — 04:45 PM

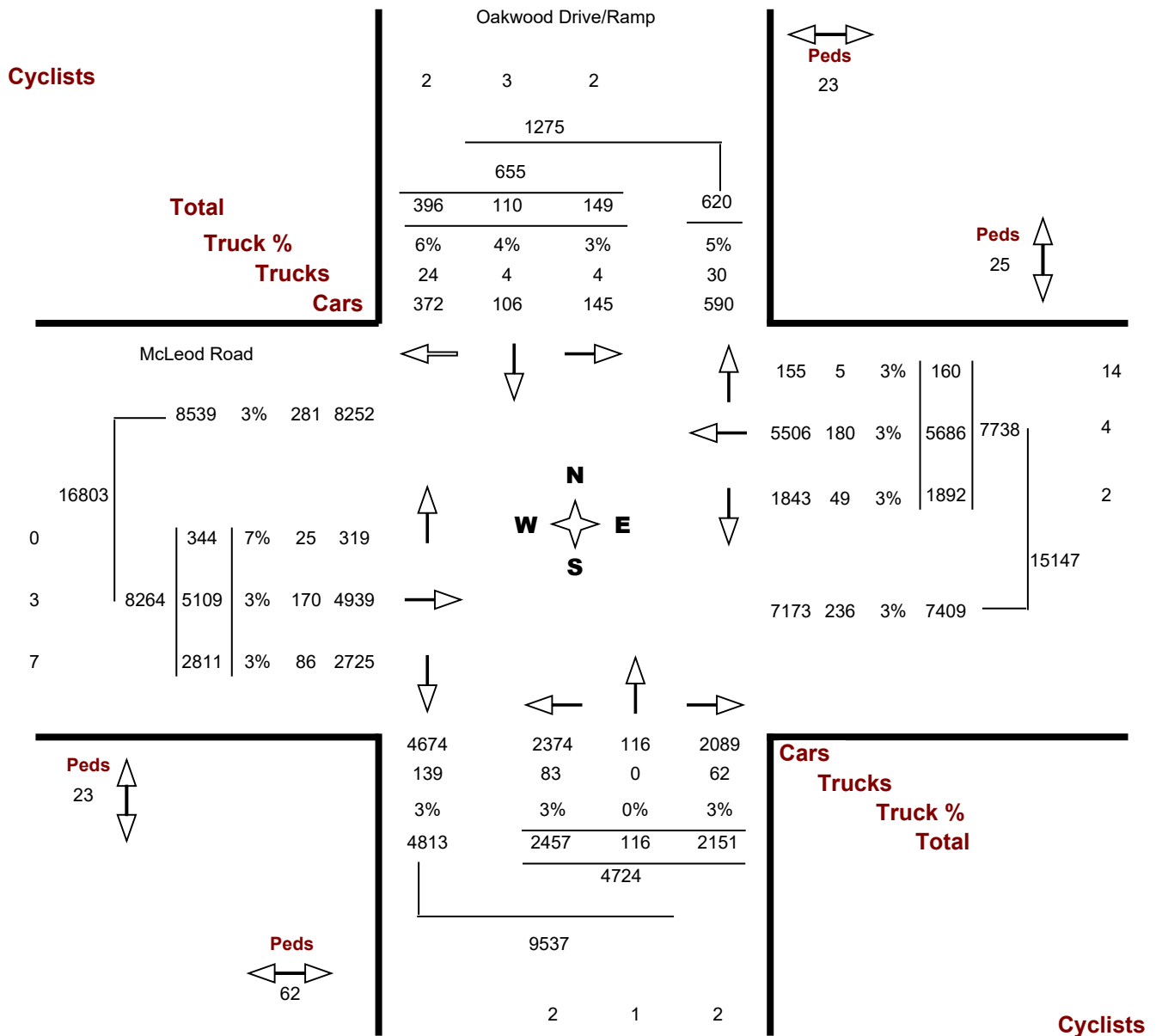


Location..... McLeod Road @ Oakwood Drive/Ramp

Municipality..... NIAGARA FALLS

GeoID..... 01564

Count Date..... Wednesday, 17 July, 2019



Turning Movement Count - Details Report (15 min)

Location..... McLeod Road @ Oakwood Drive/Ramp

Municipality..... NIAGARA FALLS

Count Date..... Wednesday, July 17, 2019

Oakwood Drive/Ramp

McLeod Road

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00 07:15	1	2	12	0	15	18	5	26	0	49	30	103	3	0	136	22	75	41	0	138
07:15 07:30	2	2	3	0	7	30	2	31	0	63	34	117	3	0	154	8	93	40	0	141
07:30 07:45	0	1	2	0	3	28	5	39	0	72	39	169	1	0	209	3	107	43	0	153
07:45 08:00	0	1	6	0	7	36	6	28	0	70	27	134	3	0	164	12	127	63	0	202
Hourly Total	3	6	23	0	32	112	18	124	0	254	130	523	10	0	663	45	402	187	0	634
08:00 08:15	3	0	4	0	7	27	7	32	0	66	31	197	5	0	233	19	118	52	0	189
08:15 08:30	0	1	10	0	11	44	6	37	0	87	38	153	5	0	196	16	136	65	0	217
08:30 08:45	4	1	6	0	11	41	0	42	0	83	35	160	7	0	202	15	127	74	0	216
08:45 09:00	0	0	13	0	13	52	3	42	0	97	58	163	4	0	225	18	125	78	0	221
Hourly Total	7	2	33	0	42	164	16	153	0	333	162	673	21	0	856	68	506	269	0	843
11:00 11:15	10	3	10	0	23	79	4	60	0	143	57	141	5	0	203	11	134	118	0	263
11:15 11:30	3	1	7	0	11	82	5	68	0	155	76	145	2	0	223	7	160	114	0	281
11:30 11:45	3	0	9	0	12	83	0	66	0	149	73	169	9	0	251	9	157	82	0	248
11:45 12:00	6	5	8	0	19	81	2	91	0	174	62	165	2	0	229	6	153	111	0	270
Hourly Total	22	9	34	0	65	325	11	285	0	621	268	620	18	0	906	33	604	425	0	1062
12:00 12:15	10	3	18	0	31	92	6	84	0	182	69	173	8	0	250	10	141	102	0	253
12:15 12:30	1	5	4	0	10	89	2	74	0	165	74	192	4	0	270	3	162	95	0	260
12:30 12:45	9	5	12	0	26	85	7	77	0	169	87	185	7	0	279	13	140	108	0	261
12:45 13:00	8	7	15	0	30	106	6	95	0	207	56	187	10	0	253	14	157	109	0	280
Hourly Total	28	20	49	0	97	372	21	330	0	723	286	737	29	0	1052	40	600	414	0	1054
13:00 13:15	6	5	19	0	30	94	6	80	0	180	72	152	14	0	238	12	154	111	0	277
13:15 13:30	2	5	10	0	17	101	3	67	0	171	56	192	9	0	257	6	154	103	0	263
13:30 13:45	8	6	11	0	25	79	2	69	0	150	70	177	8	0	255	11	182	109	0	302
13:45 14:00	9	5	15	0	29	91	7	80	0	178	71	163	6	0	240	16	169	99	0	284
Hourly Total	25	21	55	0	101	365	18	296	0	679	269	684	37	0	990	45	659	422	0	1126
15:00 15:15	13	3	12	0	28	100	2	97	0	199	49	153	3	0	205	11	189	92	0	292
15:15 15:30	2	6	17	0	25	89	3	80	0	172	97	203	2	0	302	12	179	95	0	286
15:30 15:45	4	3	13	0	20	98	2	79	0	179	73	200	3	0	276	11	166	82	0	259
15:45 16:00	4	2	8	0	14	99	0	93	0	192	70	222	4	0	296	8	197	118	0	323
Hourly Total	23	14	50	0	87	386	7	349	0	742	289	778	12	0	1079	42	731	387	0	1160
16:00 16:15	5	8	22	0	35	97	4	78	0	179	57	206	4	0	267	10	193	105	0	308

Oakwood Drive/Ramp

McLeod Road

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:15 16:30	6	2	19	0	27	93	3	83	0	179	59	257	11	0	327	20	200	93	0	313
16:30 16:45	6	5	25	0	36	113	4	64	0	181	70	234	7	0	311	16	184	76	0	276
16:45 17:00	7	3	15	0	25	88	4	73	0	165	63	191	4	0	258	6	228	105	0	339
Hourly Total	24	18	81	0	123	391	15	298	0	704	249	888	26	0	1163	52	805	379	0	1236
17:00 17:15	7	7	40	0	54	90	3	80	0	173	57	216	1	0	274	2	178	87	0	267
17:15 17:30	3	6	12	0	21	89	5	80	0	174	66	179	3	0	248	9	220	78	0	307
17:30 17:45	3	5	13	0	21	89	1	85	0	175	59	215	2	0	276	6	216	88	0	310
17:45 18:00	4	2	6	0	12	74	1	71	0	146	57	173	1	0	231	2	188	75	0	265
Hourly Total	17	20	71	0	108	342	10	316	0	668	239	783	7	0	1029	19	802	328	0	1149
Grand Total	149	110	396	0	655	2457	116	2151	0	4724	1892	5686	160	0	7738	344	5109	2811	0	8264
Truck %	3%	4%	6%	0%	5%	3%	0%	3%	0%	3%	3%	3%	3%	0%	3%	7%	3%	3%	0%	3%

Location..... Montrose Road @ Oakwood Drive

GeoID..... 01551

Municipality. NIAGARA FALLS

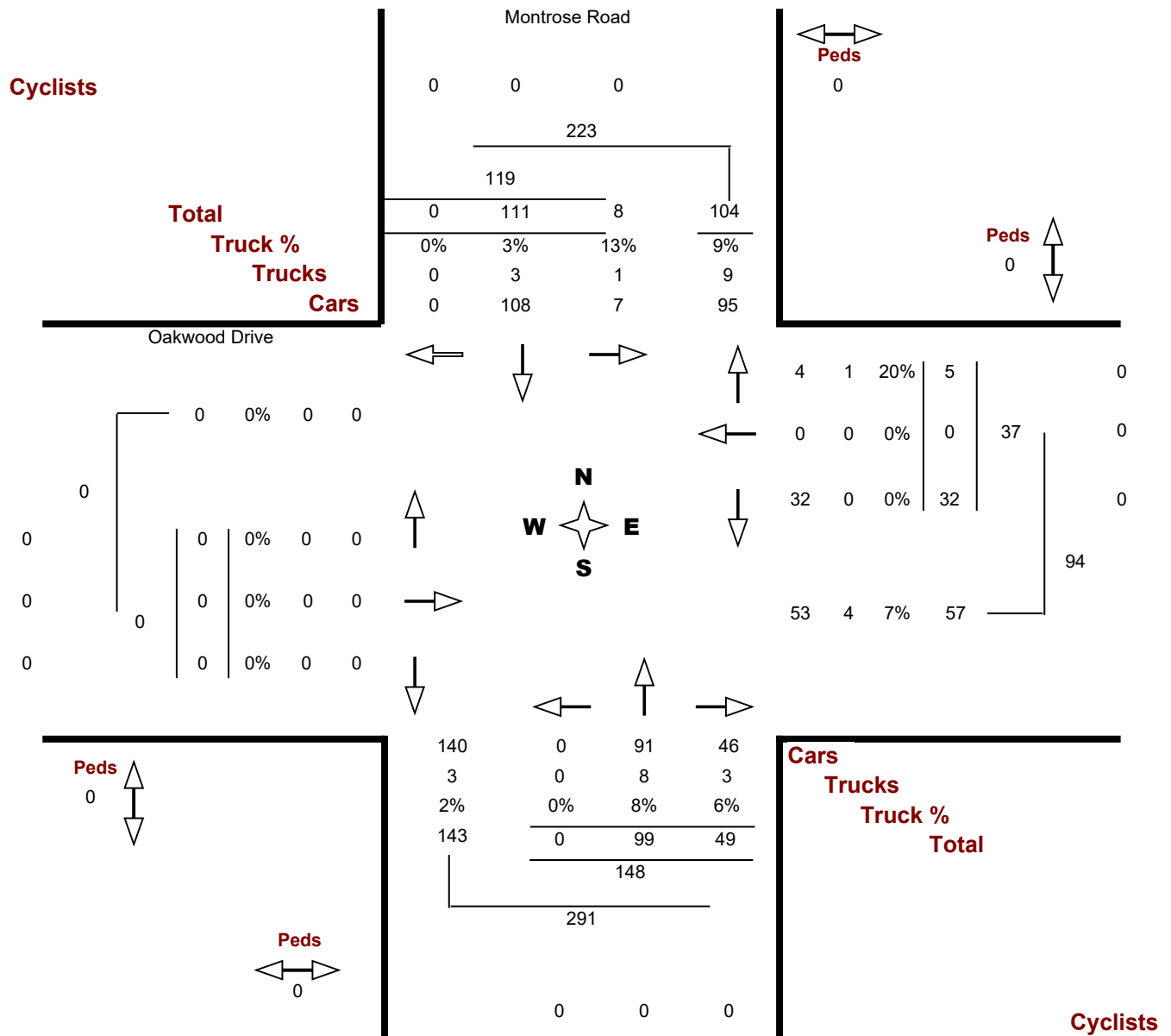
Count Date. Thursday, 10 February, 2011

Traffic Cont.

Count Time. 07:00 AM — 09:00 AM

Major Dir..... North south

Peak Hour.. 07:30 AM — 08:30 AM



Location..... Montrose Road @ Oakwood Drive

GeoID..... 01551

Municipality. NIAGARA FALLS

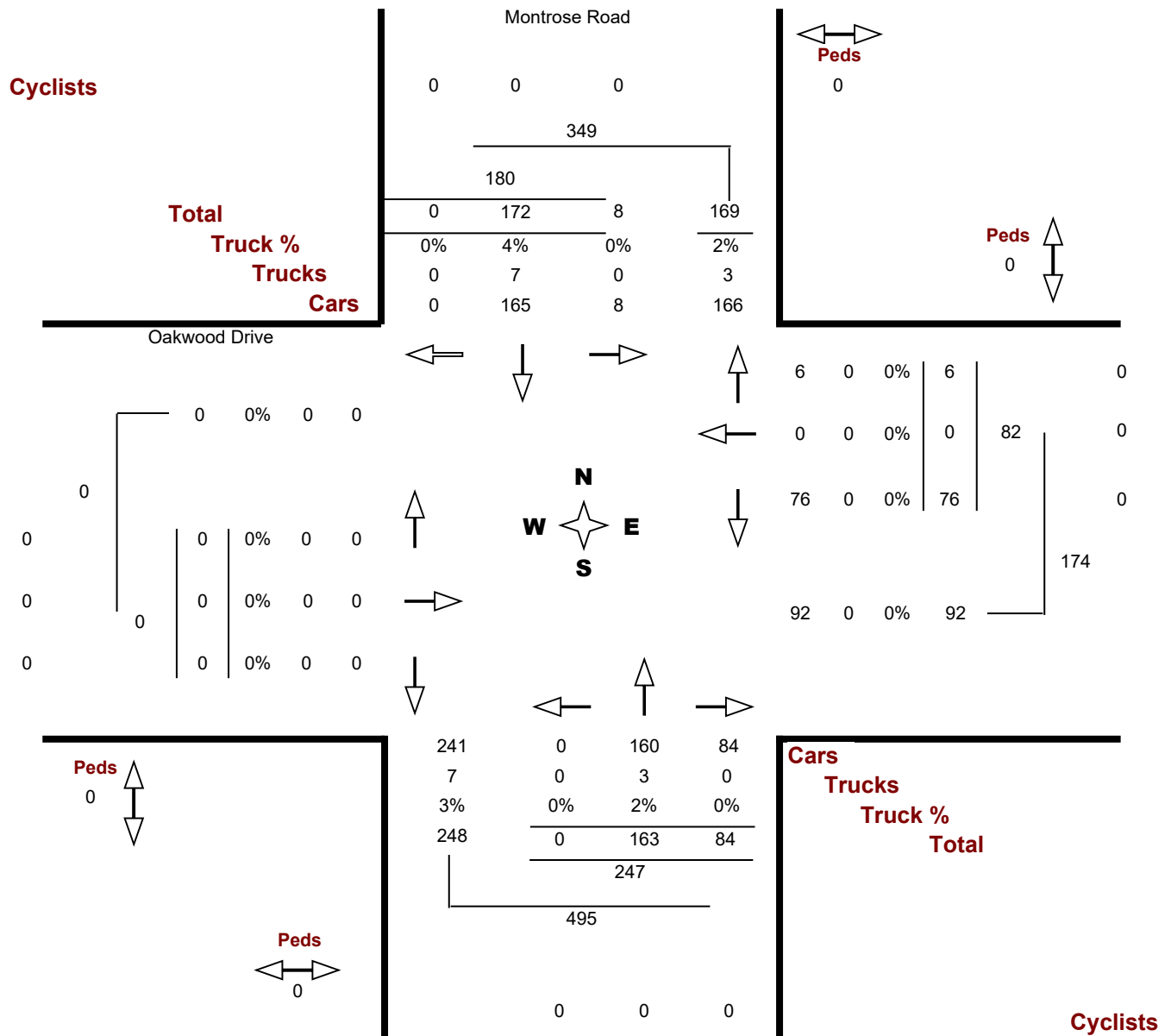
Count Date. Thursday, 10 February, 2011

Traffic Cont.

Count Time. 03:00 PM — 06:00 PM

Major Dir..... North south

Peak Hour.. 04:15 PM — 05:15 PM

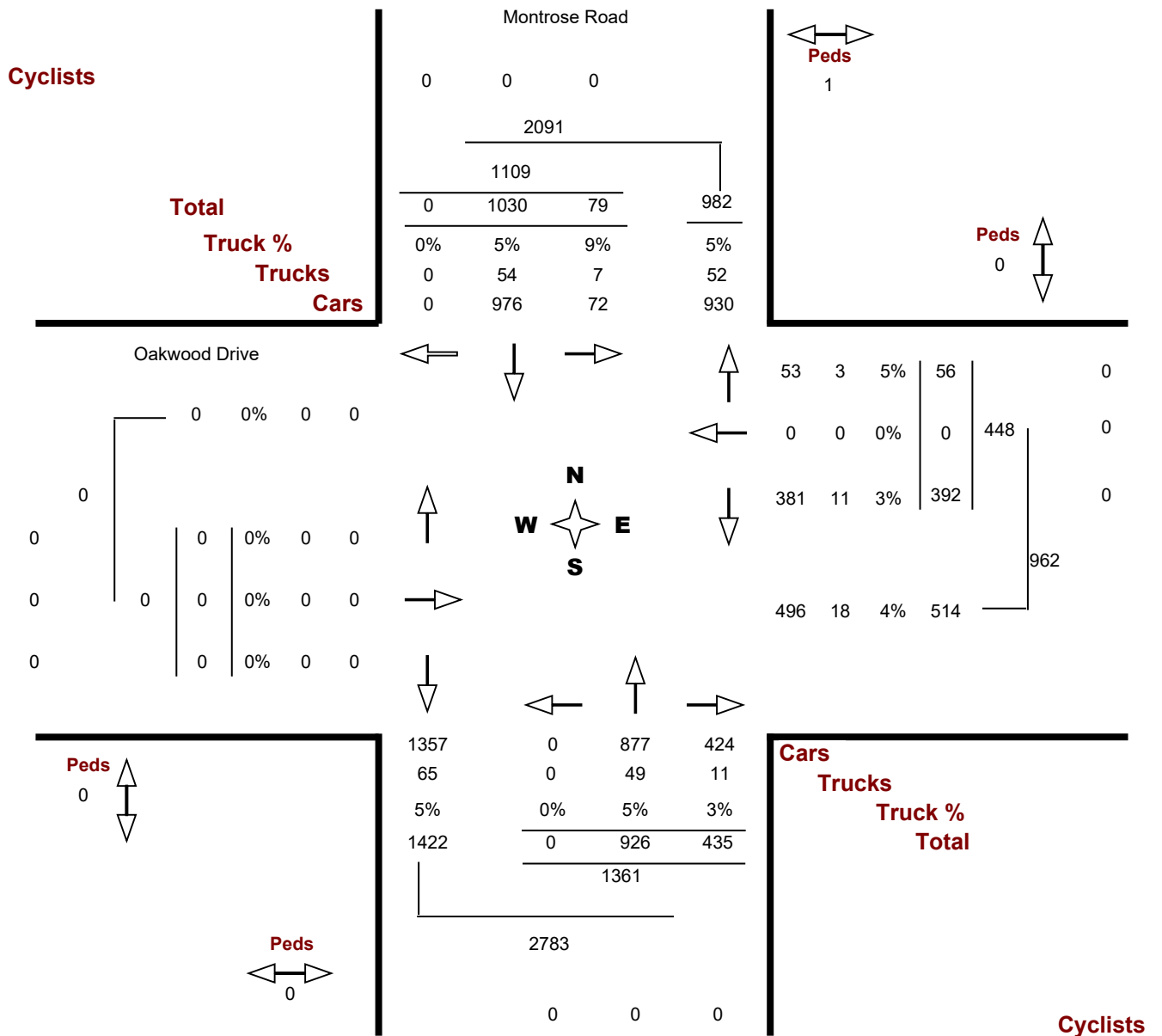


Location..... Montrose Road @ Oakwood Drive

Municipality..... NIAGARA FALLS

GeoID..... 01551

Count Date..... Thursday, 10 February, 2011



Turning Movement Count - Details Report (15 min)

Location..... Montrose Road @ Oakwood Drive

Municipality..... NIAGARA FALLS

Count Date..... Thursday, February 10, 2011

Montrose Road

Oakwood Drive

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00 07:15	0	12	0	0	12	0	14	7	0	21	5	0	3	0	8	0	0	0	0	0
07:15 07:30	3	12	0	0	15	0	10	10	0	20	6	0	0	0	6	0	0	0	0	0
07:30 07:45	3	27	0	0	30	0	22	11	0	33	4	0	1	0	5	0	0	0	0	0
07:45 08:00	0	35	0	0	35	0	29	16	0	45	9	0	3	0	12	0	0	0	0	0
Hourly Total	6	86	0	0	92	0	75	44	0	119	24	0	7	0	31	0	0	0	0	0
08:00 08:15	4	34	0	0	38	0	29	16	0	45	16	0	1	0	17	0	0	0	0	0
08:15 08:30	1	15	0	0	16	0	19	6	0	25	3	0	0	0	3	0	0	0	0	0
08:30 08:45	3	20	0	0	23	0	17	10	0	27	3	0	1	0	4	0	0	0	0	0
08:45 09:00	2	31	0	0	33	0	23	20	0	43	15	0	0	0	15	0	0	0	0	0
Hourly Total	10	100	0	0	110	0	88	52	0	140	37	0	2	0	39	0	0	0	0	0
11:00 11:15	2	18	0	0	20	0	17	5	0	22	12	0	2	0	14	0	0	0	0	0
11:15 11:30	0	18	0	0	18	0	31	12	0	43	6	0	1	0	7	0	0	0	0	0
11:30 11:45	1	29	0	0	30	0	28	8	0	36	10	0	1	0	11	0	0	0	0	0
11:45 12:00	4	29	0	0	33	0	32	13	0	45	6	0	2	0	8	0	0	0	0	0
Hourly Total	7	94	0	0	101	0	108	38	0	146	34	0	6	0	40	0	0	0	0	0
12:00 12:15	4	26	0	0	30	0	39	19	0	58	9	0	6	0	15	0	0	0	0	0
12:15 12:30	4	33	0	0	37	0	30	11	0	41	15	0	4	0	19	0	0	0	0	0
12:30 12:45	1	33	0	0	34	0	45	7	0	52	17	0	1	0	18	0	0	0	0	0
12:45 13:00	3	31	0	0	34	0	25	15	0	40	23	0	3	0	26	0	0	0	0	0
Hourly Total	12	123	0	0	135	0	139	52	0	191	64	0	14	0	78	0	0	0	0	0
13:00 13:15	2	40	0	0	42	0	32	15	0	47	16	0	0	0	16	0	0	0	0	0
13:15 13:30	1	31	0	0	32	0	22	7	0	29	10	0	3	0	13	0	0	0	0	0
13:30 13:45	4	32	0	0	36	0	34	8	0	42	12	0	1	0	13	0	0	0	0	0
13:45 14:00	1	40	0	0	41	0	21	12	0	33	12	0	1	0	13	0	0	0	0	0
Hourly Total	8	143	0	0	151	0	109	42	0	151	50	0	5	0	55	0	0	0	0	0
15:00 15:15	5	29	0	0	34	0	35	12	0	47	11	0	1	0	12	0	0	0	0	0
15:15 15:30	6	40	0	0	46	0	24	13	0	37	17	0	0	0	17	0	0	0	0	0
15:30 15:45	3	53	0	0	56	0	23	20	0	43	14	0	6	0	20	0	0	0	0	0
15:45 16:00	1	47	0	0	48	0	30	11	0	41	8	0	0	0	8	0	0	0	0	0
Hourly Total	15	169	0	0	184	0	112	56	0	168	50	0	7	0	57	0	0	0	0	0
16:00 16:15	6	46	0	0	52	0	27	20	0	47	10	0	5	0	15	0	0	0	0	0

Montrose Road

Oakwood Drive

North Approach

South Approach

East Approach

West Approach

Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:15 16:30	2	33	0	0	35	0	36	18	0	54	11	0	3	0	14	0	0	0	0	0
16:30 16:45	2	51	0	0	53	0	36	20	0	56	18	0	1	0	19	0	0	0	0	0
16:45 17:00	0	48	0	0	48	0	36	16	0	52	24	0	2	0	26	0	0	0	0	0
Hourly Total	10	178	0	0	188	0	135	74	0	209	63	0	11	0	74	0	0	0	0	0
17:00 17:15	4	40	0	0	44	0	55	30	0	85	23	0	0	0	23	0	0	0	0	0
17:15 17:30	1	32	0	0	33	0	33	17	0	50	18	0	1	0	19	0	0	0	0	0
17:30 17:45	2	45	0	0	47	0	30	19	0	49	18	0	2	0	20	0	0	0	0	0
17:45 18:00	4	20	0	0	24	0	42	11	0	53	11	0	1	0	12	0	0	0	0	0
Hourly Total	11	137	0	0	148	0	160	77	0	237	70	0	4	0	74	0	0	0	0	0
Grand Total	79	1030	0	0	1109	0	926	435	0	1361	392	0	56	0	448	0	0	0	0	0
Truck %	9%	5%	0%	0%	6%	0%	5%	3%	0%	4%	3%	0%	5%	0%	3%	0%	0%	0%	0%	0%

Signal Code: 049QEN

Intersection: RR49(McLEOD RD.) & QEW EAST OFFRAMP

Municipality: niagarafalls

Owner: mto

Last Modified: 2019-01-10 1:56:57 PM

Timing Parameters	EBD & WBD THRU McLEOD	NBD QEW EAST RAMP	n/a	n/a	n/a	n/a
Min Green	10	8	0	0	0	0
Walk	10	0	0	0	0	0
Ped Clearance	16	0	0	0	0	0
Vehicle Ext.	2.5	2.5	0	0	0	0
Max Green	44	20	0	0	0	0
Yellow	4.5	4.5	0	0	0	0
All Red	3.5	3.5	0	0	0	0

		Offset	
Minimum Cycle	34	0	
Pedestrian Cycle	34		
Maximum Cycle	80	7	
Operation	FA		

Installed On: 2018-03-07

Count Date: 2010-10-08

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

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Signal Code: 049QES

Intersection: RR49 (McLEOD RD.) & QEW WEST OFF RAMP

Municipality: niagarafalls

Owner: MTO

Last Modified: 2019-01-10 1:50:33 PM

Timing Parameters	WBD ADV McLEOD	EBD & WBD McLEOD	SBD QEW OFF RAMP	n/a	n/a	n/a
Min Green	6	20	10	0	0	0
Walk	0	10	14	0	0	0
Ped Clearance	0	16	25	0	0	0
Vehicle Ext.	2.5	2.5	2.5	0	0	0
Max Green	12	34	26	0	0	0
Yellow	3	4.8	5	0	0	0
All Red	0	3.5	3.7	0	0	0

Offset

Minimum Cycle	28.3	0
Pedestrian Cycle	34.3	
Maximum Cycle	92	0
Operation	FA	

Installed On: 2018-03-07

Count Date: --/--/----

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

Signal Code: OKWVLN

Intersection: OAKWOOD DR. & WALMART NORTH ENTRANCE

Municipality: niagarafalls

Owner: city

Last Modified: 2011-10-20 9:25:59 AM

Timing Parameters	NBD & SBD THRU OAKWOOD DR.	EBD THRU WALMART ENT.	n/a	n/a	n/a	n/a
Min Green	10	8	0	0	0	0
Walk	10	0	0	0	0	0
Ped Clearance	17	0	0	0	0	0
Vehicle Ext.	2.2	2.2	0	0	0	0
Max Green	35	25	0	0	0	0
Yellow	4.1	4.1	0	0	0	0
All Red	2.9	2.2	0	0	0	0

Offset

Minimum Cycle	31.3	0
Pedestrian Cycle	40.3	
Maximum Cycle	73.3	0
Operation	FA	

Installed On: 2010-11-30

Count Date: --/--/----

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

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Signal Code: OKWWLS

Intersection: OAKWOOD DR. & WALMART SOUTH ENTRANCE

Municipality: niagarafalls

Owner: city

Last Modified: 2011-10-20 9:23:30 AM

Timing Parameters	EBD ADVANCE OAKWOOD DR.	EBD & WBD THRU OAKWOOD DR.	NBD THRU (SPLIT)	SBD THRU WALMART ENT. (SPLIT)	n/a	n/a
Min Green	8	10	8	10	0	0
Walk	0	10	11	11	0	0
Ped Clearance	0	17	20	20	0	0
Vehicle Ext.	2.4	2.2	2.2	2.2	0	0
Max Green	15	35	15	25	0	0
Yellow	3	4.1	4.1	4.1	0	0
All Red	0	3.4	3.4	3.4	0	0

Offset

Minimum Cycle	33	0
Pedestrian Cycle	73	
Maximum Cycle	115.5	0
Operation	FA	

Installed On: 2010-11-30

Count Date: --/--/----

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

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Signal Code: 049OKW

Intersection: RR49 (McLEOD RD.) & OAKWOOD DR.

Municipality: niagarafalls

Owner: region

Last Modified: 2019-02-14 3:46:27 PM

Timing Parameters	EBD & WBD AVANCE McLEOD	EBD & WBD McLEOD	NBD OAKWOOD (SPLIT)	SBD OAKWOOD (SPLIT)	n/a	n/a
Min Green	6	10	8	8	0	0
Walk	0	12	14	16	0	0
Ped Clearance	0	20	25	28	0	0
Vehicle Ext.	2.5	2.5	2.5	2.5	0	0
Max Green	20	35	28	10	0	0
Yellow	3	4.1	4.1	4.1	0	0
All Red	0	3.5	4.2	4.2	0	0

Offset

Minimum Cycle	33.9	0
Pedestrian Cycle	91.9	
Maximum Cycle	120.2	0
Operation	FA	

Installed On: 2018-10-02

Count Date: --/--/----

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

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Signal Code: 098MCL

Intersection: RR98(Montrose Rd.) & McLeod Rd.

Municipality: niagarafalls

Owner: region

Last Modified: 2019-01-10 1:41:05 PM

Timing Parameters	EBD & WBD ADVANCE McLEOD RD.	EBD & WBD THRU McLEOD RD.	NBD & SBD ADVANCE MONTROSE RD.	NBD & SBD THRU MONTROSE RD.	n/a	n/a
Min Green	6	10	6	8	0	0
Walk	0	12	0	14	0	0
Ped Clearance	0	20	0	24	0	0
Vehicle Ext.	2.5	2.5	2.5	2.5	0	0
Max Green	10	40	20	29	0	0
Yellow	3	4.1	3	4.1	0	0
All Red	0	3.3	0	3.5	0	0

Offset

Minimum Cycle	33	0
Pedestrian Cycle	85	
Maximum Cycle	120	0
Operation	FA	

Installed On: 2018-03-07

Count Date: 2009-09-08

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

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Appendix C

Synchro Outputs

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Existing 2022
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	759	5	20	616	206	16	67	91	137	41	78
Future Volume (vph)	85	759	5	20	616	206	16	67	91	137	41	78
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98						
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1437	4595	0	1227	3264	1419	1681	1594	1319	1556	1475	1308
Flt Permitted	0.219			0.270			0.728			0.709		
Satd. Flow (perm)	331	4595	0	349	3264	1385	1288	1594	1319	1162	1475	1308
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				224			99			92
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	2					2						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%
Adj. Flow (vph)	92	825	5	22	670	224	17	73	99	149	45	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	830	0	22	670	224	17	73	99	149	45	85
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Existing 2022
AM Peak

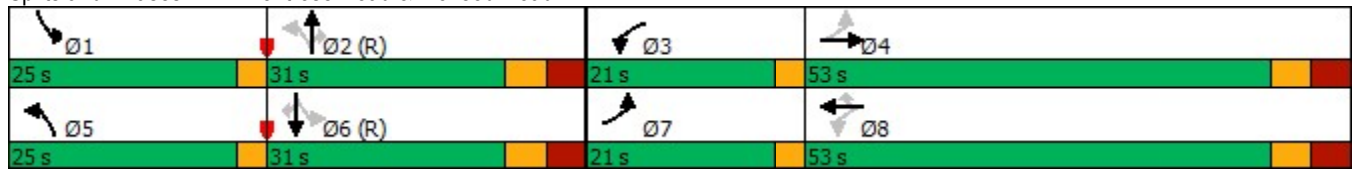


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.1	46.1
Total Split (s)	21.0	53.0		21.0	53.0	53.0	25.0	31.0	31.0	25.0	31.0	31.0
Total Split (%)	16.2%	40.8%		16.2%	40.8%	40.8%	19.2%	23.8%	23.8%	19.2%	23.8%	23.8%
Maximum Green (s)	18.0	45.0		18.0	45.0	45.0	22.0	23.0	23.0	22.0	23.0	23.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	56.6	45.5		53.6	38.0	38.0	71.3	56.2	56.2	75.4	66.6	66.6
Actuated g/C Ratio	0.44	0.35		0.41	0.29	0.29	0.55	0.43	0.43	0.58	0.51	0.51
v/c Ratio	0.34	0.52		0.10	0.70	0.40	0.02	0.11	0.16	0.21	0.06	0.12
Control Delay	23.7	34.4		19.0	44.8	5.9	15.1	27.0	6.4	15.4	21.2	4.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.7	34.4		19.0	44.8	5.9	15.1	27.0	6.4	15.4	21.2	4.7
LOS	C	C		B	D	A	B	C	A	B	C	A
Approach Delay		33.3			34.6			15.1			13.1	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 29.9 Intersection LOS: C
 Intersection Capacity Utilization 49.0% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Existing 2022

1: Montrose Road & McLeod Road

AM Peak





























Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	92	830	22	670	224	17	73	99	149	45	85
v/c Ratio	0.34	0.52	0.10	0.70	0.40	0.02	0.11	0.16	0.21	0.06	0.12
Control Delay	23.7	34.4	19.0	44.8	5.9	15.1	27.0	6.4	15.4	21.2	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.7	34.4	19.0	44.8	5.9	15.1	27.0	6.4	15.4	21.2	4.7
Queue Length 50th (m)	13.9	63.6	3.2	80.3	0.0	1.8	11.0	0.0	17.1	5.3	0.0
Queue Length 95th (m)	20.9	68.0	7.0	92.5	16.8	6.3	25.8	12.9	34.4	15.7	9.5
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	331	1756	300	1230	661	825	688	626	752	755	715
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.47	0.07	0.54	0.34	0.02	0.11	0.16	0.20	0.06	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Montrose Road & McLeod Road

Existing 2022
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			 							
Traffic Volume (vph)	85	759	5	20	616	206	16	67	91	137	41	78
Future Volume (vph)	85	759	5	20	616	206	16	67	91	137	41	78
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1436	4595		1227	3264	1385	1681	1594	1319	1556	1475	1308
Flt Permitted	0.22	1.00		0.27	1.00	1.00	0.73	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	331	4595		348	3264	1385	1288	1594	1319	1162	1475	1308
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	825	5	22	670	224	17	73	99	149	45	85
RTOR Reduction (vph)	0	1	0	0	0	156	0	0	57	0	0	43
Lane Group Flow (vph)	92	829	0	22	670	68	17	73	42	149	45	42
Confl. Peds. (#/hr)	2					2						
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	48.8	41.5		39.5	35.2	35.2	53.6	51.0	51.0	65.2	59.6	59.6
Effective Green, g (s)	52.8	45.5		47.5	39.2	39.2	61.6	55.0	55.0	69.2	63.6	63.6
Actuated g/C Ratio	0.41	0.35		0.37	0.30	0.30	0.47	0.42	0.42	0.53	0.49	0.49
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	258	1608		183	984	417	630	674	558	664	721	639
v/s Ratio Prot	c0.04	0.18		0.01	c0.21		0.00	0.05		c0.03	0.03	
v/s Ratio Perm	0.10			0.04		0.05	0.01		0.03	0.09		0.03
v/c Ratio	0.36	0.52		0.12	0.68	0.16	0.03	0.11	0.08	0.22	0.06	0.07
Uniform Delay, d1	25.8	33.5		26.8	39.9	33.3	18.2	22.7	22.3	15.7	17.5	17.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.2		0.2	1.8	0.1	0.0	0.3	0.3	0.1	0.2	0.2
Delay (s)	26.4	33.7		27.1	41.7	33.5	18.2	23.0	22.6	15.8	17.7	17.7
Level of Service	C	C		C	D	C	B	C	C	B	B	B
Approach Delay (s)		33.0			39.3			22.4			16.7	
Approach LOS		C			D			C			B	
Intersection Summary												
HCM 2000 Control Delay			32.7									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.35									
Actuated Cycle Length (s)			130.0									Sum of lost time (s) 6.0
Intersection Capacity Utilization			49.0%									ICU Level of Service A
Analysis Period (min)			15									

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑↑					↑↑	↑	↑
Traffic Volume (vph)	0	824	0	68	520	100	0	0	0	330	116	267
Future Volume (vph)	0	824	0	68	520	100	0	0	0	330	116	267
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00								
Frt					0.976						0.936	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4473	1769	1586	4351	0	0	0	0	3048	1464	1374
Flt Permitted				0.277						0.950		
Satd. Flow (perm)	0	4473	1769	462	4351	0	0	0	0	3048	1464	1374
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					73						43	197
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Adj. Flow (vph)	0	896	0	74	565	109	0	0	0	359	126	290
Shared Lane Traffic (%)												32%
Lane Group Flow (vph)	0	896	0	74	674	0	0	0	0	359	219	197
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

Lanes, Volumes, Timings
 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Existing 2022
 AM Peak

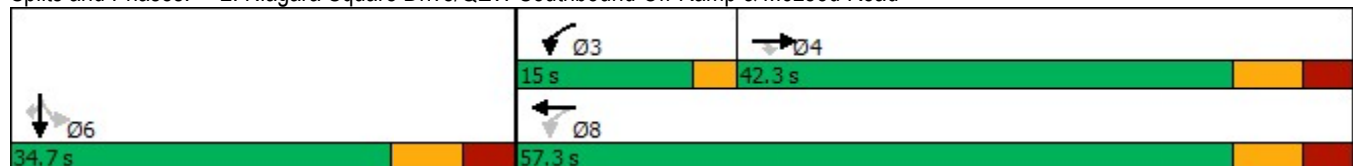


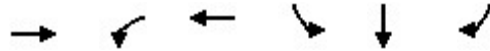
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		42.3	42.3	15.0	57.3					34.7	34.7	34.7
Total Split (%)		46.0%	46.0%	16.3%	62.3%					37.7%	37.7%	37.7%
Maximum Green (s)		34.0	34.0	12.0	49.0					26.0	26.0	26.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	-4.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	4.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		26.6		37.4	31.9					19.1	19.1	19.1
Actuated g/C Ratio		0.44		0.62	0.53					0.32	0.32	0.32
v/c Ratio		0.45		0.15	0.29					0.37	0.45	0.35
Control Delay		14.3		6.2	7.6					18.2	17.4	5.0
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		14.3		6.2	7.6					18.2	17.4	5.0
LOS		B		A	A					B	B	A
Approach Delay		14.3			7.5						14.6	
Approach LOS		B			A						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 60.3
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.45
 Intersection Signal Delay: 12.3
 Intersection LOS: B
 Intersection Capacity Utilization 45.8%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road





Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	896	74	674	359	219	197
v/c Ratio	0.45	0.15	0.29	0.37	0.45	0.35
Control Delay	14.3	6.2	7.6	18.2	17.4	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	6.2	7.6	18.2	17.4	5.0
Queue Length 50th (m)	25.3	2.5	10.9	15.9	16.0	0.0
Queue Length 95th (m)	48.5	9.3	23.6	30.9	39.7	13.4
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2936	597	3795	1579	779	806
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.12	0.18	0.23	0.28	0.24

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Existing 2022
AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	824	0	68	520	100	0	0	0	330	116	267
Future Volume (vph)	0	824	0	68	520	100	0	0	0	330	116	267
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.98					1.00	0.94	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4473		1586	4350					3048	1465	1374
Flt Permitted		1.00		0.28	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4473		462	4350					3048	1465	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	896	0	74	565	109	0	0	0	359	126	290
RTOR Reduction (vph)	0	0	0	0	33	0	0	0	0	0	30	136
Lane Group Flow (vph)	0	896	0	74	641	0	0	0	0	359	189	61
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		22.4		29.1	29.1					14.9	14.9	14.9
Effective Green, g (s)		26.4		33.1	33.1					18.9	18.9	18.9
Actuated g/C Ratio		0.43		0.54	0.54					0.31	0.31	0.31
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1935		392	2360					944	453	425
v/s Ratio Prot		c0.20		0.02	c0.15						c0.13	
v/s Ratio Perm				0.08						0.12		0.04
v/c Ratio		0.46		0.19	0.27					0.38	0.42	0.14
Uniform Delay, d1		12.3		6.7	7.5					16.5	16.7	15.2
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.1		0.2	0.0					0.2	0.5	0.1
Delay (s)		12.4		6.9	7.5					16.7	17.1	15.3
Level of Service		B		A	A					B	B	B
Approach Delay (s)		12.4			7.5			0.0			16.5	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			12.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			61.0			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			45.8%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Existing 2022
AM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	799	356	0	559	84	158
Future Volume (vph)	799	356	0	559	84	158
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Frt	0.954					0.850
Flt Protected					0.950	
Satd. Flow (prot)	4227	0	0	4473	3166	1446
Flt Permitted					0.950	
Satd. Flow (perm)	4227	0	0	4473	3166	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	252					162
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Adj. Flow (vph)	868	387	0	608	91	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1255	0	0	608	91	172
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Existing 2022
 AM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	52.0			52.0	28.0	28.0
Total Split (%)	65.0%			65.0%	35.0%	35.0%
Maximum Green (s)	44.0			44.0	20.0	20.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	27.2			27.2	12.6	12.6
Actuated g/C Ratio	0.57			0.57	0.26	0.26
v/c Ratio	0.50			0.24	0.11	0.34
Control Delay	5.6			5.5	14.3	6.1
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	5.6			5.5	14.3	6.1
LOS	A			A	B	A
Approach Delay	5.6			5.5	8.9	
Approach LOS	A			A	A	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 47.9
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.50
 Intersection Signal Delay: 6.0
 Intersection Capacity Utilization 42.7%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

Existing 2022
 AM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1255	608	91	172
v/c Ratio	0.50	0.24	0.11	0.34
Control Delay	5.6	5.5	14.3	6.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.6	5.5	14.3	6.1
Queue Length 50th (m)	14.2	7.6	2.6	0.6
Queue Length 95th (m)	24.3	13.2	8.0	12.5
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	4041	4264	1608	814
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	0.31	0.14	0.06	0.21
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
3: QEW Northbound Off-Ramp & McLeod Road

Existing 2022
AM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↔↔	↔
Traffic Volume (vph)	799	356	0	559	84	158
Future Volume (vph)	799	356	0	559	84	158
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.95			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4226			4473	3166	1446
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4226			4473	3166	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	868	387	0	608	91	172
RTOR Reduction (vph)	108	0	0	0	0	120
Lane Group Flow (vph)	1147	0	0	608	91	52
Confl. Peds. (#/hr)		1	1			
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	23.2			23.2	8.5	8.5
Effective Green, g (s)	27.2			27.2	12.5	12.5
Actuated g/C Ratio	0.57			0.57	0.26	0.26
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2409			2550	829	378
v/s Ratio Prot	c0.27			0.14	0.03	
v/s Ratio Perm						c0.04
v/c Ratio	0.48			0.24	0.11	0.14
Uniform Delay, d1	6.0			5.1	13.4	13.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.0	0.0	0.1
Delay (s)	6.2			5.1	13.4	13.6
Level of Service	A			A	B	B
Approach Delay (s)	6.2			5.1	13.5	
Approach LOS	A			A	B	

























Intersection Summary

HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Existing 2022
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	536	285	171	714	22	174	16	149	7	2	35
Future Volume (vph)	72	536	285	171	714	22	174	16	149	7	2	35
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		0.0	60.0		0.0	75.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00	1.00		1.00	1.00	0.99	1.00	0.99	
Frt			0.850		0.995				0.850		0.857	
Flt Protected	0.950			0.950			0.950	0.960		0.950		
Satd. Flow (prot)	1616	3233	1419	1648	3277	0	1566	1582	1475	1648	1469	0
Flt Permitted	0.264			0.348			0.950	0.960		0.950		
Satd. Flow (perm)	449	3233	1398	603	3277	0	1564	1581	1453	1644	1469	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			310		3				162		38	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		148.8			245.9			309.0			281.5	
Travel Time (s)		10.7			17.7			22.2			20.3	
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	78	583	310	186	776	24	189	17	162	8	2	38
Shared Lane Traffic (%)							46%					
Lane Group Flow (vph)	78	583	310	186	800	0	102	104	162	8	40	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Existing 2022
AM Peak

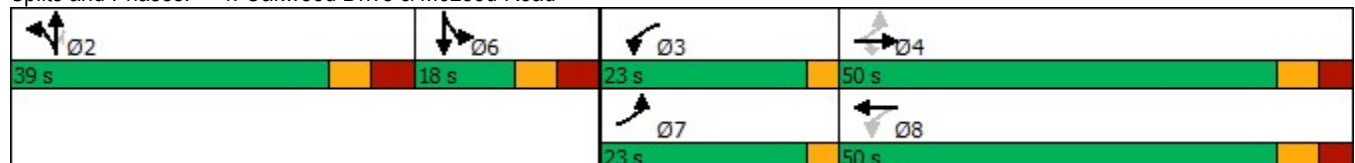


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4	8					2			
Detector Phase	7	4	4	3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6		47.3	47.3	47.3	52.3	52.3	
Total Split (s)	23.0	50.0	50.0	23.0	50.0		39.0	39.0	39.0	18.0	18.0	
Total Split (%)	17.7%	38.5%	38.5%	17.7%	38.5%		30.0%	30.0%	30.0%	13.8%	13.8%	
Maximum Green (s)	20.0	42.4	42.4	20.0	42.4		30.7	30.7	30.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1		4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5		4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6		4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min		None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0		14.0	14.0	14.0	16.0	16.0	
Flash Dont Walk (s)		20.0	20.0		20.0		25.0	25.0	25.0	28.0	28.0	
Pedestrian Calls (#/hr)		0	0		0		0	0	0	0	0	
Act Effct Green (s)	44.0	27.4	27.4	44.8	31.6		15.9	15.9	15.9	13.1	13.1	
Actuated g/C Ratio	0.61	0.38	0.38	0.62	0.44		0.22	0.22	0.22	0.18	0.18	
v/c Ratio	0.17	0.48	0.43	0.33	0.56		0.30	0.30	0.36	0.03	0.14	
Control Delay	8.7	20.5	4.7	9.7	19.8		31.8	31.9	8.3	35.0	14.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	8.7	20.5	4.7	9.7	19.8		31.8	31.9	8.3	35.0	14.8	
LOS	A	C	A	A	B		C	C	A	C	B	
Approach Delay		14.5			17.9			21.5			18.1	
Approach LOS		B			B			C			B	

Intersection Summary

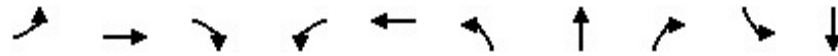
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 72.5
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 17.1
 Intersection LOS: B
 Intersection Capacity Utilization 52.0%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues
4: Oakwood Drive & McLeod Road

Existing 2022
AM Peak




























Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	78	583	310	186	800	102	104	162	8	40
v/c Ratio	0.17	0.48	0.43	0.33	0.56	0.30	0.30	0.36	0.03	0.14
Control Delay	8.7	20.5	4.7	9.7	19.8	31.8	31.9	8.3	35.0	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.7	20.5	4.7	9.7	19.8	31.8	31.9	8.3	35.0	14.8
Queue Length 50th (m)	4.9	35.6	0.0	12.5	50.6	14.0	14.3	0.0	1.0	0.3
Queue Length 95th (m)	12.1	59.4	16.4	25.9	79.7	32.7	33.2	15.9	5.5	9.7
Internal Link Dist (m)		124.8			221.9		285.0			257.5
Turn Bay Length (m)	30.0			60.0		75.0			20.0	
Base Capacity (vph)	698	2219	1056	749	2250	816	824	834	338	332
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	0.11	0.26	0.29	0.25	0.36	0.13	0.13	0.19	0.02	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Oakwood Drive & McLeod Road

Existing 2022
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	72	536	285	171	714	22	174	16	149	7	2	35
Future Volume (vph)	72	536	285	171	714	22	174	16	149	7	2	35
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6		4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3233	1400	1648	3279		1566	1582	1454	1648	1470	
Flt Permitted	0.26	1.00	1.00	0.35	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	449	3233	1400	604	3279		1566	1582	1454	1648	1470	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	583	310	186	776	24	189	17	162	8	2	38
RTOR Reduction (vph)	0	0	196	0	2	0	0	0	129	0	34	0
Lane Group Flow (vph)	78	583	114	186	798	0	102	104	33	8	6	0
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4	8					2			
Actuated Green, G (s)	29.9	24.0	24.0	36.1	27.2		11.5	11.5	11.5	4.1	4.1	
Effective Green, g (s)	37.9	28.0	28.0	40.1	31.2		15.5	15.5	15.5	8.1	8.1	
Actuated g/C Ratio	0.50	0.37	0.37	0.53	0.41		0.20	0.20	0.20	0.11	0.11	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6		8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	376	1192	516	499	1347		319	323	296	175	156	
v/s Ratio Prot	0.03	0.18		c0.06	c0.24		0.07	c0.07		c0.00	0.00	
v/s Ratio Perm	0.08		0.08	0.13					0.02			
v/c Ratio	0.21	0.49	0.22	0.37	0.59		0.32	0.32	0.11	0.05	0.04	
Uniform Delay, d1	10.4	18.4	16.5	9.8	17.4		25.7	25.7	24.6	30.4	30.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.2	0.2	0.3	0.6		0.4	0.4	0.1	0.1	0.1	
Delay (s)	10.6	18.7	16.6	10.1	18.0		26.1	26.1	24.7	30.5	30.5	
Level of Service	B	B	B	B	B		C	C	C	C	C	
Approach Delay (s)		17.4			16.5			25.5			30.5	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			18.5			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			75.9			Sum of lost time (s)			11.2			
Intersection Capacity Utilization			52.0%			ICU Level of Service			A			
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Existing 2022
AM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	158	3	2	176	206	206
Future Volume (vph)	158	3	2	176	206	206
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Fr _t	0.998				0.925	
Fl _t Protected	0.953			0.999		
Satd. Flow (prot)	1650	0	0	3056	2962	0
Fl _t Permitted	0.953			0.952		
Satd. Flow (perm)	1650	0	0	2912	2962	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1				224	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			239.7	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Adj. Flow (vph)	172	3	2	191	224	224
Shared Lane Traffic (%)						
Lane Group Flow (vph)	175	0	0	193	448	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Existing 2022
AM Peak

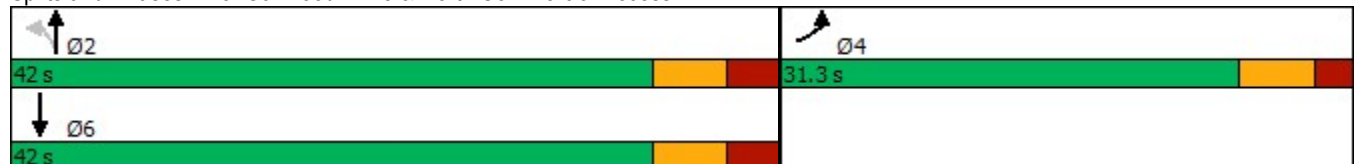


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	15.9			42.4	42.4	
Actuated g/C Ratio	0.25			0.67	0.67	
v/c Ratio	0.42			0.10	0.22	
Control Delay	22.1			4.6	2.6	
Queue Delay	0.0			0.0	0.0	
Total Delay	22.1			4.6	2.6	
LOS	C			A	A	
Approach Delay	22.1			4.6	2.6	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	63.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.42
Intersection Signal Delay:	7.3
Intersection LOS:	A
Intersection Capacity Utilization	29.7%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues
 5: Oakwood Drive & North Commercial Access

Existing 2022
 AM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	175	193	448
v/c Ratio	0.42	0.10	0.22
Control Delay	22.1	4.6	2.6
Queue Delay	0.0	0.0	0.0
Total Delay	22.1	4.6	2.6
Queue Length 50th (m)	15.7	3.3	4.0
Queue Length 95th (m)	30.0	8.1	10.5
Internal Link Dist (m)	45.0	215.7	285.0
Turn Bay Length (m)			
Base Capacity (vph)	754	1940	2048
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.23	0.10	0.22
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Existing 2022
AM Peak



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	158	3	2	176	206	206
Future Volume (vph)	158	3	2	176	206	206
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.93	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1650			3058	2962	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1650			2912	2962	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	172	3	2	191	224	224
RTOR Reduction (vph)	1	0	0	0	75	0
Lane Group Flow (vph)	174	0	0	193	373	0
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	11.9			38.4	38.4	
Effective Green, g (s)	15.9			42.4	42.4	
Actuated g/C Ratio	0.25			0.67	0.67	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	412			1941	1974	
v/s Ratio Prot	c0.11				c0.13	
v/s Ratio Perm				0.07		
v/c Ratio	0.42			0.10	0.19	
Uniform Delay, d1	20.0			3.8	4.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.7			0.1	0.2	
Delay (s)	20.7			3.9	4.3	
Level of Service	C			A	A	
Approach Delay (s)	20.7			3.9	4.3	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	5.3
Intersection Capacity Utilization	29.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Oakwood Drive & South Commercial Access

Existing 2022
AM Peak



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	134	139	7	37	20
Future Volume (vph)	25	134	139	7	37	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	1.00
Fr _t				0.850		0.850
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1616	1638	1669	1367	2965	1504
Fl _t Permitted	0.644				0.950	
Satd. Flow (perm)	1096	1638	1669	1367	2965	1504
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				8		22
Link Speed (k/h)		50	50		48	
Link Distance (m)		272.4	119.4		82.8	
Travel Time (s)		19.6	8.6		6.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	8%	6%	10%	10%	0%
Adj. Flow (vph)	27	146	151	8	40	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	146	151	8	40	22
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		7.4	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (m)	6.1	30.5	30.5	6.1	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	1.8	6.1	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7	28.7			
Detector 2 Size(m)		1.8	1.8			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Detector Phase	7	4	8	8	6	6
Switch Phase						

Lanes, Volumes, Timings
6: Oakwood Drive & South Commercial Access

Existing 2022
AM Peak

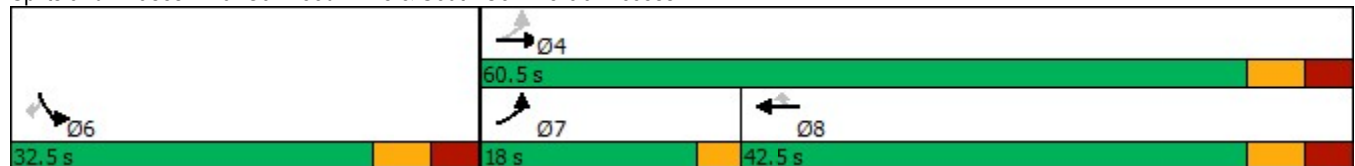


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Initial (s)	8.0	21.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	34.5	34.5	34.5	38.5	38.5
Total Split (s)	18.0	60.5	42.5	42.5	32.5	32.5
Total Split (%)	19.4%	65.1%	45.7%	45.7%	34.9%	34.9%
Maximum Green (s)	15.0	53.0	35.0	35.0	25.0	25.0
Yellow Time (s)	3.0	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	0.0	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5	3.5	3.5	3.5	3.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max	Max	Max	Max
Walk Time (s)		10.0	10.0	10.0	11.0	11.0
Flash Dont Walk (s)		17.0	17.0	17.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effect Green (s)	61.5	57.0	39.0	39.0	35.0	35.0
Actuated g/C Ratio	0.62	0.58	0.39	0.39	0.35	0.35
v/c Ratio	0.03	0.15	0.23	0.01	0.04	0.04
Control Delay	7.4	10.3	21.2	10.4	21.2	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.4	10.3	21.2	10.4	21.2	8.8
LOS	A	B	C	B	C	A
Approach Delay		9.9	20.7		16.8	
Approach LOS		A	C		B	

Intersection Summary

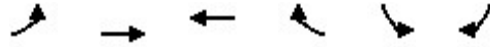
Area Type:	Other
Cycle Length:	93
Actuated Cycle Length:	99
Natural Cycle:	85
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.23
Intersection Signal Delay:	15.3
Intersection LOS:	B
Intersection Capacity Utilization	33.3%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 6: Oakwood Drive & South Commercial Access



Queues
6: Oakwood Drive & South Commercial Access

Existing 2022
AM Peak



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	27	146	151	8	40	22
v/c Ratio	0.03	0.15	0.23	0.01	0.04	0.04
Control Delay	7.4	10.3	21.2	10.4	21.2	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.4	10.3	21.2	10.4	21.2	8.8
Queue Length 50th (m)	1.8	12.2	18.9	0.0	2.5	0.0
Queue Length 95th (m)	4.9	21.3	32.9	2.8	6.0	5.0
Internal Link Dist (m)		248.4	95.4		58.8	
Turn Bay Length (m)						
Base Capacity (vph)	780	943	657	543	1048	545
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.15	0.23	0.01	0.04	0.04
Intersection Summary						

HCM Signalized Intersection Capacity Analysis
6: Oakwood Drive & South Commercial Access

Existing 2022
AM Peak












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	134	139	7	37	20
Future Volume (vph)	25	134	139	7	37	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1616	1638	1669	1367	2965	1504
Flt Permitted	0.64	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1095	1638	1669	1367	2965	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	146	151	8	40	22
RTOR Reduction (vph)	0	0	0	5	0	14
Lane Group Flow (vph)	27	146	151	3	40	8
Heavy Vehicles (%)	4%	8%	6%	10%	10%	0%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	53.0	53.0	35.0	35.0	31.0	31.0
Effective Green, g (s)	57.0	57.0	39.0	39.0	35.0	35.0
Actuated g/C Ratio	0.58	0.58	0.39	0.39	0.35	0.35
Clearance Time (s)	3.0	7.5	7.5	7.5	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	730	943	657	538	1048	531
v/s Ratio Prot	0.01	c0.09	c0.09		c0.01	
v/s Ratio Perm	0.01			0.00		0.01
v/c Ratio	0.04	0.15	0.23	0.01	0.04	0.01
Uniform Delay, d1	9.1	9.8	20.0	18.2	21.0	20.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.3	0.8	0.0	0.1	0.1
Delay (s)	9.2	10.1	20.8	18.2	21.0	20.8
Level of Service	A	B	C	B	C	C
Approach Delay (s)		10.0	20.7		21.0	
Approach LOS		A	C		C	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Existing 2022
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	39	6	123	60	9	138
Future Volume (vph)	39	6	123	60	9	138
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.981		0.956			
Flt Protected	0.959					0.997
Satd. Flow (prot)	1653	0	1576	0	0	1711
Flt Permitted	0.959					0.997
Satd. Flow (perm)	1653	0	1576	0	0	1711
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	8%	6%	5%	3%
Adj. Flow (vph)	42	7	134	65	10	150
Shared Lane Traffic (%)						
Lane Group Flow (vph)	49	0	199	0	0	160
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	25.9%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive




























Existing 2022
AM Peak



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	39	6	123	60	9	138
Future Volume (Veh/h)	39	6	123	60	9	138
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	7	134	65	10	150
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	336	166			199	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	336	166			199	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	99			99	
cM capacity (veh/h)	658	870			1356	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	49	199	160			
Volume Left	42	0	10			
Volume Right	7	65	0			
cSH	682	1700	1356			
Volume to Capacity	0.07	0.12	0.01			
Queue Length 95th (m)	1.8	0.0	0.2			
Control Delay (s)	10.7	0.0	0.5			
Lane LOS	B		A			
Approach Delay (s)	10.7	0.0	0.5			
Approach LOS	B					
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			25.9%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Existing 2022
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			 						 	
Traffic Volume (vph)	84	704	29	83	811	257	26	102	206	322	127	84
Future Volume (vph)	84	704	29	83	811	257	26	102	206	322	127	84
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.97						
Frt		0.994				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1514	4617	0	1542	3296	1460	1681	1685	1475	1664	1669	1446
Flt Permitted	0.151			0.261			0.669			0.668		
Satd. Flow (perm)	240	4617	0	424	3296	1411	1184	1685	1475	1170	1669	1446
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				279			218			92
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	7					7						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%
Adj. Flow (vph)	91	765	32	90	882	279	28	111	224	350	138	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	91	797	0	90	882	279	28	111	224	350	138	91
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Existing 2022
PM Peak

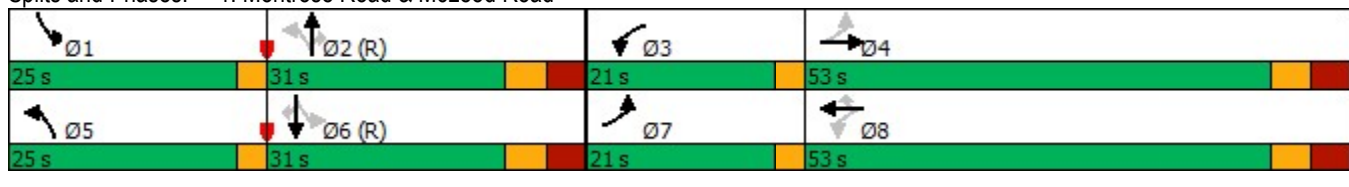


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.0	46.0
Total Split (s)	21.0	53.0		21.0	53.0	53.0	25.0	31.0	31.0	25.0	31.0	31.0
Total Split (%)	16.2%	40.8%		16.2%	40.8%	40.8%	19.2%	23.8%	23.8%	19.2%	23.8%	23.8%
Maximum Green (s)	18.0	45.0		18.0	45.0	45.0	22.0	23.0	23.0	22.0	23.0	23.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	64.6	47.7		64.1	46.4	46.4	54.7	39.2	39.2	67.4	56.5	56.5
Actuated g/C Ratio	0.50	0.37		0.49	0.36	0.36	0.42	0.30	0.30	0.52	0.43	0.43
v/c Ratio	0.35	0.47		0.28	0.75	0.41	0.05	0.22	0.38	0.50	0.19	0.13
Control Delay	19.6	31.6		18.0	40.7	4.7	19.7	40.0	8.0	23.9	27.4	6.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	31.6		18.0	40.7	4.7	19.7	40.0	8.0	23.9	27.4	6.3
LOS	B	C		B	D	A	B	D	A	C	C	A
Approach Delay		30.4			31.0			18.7			21.9	
Approach LOS		C			C			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 27.7
 Intersection LOS: C
 Intersection Capacity Utilization 65.9%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Existing 2022

1: Montrose Road & McLeod Road

PM Peak





























Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	91	797	90	882	279	28	111	224	350	138	91
v/c Ratio	0.35	0.47	0.28	0.75	0.41	0.05	0.22	0.38	0.50	0.19	0.13
Control Delay	19.6	31.6	18.0	40.7	4.7	19.7	40.0	8.0	23.9	27.4	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	31.6	18.0	40.7	4.7	19.7	40.0	8.0	23.9	27.4	6.3
Queue Length 50th (m)	12.0	56.0	11.8	102.8	0.0	3.5	21.9	1.1	53.7	22.7	0.0
Queue Length 95th (m)	18.1	61.5	17.8	116.8	16.6	9.9	41.8	22.9	90.3	43.4	11.9
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	335	1815	399	1270	715	706	507	596	708	724	680
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.44	0.23	0.69	0.39	0.04	0.22	0.38	0.49	0.19	0.13

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Montrose Road & McLeod Road

Existing 2022
PM Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		  			 								
Traffic Volume (vph)	84	704	29	83	811	257	26	102	206	322	127	84	
Future Volume (vph)	84	704	29	83	811	257	26	102	206	322	127	84	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1514	4617		1542	3296	1411	1681	1685	1475	1664	1669	1446	
Flt Permitted	0.15	1.00		0.26	1.00	1.00	0.67	1.00	1.00	0.67	1.00	1.00	
Satd. Flow (perm)	241	4617		424	3296	1411	1184	1685	1475	1170	1669	1446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	91	765	32	90	882	279	28	111	224	350	138	91	
RTOR Reduction (vph)	0	3	0	0	0	179	0	0	152	0	0	52	
Lane Group Flow (vph)	91	794	0	90	882	100	28	111	72	350	138	39	
Confl. Peds. (#/hr)	7					7							
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	53.9	43.7		51.3	42.4	42.4	39.3	35.2	35.2	58.4	51.3	51.3	
Effective Green, g (s)	59.6	47.7		59.3	46.4	46.4	47.3	39.2	39.2	62.4	55.3	55.3	
Actuated g/C Ratio	0.46	0.37		0.46	0.36	0.36	0.36	0.30	0.30	0.48	0.43	0.43	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	249	1694		304	1176	503	461	508	444	653	709	615	
v/s Ratio Prot	c0.04	0.17		0.03	c0.27		0.00	0.07		c0.10	0.08		
v/s Ratio Perm	0.13			0.11		0.07	0.02		0.05	0.16		0.03	
v/c Ratio	0.37	0.47		0.30	0.75	0.20	0.06	0.22	0.16	0.54	0.19	0.06	
Uniform Delay, d1	23.0	31.5		20.9	36.7	28.9	26.8	33.9	33.3	22.3	23.4	22.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.1		0.4	2.6	0.1	0.0	1.0	0.8	0.7	0.6	0.2	
Delay (s)	23.7	31.6		21.3	39.3	29.1	26.8	34.9	34.1	22.9	24.0	22.2	
Level of Service	C	C		C	D	C	C	C	C	C	C	C	
Approach Delay (s)		30.8			35.7			33.8			23.1		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			31.7									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.53										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			65.9%									ICU Level of Service	C
Analysis Period (min)			15										

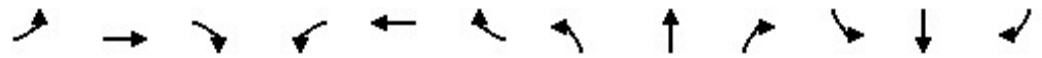
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖↗	↗	↖
Traffic Volume (vph)	0	1030	0	102	672	138	0	0	0	477	110	278
Future Volume (vph)	0	1030	0	102	672	138	0	0	0	477	110	278
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00	1.00							
Frt					0.974						0.932	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4736	1769	1616	4533	0	0	0	0	3136	1528	1401
Flt Permitted				0.188						0.950		
Satd. Flow (perm)	0	4736	1769	320	4533	0	0	0	0	3136	1528	1401
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					81						48	202
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)	3		3	3		3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Adj. Flow (vph)	0	1120	0	111	730	150	0	0	0	518	120	302
Shared Lane Traffic (%)												33%
Lane Group Flow (vph)	0	1120	0	111	880	0	0	0	0	518	220	202
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

Lanes, Volumes, Timings
 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Existing 2022
 PM Peak

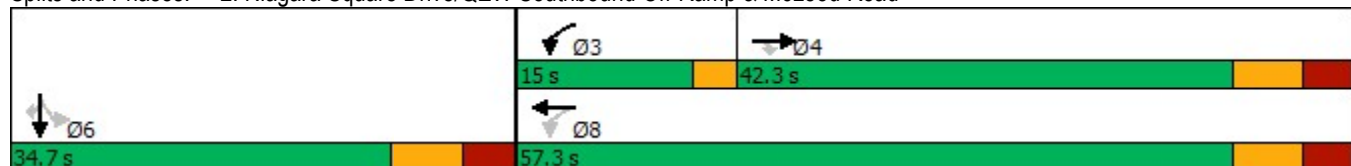


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		42.3	42.3	15.0	57.3					34.7	34.7	34.7
Total Split (%)		46.0%	46.0%	16.3%	62.3%					37.7%	37.7%	37.7%
Maximum Green (s)		34.0	34.0	12.0	49.0					26.0	26.0	26.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	-4.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	4.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		30.0		43.4	37.9					22.1	22.1	22.1
Actuated g/C Ratio		0.43		0.63	0.55					0.32	0.32	0.32
v/c Ratio		0.55		0.27	0.35					0.52	0.42	0.35
Control Delay		17.2		7.7	8.6					22.5	18.7	5.2
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		17.2		7.7	8.6					22.5	18.7	5.2
LOS		B		A	A					C	B	A
Approach Delay		17.2			8.5						17.9	
Approach LOS		B			A						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 69.4
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.55
 Intersection Signal Delay: 14.6
 Intersection LOS: B
 Intersection Capacity Utilization 53.4%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

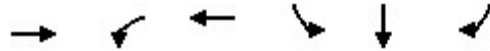


Queues

Existing 2022

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

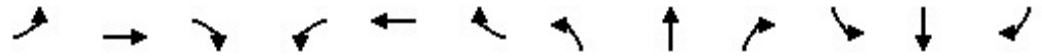
PM Peak



Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1120	111	880	518	220	202
v/c Ratio	0.55	0.27	0.35	0.52	0.42	0.35
Control Delay	17.2	7.7	8.6	22.5	18.7	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	7.7	8.6	22.5	18.7	5.2
Queue Length 50th (m)	39.9	5.1	19.0	27.8	17.7	0.0
Queue Length 95th (m)	64.6	13.3	32.6	50.6	43.5	14.6
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2726	514	3541	1425	720	746
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.22	0.25	0.36	0.31	0.27
Intersection Summary						

HCM Signalized Intersection Capacity Analysis
 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Existing 2022
 PM Peak

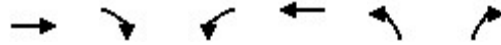


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	1030	0	102	672	138	0	0	0	477	110	278
Future Volume (vph)	0	1030	0	102	672	138	0	0	0	477	110	278
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.97					1.00	0.93	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4736		1616	4536					3136	1527	1401
Flt Permitted		1.00		0.19	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4736		321	4536					3136	1527	1401
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1120	0	111	730	150	0	0	0	518	120	302
RTOR Reduction (vph)	0	0	0	0	36	0	0	0	0	0	33	138
Lane Group Flow (vph)	0	1120	0	111	844	0	0	0	0	518	187	64
Confl. Peds. (#/hr)	3		3	3		3						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		25.7		34.3	34.3					17.9	17.9	17.9
Effective Green, g (s)		29.7		38.3	38.3					21.9	21.9	21.9
Actuated g/C Ratio		0.43		0.55	0.55					0.32	0.32	0.32
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		2032		357	2510					992	483	443
v/s Ratio Prot		c0.24		0.04	c0.19						0.12	
v/s Ratio Perm				0.13						c0.17		0.05
v/c Ratio		0.55		0.31	0.34					0.52	0.39	0.14
Uniform Delay, d1		14.8		7.8	8.5					19.4	18.4	16.9
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.3		0.4	0.1					0.4	0.4	0.1
Delay (s)		15.0		8.2	8.5					19.7	18.8	17.0
Level of Service		B		A	A					B	B	B
Approach Delay (s)		15.0			8.5			0.0			18.9	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			14.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			69.2			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			53.4%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

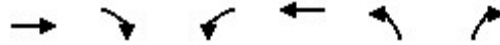
Existing 2022
PM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1099	366	0	839	113	160
Future Volume (vph)	1099	366	0	839	113	160
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Frt	0.963					0.850
Flt Protected					0.950	
Satd. Flow (prot)	4467	0	0	4690	3197	1489
Flt Permitted					0.950	
Satd. Flow (perm)	4467	0	0	4690	3197	1489
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	187					76
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Adj. Flow (vph)	1195	398	0	912	123	174
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1593	0	0	912	123	174
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Existing 2022
 PM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	52.0			52.0	28.0	28.0
Total Split (%)	65.0%			65.0%	35.0%	35.0%
Maximum Green (s)	44.0			44.0	20.0	20.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	36.1			36.1	14.4	14.4
Actuated g/C Ratio	0.61			0.61	0.25	0.25
v/c Ratio	0.56			0.32	0.16	0.41
Control Delay	6.7			5.8	19.3	15.3
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	6.7			5.8	19.3	15.3
LOS	A			A	B	B
Approach Delay	6.7			5.8	16.9	
Approach LOS	A			A	B	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 58.7
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 7.5
 Intersection Capacity Utilization 49.4%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

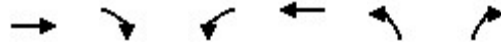
Existing 2022
 PM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1593	912	123	174
v/c Ratio	0.56	0.32	0.16	0.41
Control Delay	6.7	5.8	19.3	15.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.7	5.8	19.3	15.3
Queue Length 50th (m)	23.6	13.0	4.8	7.7
Queue Length 95th (m)	46.1	25.2	13.1	27.1
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3777	3934	1340	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	0.42	0.23	0.09	0.26
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
 3: QEW Northbound Off-Ramp & McLeod Road

Existing 2022
 PM Peak

























Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1099	366	0	839	113	160
Future Volume (vph)	1099	366	0	839	113	160
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.96			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4466			4690	3197	1489
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4466			4690	3197	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1195	398	0	912	123	174
RTOR Reduction (vph)	72	0	0	0	0	57
Lane Group Flow (vph)	1521	0	0	912	123	117
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	32.0			32.0	10.3	10.3
Effective Green, g (s)	36.0			36.0	14.3	14.3
Actuated g/C Ratio	0.62			0.62	0.25	0.25
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2757			2896	784	365
v/s Ratio Prot	c0.34			0.19	0.04	
v/s Ratio Perm						c0.08
v/c Ratio	0.55			0.31	0.16	0.32
Uniform Delay, d1	6.5			5.3	17.3	18.0
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.2			0.0	0.1	0.4
Delay (s)	6.7			5.3	17.3	18.4
Level of Service	A			A	B	B
Approach Delay (s)	6.7			5.3	18.0	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Existing 2022
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	821	415	271	975	27	426	11	337	22	18	78
Future Volume (vph)	57	821	415	271	975	27	426	11	337	22	18	78
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		0.0	75.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98	1.00	1.00		1.00	1.00	0.99	1.00	0.99	
Frt			0.850		0.996				0.850		0.879	
Flt Protected	0.950			0.950			0.950	0.955		0.950		
Satd. Flow (prot)	1616	3264	1475	1632	3279	0	1566	1575	1460	1681	1474	0
Flt Permitted	0.171			0.160			0.950	0.955		0.950		
Satd. Flow (perm)	291	3264	1452	275	3279	0	1558	1569	1441	1680	1474	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			451		2				366		85	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		148.8			245.9			309.0			281.5	
Travel Time (s)		10.7			17.7			22.2			20.3	
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Adj. Flow (vph)	62	892	451	295	1060	29	463	12	366	24	20	85
Shared Lane Traffic (%)							49%					
Lane Group Flow (vph)	62	892	451	295	1089	0	236	239	366	24	105	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Existing 2022
PM Peak

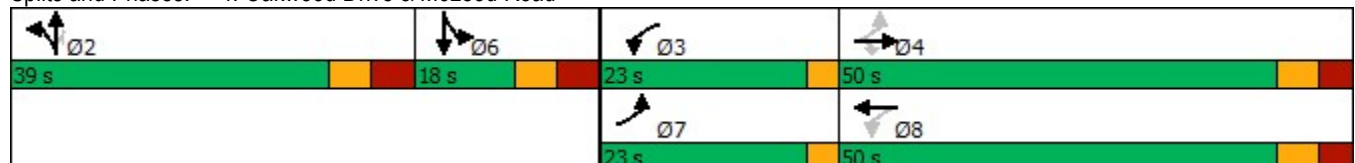


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4	8					2			
Detector Phase	7	4	4	3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6		47.3	47.3	47.3	52.3	52.3	
Total Split (s)	23.0	50.0	50.0	23.0	50.0		39.0	39.0	39.0	18.0	18.0	
Total Split (%)	17.7%	38.5%	38.5%	17.7%	38.5%		30.0%	30.0%	30.0%	13.8%	13.8%	
Maximum Green (s)	20.0	42.4	42.4	20.0	42.4		30.7	30.7	30.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1		4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5		4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6		4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min		None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0		14.0	14.0	14.0	16.0	16.0	
Flash Dont Walk (s)		20.0	20.0		20.0		25.0	25.0	25.0	28.0	28.0	
Pedestrian Calls (#/hr)		0	0		0		0	0	0	0	0	
Act Effct Green (s)	57.5	41.3	41.3	65.0	52.3		27.1	27.1	27.1	12.9	12.9	
Actuated g/C Ratio	0.51	0.37	0.37	0.58	0.46		0.24	0.24	0.24	0.11	0.11	
v/c Ratio	0.22	0.75	0.55	0.74	0.72		0.63	0.63	0.59	0.12	0.43	
Control Delay	14.1	36.9	5.5	30.8	29.0		47.9	48.0	8.0	53.1	22.4	
Queue Delay	0.0	0.7	0.1	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	14.1	37.7	5.6	30.8	29.0		47.9	48.0	8.0	53.1	22.4	
LOS	B	D	A	C	C		D	D	A	D	C	
Approach Delay		26.3			29.4			30.6			28.1	
Approach LOS		C			C			C			C	

Intersection Summary

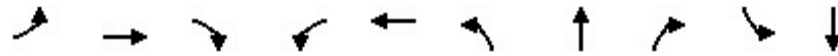
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 112.8
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 28.5
 Intersection LOS: C
 Intersection Capacity Utilization 71.6%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues
4: Oakwood Drive & McLeod Road

Existing 2022
PM Peak




























Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	62	892	451	295	1089	236	239	366	24	105
v/c Ratio	0.22	0.75	0.55	0.74	0.72	0.63	0.63	0.59	0.12	0.43
Control Delay	14.1	36.9	5.5	30.8	29.0	47.9	48.0	8.0	53.1	22.4
Queue Delay	0.0	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	37.7	5.6	30.8	29.0	47.9	48.0	8.0	53.1	22.4
Queue Length 50th (m)	5.8	93.1	0.0	34.9	103.3	52.9	53.6	0.0	5.3	4.4
Queue Length 95th (m)	13.3	130.8	23.4	73.4	147.6	83.6	84.8	25.0	14.2	22.6
Internal Link Dist (m)		124.8			221.9		285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		75.0			20.0	
Base Capacity (vph)	458	1384	875	456	1567	496	499	706	210	258
Starvation Cap Reductn	0	207	52	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	0.14	0.76	0.55	0.65	0.69	0.48	0.48	0.52	0.11	0.41

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Oakwood Drive & McLeod Road

Existing 2022
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	57	821	415	271	975	27	426	11	337	22	18	78
Future Volume (vph)	57	821	415	271	975	27	426	11	337	22	18	78
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6		4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3264	1452	1632	3279		1566	1575	1441	1681	1474	
Flt Permitted	0.17	1.00	1.00	0.16	1.00		0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	292	3264	1452	275	3279		1566	1575	1441	1681	1474	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	892	451	295	1060	29	463	12	366	24	20	85
RTOR Reduction (vph)	0	0	283	0	1	0	0	0	279	0	75	0
Lane Group Flow (vph)	62	892	168	295	1088	0	236	239	87	24	30	0
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4	8					2			
Actuated Green, G (s)	43.6	37.9	37.9	56.8	48.1		22.9	22.9	22.9	8.8	8.8	
Effective Green, g (s)	51.6	41.9	41.9	60.8	52.1		26.9	26.9	26.9	12.8	12.8	
Actuated g/C Ratio	0.46	0.37	0.37	0.54	0.46		0.24	0.24	0.24	0.11	0.11	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6		8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	247	1213	539	387	1515		373	375	343	190	167	
v/s Ratio Prot	0.02	0.27		c0.13	c0.33		0.15	c0.15		0.01	c0.02	
v/s Ratio Perm	0.09		0.12	0.28					0.06			
v/c Ratio	0.25	0.74	0.31	0.76	0.72		0.63	0.64	0.25	0.13	0.18	
Uniform Delay, d1	18.3	30.6	25.1	20.1	24.4		38.5	38.5	34.8	44.9	45.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	2.2	0.2	8.3	1.5		3.1	3.1	0.3	0.2	0.4	
Delay (s)	18.7	32.8	25.4	28.4	25.9		41.5	41.6	35.1	45.1	45.6	
Level of Service	B	C	C	C	C		D	D	D	D	D	
Approach Delay (s)		29.8			26.5			38.7			45.5	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			31.1				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			112.7				Sum of lost time (s)			11.2		
Intersection Capacity Utilization			71.6%				ICU Level of Service			C		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Existing 2022
PM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	345	8	1	325	279	330
Future Volume (vph)	345	8	1	325	279	330
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.997				0.919	
Flt Protected	0.953					
Satd. Flow (prot)	1681	0	0	3233	3048	0
Flt Permitted	0.953			0.954		
Satd. Flow (perm)	1681	0	0	3084	3048	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2				359	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			240.9	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Adj. Flow (vph)	375	9	1	353	303	359
Shared Lane Traffic (%)						
Lane Group Flow (vph)	384	0	0	354	662	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
 5: Oakwood Drive & North Commercial Access

Existing 2022
 PM Peak

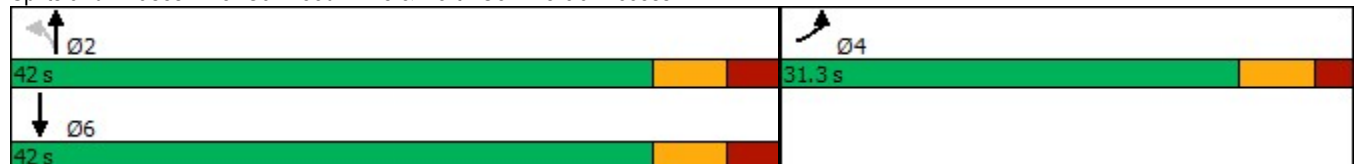


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	23.7			39.2	39.2	
Actuated g/C Ratio	0.35			0.57	0.57	
v/c Ratio	0.66			0.20	0.35	
Control Delay	24.5			8.1	4.3	
Queue Delay	0.0			0.0	0.0	
Total Delay	24.5			8.1	4.3	
LOS	C			A	A	
Approach Delay	24.5			8.1	4.3	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	68.2
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.66
Intersection Signal Delay:	10.8
Intersection LOS:	B
Intersection Capacity Utilization:	47.8%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues
 5: Oakwood Drive & North Commercial Access

Existing 2022
 PM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	384	354	662
v/c Ratio	0.66	0.20	0.35
Control Delay	24.5	8.1	4.3
Queue Delay	0.0	0.0	0.0
Total Delay	24.5	8.1	4.3
Queue Length 50th (m)	40.0	10.5	8.8
Queue Length 95th (m)	65.7	19.3	19.0
Internal Link Dist (m)	45.0	216.9	285.0
Turn Bay Length (m)			
Base Capacity (vph)	719	1772	1904
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.53	0.20	0.35
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Existing 2022
PM Peak



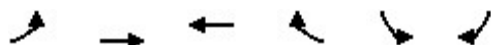
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	345	8	1	325	279	330
Future Volume (vph)	345	8	1	325	279	330
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.92	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1682			3233	3047	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1682			3084	3047	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	375	9	1	353	303	359
RTOR Reduction (vph)	1	0	0	0	152	0
Lane Group Flow (vph)	383	0	0	354	510	0
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Turn Type	Prot		Perm		NA	NA
Protected Phases	4				2	6
Permitted Phases			2			
Actuated Green, G (s)	19.6				35.2	35.2
Effective Green, g (s)	23.6				39.2	39.2
Actuated g/C Ratio	0.35				0.58	0.58
Clearance Time (s)	6.3				7.0	7.0
Vehicle Extension (s)	3.0				3.0	3.0
Lane Grp Cap (vph)	582				1775	1753
v/s Ratio Prot	c0.23					c0.17
v/s Ratio Perm					0.11	
v/c Ratio	0.66				0.20	0.29
Uniform Delay, d1	18.8				6.9	7.4
Progression Factor	1.00				1.00	1.00
Incremental Delay, d2	2.7				0.3	0.4
Delay (s)	21.5				7.2	7.8
Level of Service	C				A	A
Approach Delay (s)	21.5				7.2	7.8
Approach LOS	C				A	A

Intersection Summary

HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	68.1	Sum of lost time (s)	5.3
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Oakwood Drive & South Commercial Access

Existing 2022
PM Peak



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	46	134	137	30	159	77
Future Volume (vph)	46	134	137	30	159	77
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	1.00
Ped Bike Factor	1.00			0.98		
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1718	1718	1504	3076	1504
Flt Permitted	0.646				0.950	
Satd. Flow (perm)	1141	1718	1718	1471	3076	1504
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				33		84
Link Speed (k/h)		50	50		48	
Link Distance (m)		272.4	122.6		82.8	
Travel Time (s)		19.6	8.8		6.2	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	3%	0%	6%	0%
Adj. Flow (vph)	50	146	149	33	173	84
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	146	149	33	173	84
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		7.4	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (m)	6.1	30.5	30.5	6.1	6.1	6.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8	1.8	6.1	6.1	6.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7	28.7			
Detector 2 Size(m)		1.8	1.8			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6

Lanes, Volumes, Timings
6: Oakwood Drive & South Commercial Access

Existing 2022
PM Peak

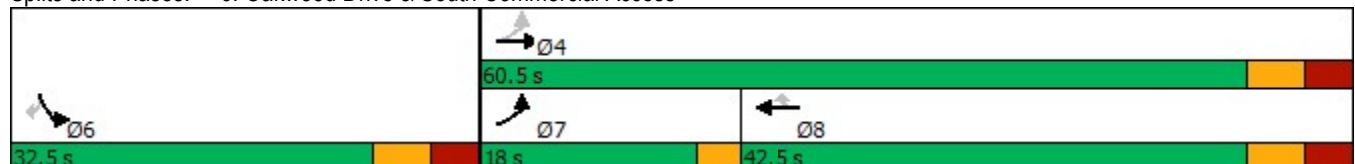


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	7	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	8.0	21.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	34.5	34.5	34.5	38.5	38.5
Total Split (s)	18.0	60.5	42.5	42.5	32.5	32.5
Total Split (%)	19.4%	65.1%	45.7%	45.7%	34.9%	34.9%
Maximum Green (s)	15.0	53.0	35.0	35.0	25.0	25.0
Yellow Time (s)	3.0	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	0.0	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5	3.5	3.5	3.5	3.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max	Max	Max	Max
Walk Time (s)		10.0	10.0	10.0	11.0	11.0
Flash Dont Walk (s)		17.0	17.0	17.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effect Green (s)	61.5	57.0	39.0	39.0	35.0	35.0
Actuated g/C Ratio	0.62	0.58	0.39	0.39	0.35	0.35
v/c Ratio	0.06	0.15	0.22	0.06	0.16	0.14
Control Delay	7.6	10.2	21.0	6.7	22.4	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.6	10.2	21.0	6.7	22.4	5.6
LOS	A	B	C	A	C	A
Approach Delay		9.6	18.4		17.0	
Approach LOS		A	B		B	

Intersection Summary

Area Type:	Other
Cycle Length:	93
Actuated Cycle Length:	99
Natural Cycle:	85
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.22
Intersection Signal Delay:	15.1
Intersection LOS:	B
Intersection Capacity Utilization:	47.5%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 6: Oakwood Drive & South Commercial Access



Queues
6: Oakwood Drive & South Commercial Access

Existing 2022
PM Peak

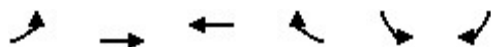


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	50	146	149	33	173	84
v/c Ratio	0.06	0.15	0.22	0.06	0.16	0.14
Control Delay	7.6	10.2	21.0	6.7	22.4	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.6	10.2	21.0	6.7	22.4	5.6
Queue Length 50th (m)	3.4	12.1	18.6	0.0	11.5	0.0
Queue Length 95th (m)	7.7	21.1	32.3	5.7	18.9	9.5
Internal Link Dist (m)		248.4	98.6		58.8	
Turn Bay Length (m)						
Base Capacity (vph)	812	989	676	599	1087	586
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.15	0.22	0.06	0.16	0.14
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

6: Oakwood Drive & South Commercial Access

Existing 2022
PM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	46	134	137	30	159	77
Future Volume (vph)	46	134	137	30	159	77
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1679	1718	1718	1471	3076	1504
Flt Permitted	0.65	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1142	1718	1718	1471	3076	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	146	149	33	173	84
RTOR Reduction (vph)	0	0	0	20	0	54
Lane Group Flow (vph)	50	146	149	13	173	30
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	0%	3%	3%	0%	6%	0%
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	53.0	53.0	35.0	35.0	31.0	31.0
Effective Green, g (s)	57.0	57.0	39.0	39.0	35.0	35.0
Actuated g/C Ratio	0.58	0.58	0.39	0.39	0.35	0.35
Clearance Time (s)	3.0	7.5	7.5	7.5	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	760	989	676	579	1087	531
v/s Ratio Prot	0.01	c0.08	c0.09		c0.06	
v/s Ratio Perm	0.03			0.01		0.02
v/c Ratio	0.07	0.15	0.22	0.02	0.16	0.06
Uniform Delay, d1	9.2	9.7	19.9	18.3	21.9	21.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.8	0.1	0.3	0.2
Delay (s)	9.4	10.1	20.7	18.4	22.2	21.3
Level of Service	A	B	C	B	C	C
Approach Delay (s)		9.9	20.3		21.9	
Approach LOS		A	C		C	

Intersection Summary

HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Existing 2022
PM Peak












Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	94	7	202	104	9	213
Future Volume (vph)	94	7	202	104	9	213
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.990		0.954			
Flt Protected	0.956					0.998
Satd. Flow (prot)	1675	0	1666	0	0	1701
Flt Permitted	0.956					0.998
Satd. Flow (perm)	1675	0	1666	0	0	1701
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	4%
Adj. Flow (vph)	102	8	220	113	10	232
Shared Lane Traffic (%)						
Lane Group Flow (vph)	110	0	333	0	0	242
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	32.9%
ICU Level of Service	A
Analysis Period (min)	15



























HCM Unsignalized Intersection Capacity Analysis
 8: Montrose Road & Oakwood Drive

Existing 2022
 PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	94	7	202	104	9	213
Future Volume (Veh/h)	94	7	202	104	9	213
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	102	8	220	113	10	232
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	528	276			333	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	528	276			333	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	80	99			99	
cM capacity (veh/h)	510	767			1238	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	110	333	242			
Volume Left	102	0	10			
Volume Right	8	113	0			
cSH	523	1700	1238			
Volume to Capacity	0.21	0.20	0.01			
Queue Length 95th (m)	6.0	0.0	0.2			
Control Delay (s)	13.7	0.0	0.4			
Lane LOS	B		A			
Approach Delay (s)	13.7	0.0	0.4			
Approach LOS	B					
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			32.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Background 2024
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			 						 	
Traffic Volume (vph)	89	802	5	20	667	215	17	70	94	143	43	81
Future Volume (vph)	89	802	5	20	667	215	17	70	94	143	43	81
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98						
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1437	4595	0	1227	3264	1419	1681	1594	1319	1556	1475	1308
Flt Permitted	0.202			0.258			0.726			0.708		
Satd. Flow (perm)	305	4595	0	333	3264	1385	1285	1594	1319	1160	1475	1308
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				234			102			92
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	2					2						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%
Adj. Flow (vph)	97	872	5	22	725	234	18	76	102	155	47	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	877	0	22	725	234	18	76	102	155	47	88
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

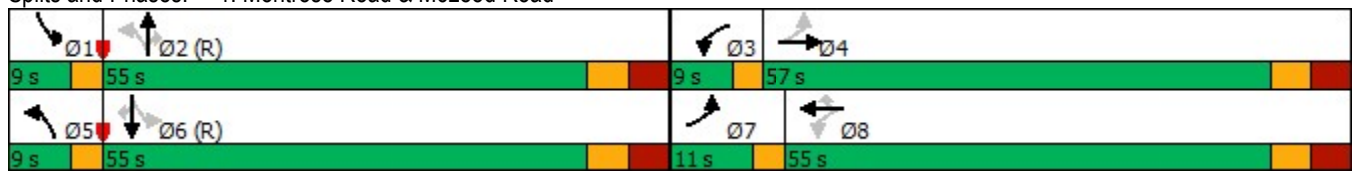
Future Background 2024
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.1	46.1
Total Split (s)	11.0	57.0		9.0	55.0	55.0	9.0	55.0	55.0	9.0	55.0	55.0
Total Split (%)	8.5%	43.8%		6.9%	42.3%	42.3%	6.9%	42.3%	42.3%	6.9%	42.3%	42.3%
Maximum Green (s)	8.0	49.0		6.0	47.0	47.0	6.0	47.0	47.0	6.0	47.0	47.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	59.3	48.2		56.1	40.4	40.4	68.1	52.9	52.9	72.7	63.9	63.9
Actuated g/C Ratio	0.46	0.37		0.43	0.31	0.31	0.52	0.41	0.41	0.56	0.49	0.49
v/c Ratio	0.36	0.51		0.10	0.71	0.40	0.03	0.12	0.17	0.22	0.06	0.13
Control Delay	22.5	32.6		17.4	43.4	5.5	16.6	29.5	7.1	17.0	23.0	5.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.5	32.6		17.4	43.4	5.5	16.6	29.5	7.1	17.0	23.0	5.4
LOS	C	C		B	D	A	B	C	A	B	C	A
Approach Delay		31.6			33.8			16.6			14.5	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 29.2 Intersection LOS: C
 Intersection Capacity Utilization 51.1% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Background 2024

1: Montrose Road & McLeod Road

AM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	97	877	22	725	234	18	76	102	155	47	88
v/c Ratio	0.36	0.51	0.10	0.71	0.40	0.03	0.12	0.17	0.22	0.06	0.13
Control Delay	22.5	32.6	17.4	43.4	5.5	16.6	29.5	7.1	17.0	23.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.5	32.6	17.4	43.4	5.5	16.6	29.5	7.1	17.0	23.0	5.4
Queue Length 50th (m)	14.2	66.2	3.1	86.4	0.0	2.0	11.9	0.0	18.6	5.8	0.0
Queue Length 95th (m)	20.5	69.3	6.6	97.6	16.2	6.9	28.0	13.5	37.4	16.8	10.4
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	270	1891	217	1280	685	703	699	636	696	736	699
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.46	0.10	0.57	0.34	0.03	0.11	0.16	0.22	0.06	0.13




























Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Background 2024

1: Montrose Road & McLeod Road

AM Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		  			 						 		
Traffic Volume (vph)	89	802	5	20	667	215	17	70	94	143	43	81	
Future Volume (vph)	89	802	5	20	667	215	17	70	94	143	43	81	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1436	4595		1227	3264	1385	1681	1594	1319	1556	1475	1308	
Flt Permitted	0.20	1.00		0.26	1.00	1.00	0.73	1.00	1.00	0.71	1.00	1.00	
Satd. Flow (perm)	306	4595		333	3264	1385	1285	1594	1319	1159	1475	1308	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	97	872	5	22	725	234	18	76	102	155	47	88	
RTOR Reduction (vph)	0	1	0	0	0	159	0	0	61	0	0	47	
Lane Group Flow (vph)	97	876	0	22	725	75	18	76	41	155	47	41	
Confl. Peds. (#/hr)	2					2							
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	51.5	44.2		41.9	37.6	37.6	50.3	47.7	47.7	62.5	56.9	56.9	
Effective Green, g (s)	55.5	48.2		49.9	41.6	41.6	58.3	51.7	51.7	66.5	60.9	60.9	
Actuated g/C Ratio	0.43	0.37		0.38	0.32	0.32	0.45	0.40	0.40	0.51	0.47	0.47	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	260	1703		184	1044	443	596	633	524	641	690	612	
v/s Ratio Prot	c0.04	0.19		0.01	c0.22		0.00	0.05		c0.03	0.03		
v/s Ratio Perm	0.12			0.04		0.05	0.01		0.03	0.09		0.03	
v/c Ratio	0.37	0.51		0.12	0.69	0.17	0.03	0.12	0.08	0.24	0.07	0.07	
Uniform Delay, d1	24.5	31.8		25.3	38.6	31.8	20.0	24.8	24.3	17.2	19.0	19.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.2		0.2	1.9	0.1	0.0	0.4	0.3	0.1	0.2	0.2	
Delay (s)	25.2	32.0		25.5	40.5	31.9	20.0	25.2	24.6	17.4	19.2	19.2	
Level of Service	C	C		C	D	C	C	C	C	B	B	B	
Approach Delay (s)		31.3			38.1			24.4			18.2		
Approach LOS		C			D			C			B		
Intersection Summary													
HCM 2000 Control Delay			31.9									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.37										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			51.1%									ICU Level of Service	A
Analysis Period (min)			15										

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑↑					↑↑	↑	↑
Traffic Volume (vph)	0	870	0	93	567	104	0	0	0	357	121	278
Future Volume (vph)	0	870	0	93	567	104	0	0	0	357	121	278
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00								
Frt					0.977						0.938	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4473	1769	1586	4355	0	0	0	0	3048	1467	1374
Flt Permitted				0.251						0.950		
Satd. Flow (perm)	0	4473	1769	419	4355	0	0	0	0	3048	1467	1374
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					51						52	170
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Adj. Flow (vph)	0	946	0	101	616	113	0	0	0	388	132	302
Shared Lane Traffic (%)												31%
Lane Group Flow (vph)	0	946	0	101	729	0	0	0	0	388	226	208
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

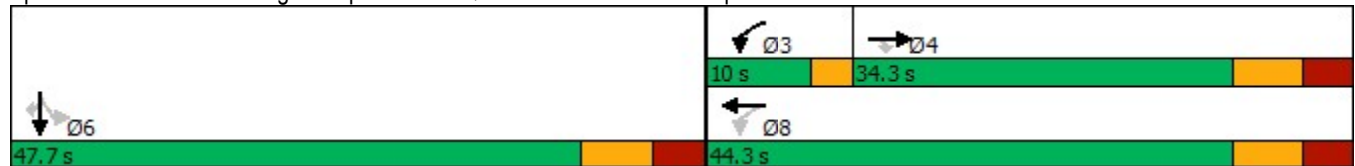


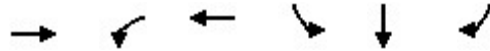
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	-4.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	4.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		26.3		39.0	33.6					19.6	19.6	19.6
Actuated g/C Ratio		0.42		0.62	0.54					0.31	0.31	0.31
v/c Ratio		0.50		0.22	0.31					0.41	0.46	0.38
Control Delay		15.7		6.8	8.1					18.8	17.1	7.2
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		15.7		6.8	8.1					18.8	17.1	7.2
LOS		B		A	A					B	B	A
Approach Delay		15.7			8.0						15.4	
Approach LOS		B			A						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 62.4
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.50
 Intersection Signal Delay: 13.1
 Intersection LOS: B
 Intersection Capacity Utilization 47.8%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road





Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	946	101	729	388	226	208
v/c Ratio	0.50	0.22	0.31	0.41	0.46	0.38
Control Delay	15.7	6.8	8.1	18.8	17.1	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.7	6.8	8.1	18.8	17.1	7.2
Queue Length 50th (m)	29.2	3.8	13.6	17.6	16.0	3.1
Queue Length 95th (m)	49.3	11.8	26.1	31.3	37.4	17.7
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2209	473	2886	2158	1054	1022
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.21	0.25	0.18	0.21	0.20
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

Future Background 2024

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	870	0	93	567	104	0	0	0	357	121	278
Future Volume (vph)	0	870	0	93	567	104	0	0	0	357	121	278
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.98					1.00	0.94	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4473		1586	4353					3048	1466	1374
Flt Permitted		1.00		0.25	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4473		419	4353					3048	1466	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	946	0	101	616	113	0	0	0	388	132	302
RTOR Reduction (vph)	0	0	0	0	23	0	0	0	0	0	36	117
Lane Group Flow (vph)	0	946	0	101	706	0	0	0	0	388	190	91
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		22.2		30.2	30.2					15.4	15.4	15.4
Effective Green, g (s)		26.2		34.2	34.2					19.4	19.4	19.4
Actuated g/C Ratio		0.42		0.55	0.55					0.31	0.31	0.31
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1872		396	2378					944	454	425
v/s Ratio Prot		c0.21		0.04	c0.16						c0.13	
v/s Ratio Perm				0.10						0.13		0.07
v/c Ratio		0.51		0.26	0.30					0.41	0.42	0.21
Uniform Delay, d1		13.4		7.0	7.7					17.1	17.1	16.0
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.2		0.2	0.1					0.2	0.5	0.2
Delay (s)		13.6		7.2	7.7					17.3	17.6	16.1
Level of Service		B		A	A					B	B	B
Approach Delay (s)		13.6			7.7			0.0			17.1	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			12.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			62.6			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			47.8%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

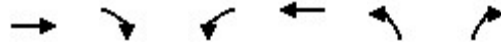
Future Background 2024
AM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	857	370	0	608	87	164
Future Volume (vph)	857	370	0	608	87	164
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Frt	0.955					0.850
Flt Protected					0.950	
Satd. Flow (prot)	4232	0	0	4473	3166	1446
Flt Permitted					0.950	
Satd. Flow (perm)	4232	0	0	4473	3166	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	216					115
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Adj. Flow (vph)	932	402	0	661	95	178
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1334	0	0	661	95	178
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2024
 AM Peak

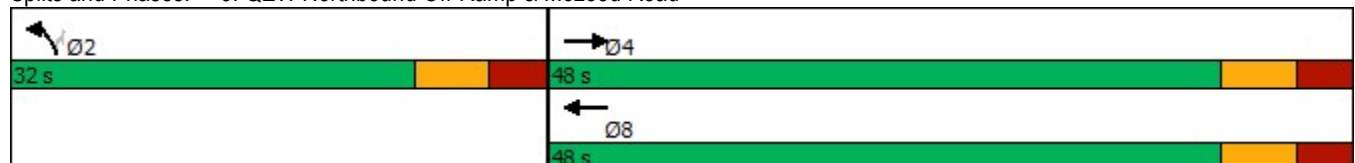


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	48.0			48.0	32.0	32.0
Total Split (%)	60.0%			60.0%	40.0%	40.0%
Maximum Green (s)	40.0			40.0	24.0	24.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	30.1			30.1	13.5	13.5
Actuated g/C Ratio	0.58			0.58	0.26	0.26
v/c Ratio	0.52			0.25	0.12	0.39
Control Delay	6.3			5.7	15.4	9.8
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	6.3			5.7	15.4	9.8
LOS	A			A	B	A
Approach Delay	6.3			5.7	11.7	
Approach LOS	A			A	B	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 51.7
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.52
 Intersection Signal Delay: 6.8
 Intersection Capacity Utilization 44.7%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2024
AM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1334	661	95	178
v/c Ratio	0.52	0.25	0.12	0.39
Control Delay	6.3	5.7	15.4	9.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.3	5.7	15.4	9.8
Queue Length 50th (m)	16.4	8.4	2.9	3.9
Queue Length 95th (m)	33.0	16.9	9.0	19.0
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3672	3849	1746	849
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	0.36	0.17	0.05	0.21
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2024
 AM Peak



























Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↔↔	↔
Traffic Volume (vph)	857	370	0	608	87	164
Future Volume (vph)	857	370	0	608	87	164
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.95			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4232			4473	3166	1446
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4232			4473	3166	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	932	402	0	661	95	178
RTOR Reduction (vph)	90	0	0	0	0	85
Lane Group Flow (vph)	1244	0	0	661	95	93
Confl. Peds. (#/hr)		1	1			
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	26.0			26.0	9.4	9.4
Effective Green, g (s)	30.0			30.0	13.4	13.4
Actuated g/C Ratio	0.58			0.58	0.26	0.26
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2470			2610	825	376
v/s Ratio Prot	c0.29			0.15	0.03	
v/s Ratio Perm						c0.06
v/c Ratio	0.50			0.25	0.12	0.25
Uniform Delay, d1	6.3			5.2	14.5	15.0
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.0	0.0	0.3
Delay (s)	6.4			5.3	14.5	15.3
Level of Service	A			A	B	B
Approach Delay (s)	6.4			5.3	15.0	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	51.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Background 2024
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	558	321	189	743	23	255	17	176	7	2	36
Future Volume (vph)	75	558	321	189	743	23	255	17	176	7	2	36
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00	1.00	0.98	1.00	0.98	
Frt			0.850			0.850			0.850		0.857	
Flt Protected	0.950			0.950			0.950	0.958		0.950		
Satd. Flow (prot)	1616	3233	1419	3197	3296	1475	1566	1579	1475	1648	1464	0
Flt Permitted	0.277			0.950			0.950	0.958		0.950		
Satd. Flow (perm)	471	3233	1398	3192	3296	1439	1560	1574	1451	1643	1464	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			349			139			191			39
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	82	607	349	205	808	25	277	18	191	8	2	39
Shared Lane Traffic (%)							47%					
Lane Group Flow (vph)	82	607	349	205	808	25	147	148	191	8	41	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

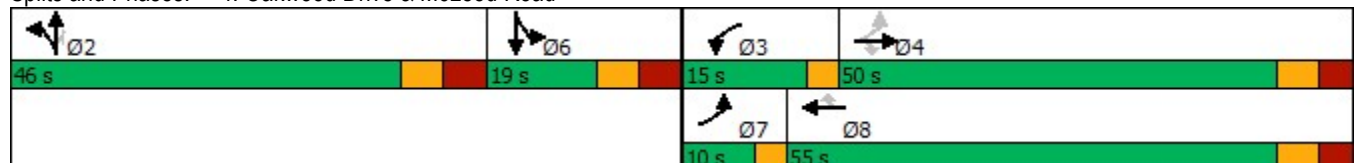
Future Background 2024
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	50.0	50.0	15.0	55.0	55.0	46.0	46.0	46.0	19.0	19.0	
Total Split (%)	7.7%	38.5%	38.5%	11.5%	42.3%	42.3%	35.4%	35.4%	35.4%	14.6%	14.6%	
Maximum Green (s)	7.0	42.4	42.4	12.0	47.4	47.4	37.7	37.7	37.7	10.7	10.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	44.1	27.5	27.5	14.7	33.7	33.7	18.4	18.4	18.4	13.2	13.2	
Actuated g/C Ratio	0.58	0.36	0.36	0.19	0.44	0.44	0.24	0.24	0.24	0.17	0.17	
v/c Ratio	0.18	0.52	0.48	0.33	0.56	0.04	0.39	0.39	0.39	0.03	0.14	
Control Delay	10.4	23.2	5.1	33.6	20.7	0.1	32.3	32.2	7.4	37.7	15.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	10.4	23.2	5.1	33.6	20.7	0.1	32.3	32.2	7.4	37.7	15.4	
LOS	B	C	A	C	C	A	C	C	A	D	B	
Approach Delay		16.1			22.7			22.5			19.0	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 76.5
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 20.0
 Intersection LOS: B
 Intersection Capacity Utilization 53.7%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Background 2024

4: Oakwood Drive & McLeod Road

AM Peak



























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	82	607	349	205	808	25	147	148	191	8	41
v/c Ratio	0.18	0.52	0.48	0.33	0.56	0.04	0.39	0.39	0.39	0.03	0.14
Control Delay	10.4	23.2	5.1	33.6	20.7	0.1	32.3	32.2	7.4	37.7	15.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	23.2	5.1	33.6	20.7	0.1	32.3	32.2	7.4	37.7	15.4
Queue Length 50th (m)	5.6	40.6	0.0	14.6	54.0	0.0	21.1	21.2	0.0	1.1	0.3
Queue Length 95th (m)	14.5	66.5	18.0	30.6	85.0	0.0	44.7	44.8	16.6	5.9	10.2
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	452	2136	1042	730	2341	1062	933	940	941	346	338
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.28	0.33	0.28	0.35	0.02	0.16	0.16	0.20	0.02	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Oakwood Drive & McLeod Road

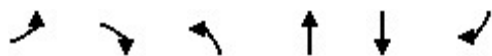
Future Background 2024
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	558	321	189	743	23	255	17	176	7	2	36
Future Volume (vph)	75	558	321	189	743	23	255	17	176	7	2	36
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3233	1400	3197	3296	1441	1566	1579	1453	1648	1467	
Flt Permitted	0.28	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	472	3233	1400	3197	3296	1441	1566	1579	1453	1648	1467	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	607	349	205	808	25	277	18	191	8	2	39
RTOR Reduction (vph)	0	0	226	0	0	15	0	0	148	0	35	0
Lane Group Flow (vph)	82	607	123	205	808	10	147	148	43	8	6	0
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	29.3	24.1	24.1	10.4	29.3	29.3	14.1	14.1	14.1	4.1	4.1	
Effective Green, g (s)	37.3	28.1	28.1	14.4	33.3	33.3	18.1	18.1	18.1	8.1	8.1	
Actuated g/C Ratio	0.47	0.35	0.35	0.18	0.42	0.42	0.23	0.23	0.23	0.10	0.10	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	352	1137	492	576	1373	600	354	357	329	167	148	
v/s Ratio Prot	0.03	0.19		c0.06	c0.25		c0.09	0.09		c0.00	0.00	
v/s Ratio Perm	0.08		0.09			0.01			0.03			
v/c Ratio	0.23	0.53	0.25	0.36	0.59	0.02	0.42	0.41	0.13	0.05	0.04	
Uniform Delay, d1	12.2	20.7	18.4	28.7	18.0	13.7	26.4	26.4	24.6	32.4	32.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.4	0.2	0.3	0.5	0.0	0.6	0.6	0.1	0.1	0.1	
Delay (s)	12.4	21.0	18.6	29.0	18.5	13.7	27.0	26.9	24.8	32.5	32.5	
Level of Service	B	C	B	C	B	B	C	C	C	C	C	
Approach Delay (s)		19.5			20.5			26.1			32.5	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			21.4	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			79.9	Sum of lost time (s)				11.2				
Intersection Capacity Utilization			53.7%	ICU Level of Service				A				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2024
AM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	164	3	2	278	252	215
Future Volume (vph)	164	3	2	278	252	215
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Fr't	0.998				0.931	
Flt Protected	0.953					
Satd. Flow (prot)	1650	0	0	3058	2970	0
Flt Permitted	0.953			0.953		
Satd. Flow (perm)	1650	0	0	2914	2970	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1				234	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			239.7	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Adj. Flow (vph)	178	3	2	302	274	234
Shared Lane Traffic (%)						
Lane Group Flow (vph)	181	0	0	304	508	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
 5: Oakwood Drive & North Commercial Access

Future Background 2024
 AM Peak

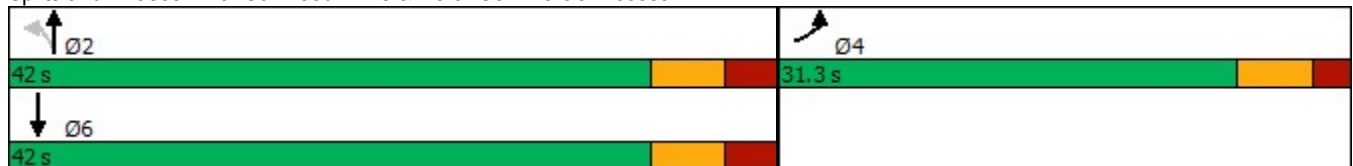


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	16.1			42.3	42.3	
Actuated g/C Ratio	0.25			0.66	0.66	
v/c Ratio	0.43			0.16	0.25	
Control Delay	22.1			4.8	2.9	
Queue Delay	0.0			0.0	0.0	
Total Delay	22.1			4.8	2.9	
LOS	C			A	A	
Approach Delay	22.1			4.8	2.9	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	63.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.43
Intersection Signal Delay:	7.0
Intersection LOS:	A
Intersection Capacity Utilization	31.8%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



5: Oakwood Drive & North Commercial Access

AM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	181	304	508
v/c Ratio	0.43	0.16	0.25
Control Delay	22.1	4.8	2.9
Queue Delay	0.0	0.0	0.0
Total Delay	22.1	4.8	2.9
Queue Length 50th (m)	16.4	5.6	5.0
Queue Length 95th (m)	30.9	12.3	12.5
Internal Link Dist (m)	45.0	215.7	285.0
Turn Bay Length (m)			
Base Capacity (vph)	754	1932	2048
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.24	0.16	0.25
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Background 2024
AM Peak

























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑↑	↑↑	
Traffic Volume (vph)	164	3	2	278	252	215
Future Volume (vph)	164	3	2	278	252	215
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.93	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1650			3057	2969	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1650			2914	2969	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	3	2	302	274	234
RTOR Reduction (vph)	1	0	0	0	79	0
Lane Group Flow (vph)	180	0	0	304	429	0
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.1			38.2	38.2	
Effective Green, g (s)	16.1			42.2	42.2	
Actuated g/C Ratio	0.25			0.66	0.66	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	417			1933	1969	
v/s Ratio Prot	c0.11				c0.14	
v/s Ratio Perm				0.10		
v/c Ratio	0.43			0.16	0.22	
Uniform Delay, d1	19.9			4.0	4.2	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.7			0.2	0.3	
Delay (s)	20.6			4.2	4.5	
Level of Service	C			A	A	
Approach Delay (s)	20.6			4.2	4.5	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	5.3
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2024
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	144	0	35	147	7	0	0	79	39	0	21
Future Volume (vph)	27	144	0	35	147	7	0	0	79	39	0	21
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Frt						0.850		0.850				0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1616	1638	0	1648	1669	1367	1735	1475	0	1528	1735	1504
Flt Permitted	0.619			0.657						0.950		
Satd. Flow (perm)	1053	1638	0	1140	1669	1367	1735	1475	0	1528	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		779				837
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			119.4			97.6				82.8
Travel Time (s)		19.6			8.6			7.3				6.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%
Adj. Flow (vph)	29	157	0	38	160	8	0	0	86	42	0	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	157	0	38	160	8	0	86	0	42	0	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6		6

Lanes, Volumes, Timings
6: Site Access 1/South Commercial Access & Oakwood Drive

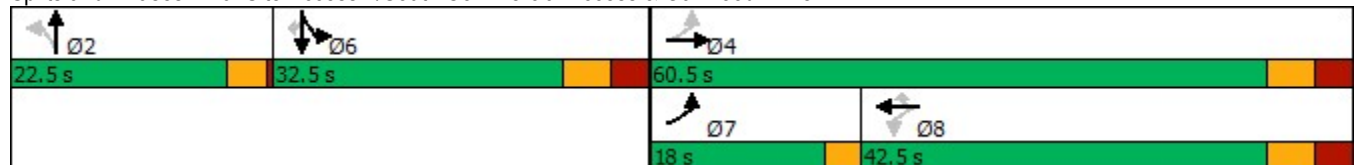
Future Background 2024
AM Peak

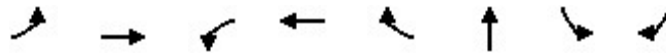
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	None	None		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.6	57.1		39.1	39.1	39.1		8.7		35.1		35.1
Actuated g/C Ratio	0.58	0.54		0.37	0.37	0.37		0.08		0.33		0.33
v/c Ratio	0.04	0.18		0.09	0.26	0.01		0.10		0.08		0.02
Control Delay	10.3	13.6		23.6	25.4	0.0		0.2		25.9		0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0		0.0
Total Delay	10.3	13.6		23.6	25.4	0.0		0.2		25.9		0.0
LOS	B	B		C	C	A		A		C		A
Approach Delay		13.1			24.1			0.2				16.8
Approach LOS		B			C			A				B

Intersection Summary

Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 106
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.26
 Intersection Signal Delay: 15.7
 Intersection LOS: B
 Intersection Capacity Utilization 44.8%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive



























Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBR
Lane Group Flow (vph)	29	157	38	160	8	86	42	23
v/c Ratio	0.04	0.18	0.09	0.26	0.01	0.10	0.08	0.02
Control Delay	10.3	13.6	23.6	25.4	0.0	0.2	25.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	13.6	23.6	25.4	0.0	0.2	25.9	0.0
Queue Length 50th (m)	2.5	16.4	5.2	23.4	0.0	0.0	6.1	0.0
Queue Length 95th (m)	6.4	27.6	12.5	39.3	0.0	0.0	14.1	0.0
Internal Link Dist (m)		248.4		95.4		73.6		
Turn Bay Length (m)			85.0					
Base Capacity (vph)	712	881	419	615	572	927	505	1057
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	0.04	0.18	0.09	0.26	0.01	0.09	0.08	0.02

Intersection Summary










HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2024
 AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	144	0	35	147	7	0	0	79	39	0	21
Future Volume (vph)	27	144	0	35	147	7	0	0	79	39	0	21
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5		3.5	3.5	3.5		0.0		3.5		3.5
Lane Util. Factor	1.00	1.00		1.00	1.00	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)	1616	1638		1648	1669	1367		1475		1528		1504
Flt Permitted	0.62	1.00		0.66	1.00	1.00		1.00		0.95		1.00
Satd. Flow (perm)	1054	1638		1140	1669	1367		1475		1528		1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	157	0	38	160	8	0	0	86	42	0	23
RTOR Reduction (vph)	0	0	0	0	0	5	0	80	0	0	0	15
Lane Group Flow (vph)	29	157	0	38	160	3	0	6	0	42	0	8
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	53.1	53.1		35.1	35.1	35.1		3.7		31.0		31.0
Effective Green, g (s)	57.1	57.1		39.1	39.1	39.1		7.7		35.0		35.0
Actuated g/C Ratio	0.53	0.53		0.37	0.37	0.37		0.07		0.33		0.33
Clearance Time (s)	3.0	7.5		7.5	7.5	7.5		4.0		7.5		7.5
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2		2.2		2.2		2.2
Lane Grp Cap (vph)	663	875		417	611	500		106		500		492
v/s Ratio Prot	0.01	c0.10			c0.10			c0.00		c0.03		
v/s Ratio Perm	0.02			0.03		0.00						0.01
v/c Ratio	0.04	0.18		0.09	0.26	0.01		0.06		0.08		0.02
Uniform Delay, d1	11.8	12.8		22.2	23.7	21.5		46.2		24.8		24.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Incremental Delay, d2	0.1	0.4		0.4	1.0	0.0		0.1		0.3		0.1
Delay (s)	11.9	13.2		22.6	24.8	21.5		46.3		25.1		24.3
Level of Service	B	B		C	C	C		D		C		C
Approach Delay (s)		13.0			24.3			46.3			24.9	
Approach LOS		B			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			24.0									C
HCM 2000 Volume to Capacity ratio			0.16									
Actuated Cycle Length (s)			106.8							7.0		
Intersection Capacity Utilization			44.8%									A
Analysis Period (min)			15									
c Critical Lane Group												










Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Background 2024
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	52	6	128	66	10	143
Future Volume (vph)	52	6	128	66	10	143
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	0	0		0	0	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.985		0.954			
Flt Protected	0.957					0.997
Satd. Flow (prot)	1659	0	1573	0	0	1711
Flt Permitted	0.957					0.997
Satd. Flow (perm)	1659	0	1573	0	0	1711
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	8%	6%	5%	3%
Adj. Flow (vph)	57	7	139	72	11	155
Shared Lane Traffic (%)						
Lane Group Flow (vph)	64	0	211	0	0	166
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	27.3%			ICU Level of Service A		
Analysis Period (min)	15					
























HCM Unsignalized Intersection Capacity Analysis
 8: Montrose Road & Oakwood Drive

Future Background 2024
 AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	52	6	128	66	10	143
Future Volume (Veh/h)	52	6	128	66	10	143
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	7	139	72	11	155
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	352	175			211	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	352	175			211	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	99			99	
cM capacity (veh/h)	644	861			1342	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	64	211	166			
Volume Left	57	0	11			
Volume Right	7	72	0			
cSH	663	1700	1342			
Volume to Capacity	0.10	0.12	0.01			
Queue Length 95th (m)	2.4	0.0	0.2			
Control Delay (s)	11.0	0.0	0.6			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.6			
Approach LOS	B					
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			27.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Background 2024
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	743	30	87	862	268	27	107	215	335	132	88
Future Volume (vph)	88	743	30	87	862	268	27	107	215	335	132	88
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.97						
Frt		0.994				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1514	4617	0	1542	3296	1460	1681	1685	1475	1664	1669	1446
Flt Permitted	0.127			0.236			0.666			0.674		
Satd. Flow (perm)	202	4617	0	383	3296	1411	1178	1685	1475	1181	1669	1446
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				289			155			96
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	7					7						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%
Adj. Flow (vph)	96	808	33	95	937	291	29	116	234	364	143	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	96	841	0	95	937	291	29	116	234	364	143	96
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Background 2024
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.0	46.0
Total Split (s)	9.0	53.0		9.0	53.0	53.0	9.0	51.0	51.0	17.0	59.0	59.0
Total Split (%)	6.9%	40.8%		6.9%	40.8%	40.8%	6.9%	39.2%	39.2%	13.1%	45.4%	45.4%
Maximum Green (s)	6.0	45.0		6.0	45.0	45.0	6.0	43.0	43.0	14.0	51.0	51.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	60.5	46.5		60.5	46.5	46.5	63.8	48.8	48.8	71.5	61.1	61.1
Actuated g/C Ratio	0.47	0.36		0.47	0.36	0.36	0.49	0.38	0.38	0.55	0.47	0.47
v/c Ratio	0.49	0.51		0.36	0.79	0.42	0.05	0.18	0.36	0.51	0.18	0.13
Control Delay	28.0	33.5		23.0	43.0	5.1	14.9	29.1	12.1	20.4	22.6	4.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	33.5		23.0	43.0	5.1	14.9	29.1	12.1	20.4	22.6	4.7
LOS	C	C		C	D	A	B	C	B	C	C	A
Approach Delay		32.9			33.2			17.5			18.4	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 28.6 Intersection LOS: C
 Intersection Capacity Utilization 68.1% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Background 2024

1: Montrose Road & McLeod Road

PM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	96	841	95	937	291	29	116	234	364	143	96
v/c Ratio	0.49	0.51	0.36	0.79	0.42	0.05	0.18	0.36	0.51	0.18	0.13
Control Delay	28.0	33.5	23.0	43.0	5.1	14.9	29.1	12.1	20.4	22.6	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	33.5	23.0	43.0	5.1	14.9	29.1	12.1	20.4	22.6	4.7
Queue Length 50th (m)	13.3	59.4	13.1	109.3	0.3	3.4	20.3	13.6	53.9	22.7	0.0
Queue Length 95th (m)	23.5	72.0	23.2	134.2	18.3	8.3	34.4	33.9	77.4	37.3	10.2
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	194	1743	267	1242	711	616	633	650	719	784	730
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.48	0.36	0.75	0.41	0.05	0.18	0.36	0.51	0.18	0.13

Intersection Summary

HCM Signalized Intersection Capacity Analysis

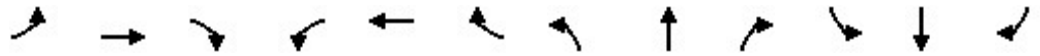
Future Background 2024

1: Montrose Road & McLeod Road

PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	88	743	30	87	862	268	27	107	215	335	132	88	
Future Volume (vph)	88	743	30	87	862	268	27	107	215	335	132	88	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1514	4617		1542	3296	1411	1681	1685	1475	1664	1669	1446	
Flt Permitted	0.13	1.00		0.24	1.00	1.00	0.67	1.00	1.00	0.67	1.00	1.00	
Satd. Flow (perm)	203	4617		384	3296	1411	1178	1685	1475	1181	1669	1446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	96	808	33	95	937	291	29	116	234	364	143	96	
RTOR Reduction (vph)	0	3	0	0	0	186	0	0	97	0	0	52	
Lane Group Flow (vph)	96	838	0	95	937	105	29	116	137	364	143	44	
Confl. Peds. (#/hr)	7					7							
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	48.5	42.5		48.5	42.5	42.5	48.4	44.8	44.8	62.5	55.9	55.9	
Effective Green, g (s)	55.5	46.5		55.5	46.5	46.5	56.4	48.8	48.8	66.5	59.9	59.9	
Actuated g/C Ratio	0.43	0.36		0.43	0.36	0.36	0.43	0.38	0.38	0.51	0.46	0.46	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	187	1651		253	1178	504	540	632	553	673	769	666	
v/s Ratio Prot	c0.04	0.18		0.03	c0.28		0.00	0.07		c0.08	0.09		
v/s Ratio Perm	0.18			0.13		0.07	0.02		0.09	0.20		0.03	
v/c Ratio	0.51	0.51		0.38	0.80	0.21	0.05	0.18	0.25	0.54	0.19	0.07	
Uniform Delay, d1	26.2	32.8		23.5	37.5	29.0	21.2	27.2	28.0	19.9	20.7	19.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	0.2		0.7	3.7	0.2	0.0	0.6	1.1	0.7	0.5	0.2	
Delay (s)	27.9	32.9		24.1	41.2	29.1	21.2	27.9	29.0	20.6	21.2	19.7	
Level of Service	C	C		C	D	C	C	C	C	C	C	B	
Approach Delay (s)		32.4			37.3			28.1			20.6		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			31.7									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.55										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			68.1%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	1082	0	143	717	144	0	0	0	521	114	289
Future Volume (vph)	0	1082	0	143	717	144	0	0	0	521	114	289
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00	1.00							
Frt					0.975						0.932	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4736	1769	1616	4539	0	0	0	0	3136	1528	1401
Flt Permitted				0.160						0.950		
Satd. Flow (perm)	0	4736	1769	272	4539	0	0	0	0	3136	1528	1401
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					58						62	99
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)	3		3	3		3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Adj. Flow (vph)	0	1176	0	155	779	157	0	0	0	566	124	314
Shared Lane Traffic (%)												33%
Lane Group Flow (vph)	0	1176	0	155	936	0	0	0	0	566	228	210
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

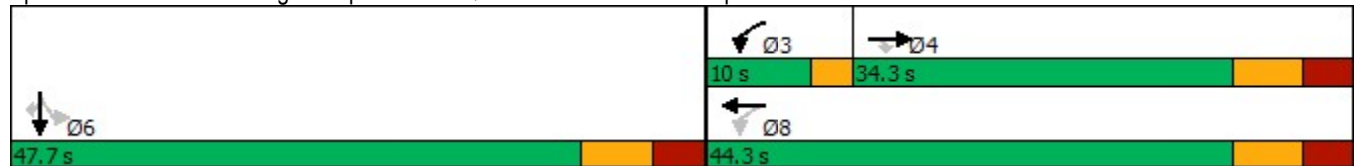


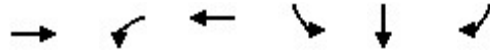
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	0.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	8.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		28.2		43.4	38.0					23.9	23.9	23.9
Actuated g/C Ratio		0.40		0.61	0.53					0.34	0.34	0.34
v/c Ratio		0.63		0.42	0.38					0.54	0.41	0.39
Control Delay		19.8		10.7	10.2					21.1	15.3	11.9
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		19.8		10.7	10.2					21.1	15.3	11.9
LOS		B		B	B					C	B	B
Approach Delay		19.8			10.3						17.9	
Approach LOS		B			B						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 71.1
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 16.0
 Intersection LOS: B
 Intersection Capacity Utilization 58.3%
 ICU Level of Service B
 Analysis Period (min) 15

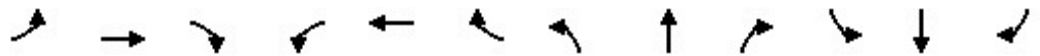
Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road





Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1176	155	936	566	228	210
v/c Ratio	0.63	0.42	0.38	0.54	0.41	0.39
Control Delay	19.8	10.7	10.2	21.1	15.3	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	10.7	10.2	21.1	15.3	11.9
Queue Length 50th (m)	45.0	7.9	22.9	32.3	17.7	11.5
Queue Length 95th (m)	69.7	20.1	39.5	45.6	35.2	27.3
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2026	377	2614	1923	961	897
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.41	0.36	0.29	0.24	0.23

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘	↑↑↑					↖	↘	↗
Traffic Volume (vph)	0	1082	0	143	717	144	0	0	0	521	114	289
Future Volume (vph)	0	1082	0	143	717	144	0	0	0	521	114	289
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.97					1.00	0.93	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4736		1616	4539					3136	1527	1401
Flt Permitted		1.00		0.16	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4736		272	4539					3136	1527	1401
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1176	0	155	779	157	0	0	0	566	124	314
RTOR Reduction (vph)	0	0	0	0	27	0	0	0	0	0	41	66
Lane Group Flow (vph)	0	1176	0	155	909	0	0	0	0	566	187	144
Confl. Peds. (#/hr)	3		3	3		3						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		24.2		34.0	34.0					19.9	19.9	19.9
Effective Green, g (s)		28.2		38.0	38.0					23.9	23.9	23.9
Actuated g/C Ratio		0.40		0.54	0.54					0.34	0.34	0.34
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1883		350	2432					1057	514	472
v/s Ratio Prot		c0.25		c0.07	0.20						0.12	
v/s Ratio Perm				0.17						c0.18		0.10
v/c Ratio		0.62		0.44	0.37					0.54	0.36	0.31
Uniform Delay, d1		17.1		9.2	9.5					19.0	17.8	17.4
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.6		0.7	0.1					0.4	0.3	0.3
Delay (s)		17.7		9.9	9.6					19.4	18.1	17.6
Level of Service		B		A	A					B	B	B
Approach Delay (s)		17.7			9.7			0.0			18.7	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			15.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			70.9			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			58.3%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

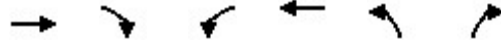
Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2024
PM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1179	381	0	891	118	166
Future Volume (vph)	1179	381	0	891	118	166
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Frt	0.963					0.850
Flt Protected					0.950	
Satd. Flow (prot)	4467	0	0	4690	3197	1489
Flt Permitted					0.950	
Satd. Flow (perm)	4467	0	0	4690	3197	1489
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	171					54
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Adj. Flow (vph)	1282	414	0	968	128	180
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1696	0	0	968	128	180
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2024
 PM Peak

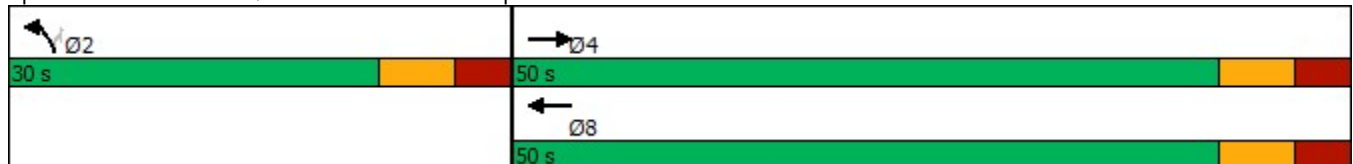


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	50.0			50.0	30.0	30.0
Total Split (%)	62.5%			62.5%	37.5%	37.5%
Maximum Green (s)	42.0			42.0	22.0	22.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	38.2			38.2	15.2	15.2
Actuated g/C Ratio	0.62			0.62	0.25	0.25
v/c Ratio	0.60			0.33	0.16	0.44
Control Delay	7.5			6.2	19.8	18.5
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	7.5			6.2	19.8	18.5
LOS	A			A	B	B
Approach Delay	7.5			6.2	19.0	
Approach LOS	A			A	B	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 61.6
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 8.3
 Intersection Capacity Utilization 51.9%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2024
 PM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1696	968	128	180
v/c Ratio	0.60	0.33	0.16	0.44
Control Delay	7.5	6.2	19.8	18.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.5	6.2	19.8	18.5
Queue Length 50th (m)	30.1	15.6	5.6	11.4
Queue Length 95th (m)	55.3	28.6	13.0	30.4
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3450	3580	1379	673
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	0.49	0.27	0.09	0.27
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2024
PM Peak



























Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↔↔	↔
Traffic Volume (vph)	1179	381	0	891	118	166
Future Volume (vph)	1179	381	0	891	118	166
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.96			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4470			4690	3197	1489
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4470			4690	3197	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1282	414	0	968	128	180
RTOR Reduction (vph)	65	0	0	0	0	41
Lane Group Flow (vph)	1631	0	0	968	128	139
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	34.1			34.1	11.1	11.1
Effective Green, g (s)	38.1			38.1	15.1	15.1
Actuated g/C Ratio	0.62			0.62	0.25	0.25
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2782			2919	788	367
v/s Ratio Prot	c0.36			0.21	0.04	
v/s Ratio Perm						c0.09
v/c Ratio	0.59			0.33	0.16	0.38
Uniform Delay, d1	6.9			5.5	18.1	19.2
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			0.0	0.1	0.5
Delay (s)	7.1			5.5	18.2	19.6
Level of Service	A			A	B	B
Approach Delay (s)	7.1			5.5	19.0	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			7.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			61.2		Sum of lost time (s)	8.0
Intersection Capacity Utilization			51.9%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Background 2024
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	854	467	292	1014	28	489	12	369	23	18	81
Future Volume (vph)	59	854	467	292	1014	28	489	12	369	23	18	81
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	0.98	0.98	0.99	1.00	0.97	
Frt			0.850			0.850			0.850		0.878	
Flt Protected	0.950			0.950			0.950	0.955		0.950		
Satd. Flow (prot)	1616	3264	1475	3166	3296	1446	1566	1575	1460	1681	1449	0
Flt Permitted	0.160			0.950			0.950	0.955		0.950		
Satd. Flow (perm)	272	3264	1452	3161	3296	1414	1533	1544	1441	1680	1449	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			508			139			352			88
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		148.8			245.9			309.0			281.5	
Travel Time (s)		10.7			17.7			22.2			20.3	
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Adj. Flow (vph)	64	928	508	317	1102	30	532	13	401	25	20	88
Shared Lane Traffic (%)							49%					
Lane Group Flow (vph)	64	928	508	317	1102	30	271	274	401	25	108	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

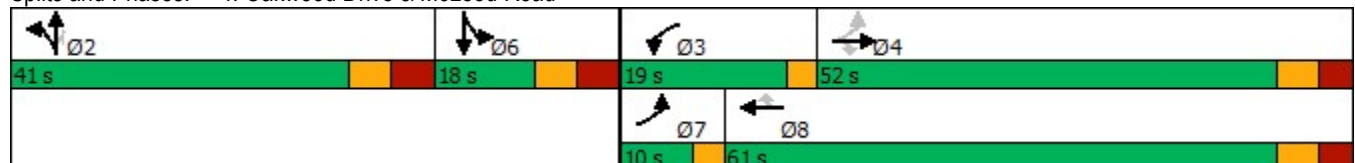
Future Background 2024
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	52.0	52.0	19.0	61.0	61.0	41.0	41.0	41.0	18.0	18.0	
Total Split (%)	7.7%	40.0%	40.0%	14.6%	46.9%	46.9%	31.5%	31.5%	31.5%	13.8%	13.8%	
Maximum Green (s)	7.0	44.4	44.4	16.0	53.4	53.4	32.7	32.7	32.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	59.3	43.8	43.8	18.8	54.0	54.0	30.2	30.2	30.2	12.8	12.8	
Actuated g/C Ratio	0.51	0.37	0.37	0.16	0.46	0.46	0.26	0.26	0.26	0.11	0.11	
v/c Ratio	0.24	0.76	0.59	0.63	0.72	0.04	0.67	0.67	0.63	0.14	0.46	
Control Delay	15.4	37.5	5.5	53.9	30.2	0.1	48.9	49.0	11.4	54.0	22.8	
Queue Delay	0.0	1.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	15.4	38.7	5.7	53.9	30.2	0.1	48.9	49.0	11.4	54.0	22.8	
LOS	B	D	A	D	C	A	D	D	B	D	C	
Approach Delay		26.5			34.7			33.0			28.7	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 116.9
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 31.1
 Intersection LOS: C
 Intersection Capacity Utilization 68.3%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Background 2024

4: Oakwood Drive & McLeod Road

PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	64	928	508	317	1102	30	271	274	401	25	108
v/c Ratio	0.24	0.76	0.59	0.63	0.72	0.04	0.67	0.67	0.63	0.14	0.46
Control Delay	15.4	37.5	5.5	53.9	30.2	0.1	48.9	49.0	11.4	54.0	22.8
Queue Delay	0.0	1.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	38.7	5.7	53.9	30.2	0.1	48.9	49.0	11.4	54.0	22.8
Queue Length 50th (m)	6.5	100.5	0.0	37.6	111.8	0.0	62.4	63.1	9.2	5.7	4.6
Queue Length 95th (m)	14.2	134.3	24.0	55.4	149.1	0.0	95.0	95.5	40.5	14.7	22.6
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	268	1378	906	552	1650	777	501	504	700	201	250
Starvation Cap Reductn	0	236	61	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.24	0.81	0.60	0.57	0.67	0.04	0.54	0.54	0.57	0.12	0.43

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Oakwood Drive & McLeod Road

Future Background 2024
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	854	467	292	1014	28	489	12	369	23	18	81
Future Volume (vph)	59	854	467	292	1014	28	489	12	369	23	18	81
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3264	1452	3166	3296	1415	1566	1575	1441	1681	1452	
Flt Permitted	0.16	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	273	3264	1452	3166	3296	1415	1566	1575	1441	1681	1452	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	928	508	317	1102	30	532	13	401	25	20	88
RTOR Reduction (vph)	0	0	315	0	0	16	0	0	262	0	78	0
Lane Group Flow (vph)	64	928	193	317	1102	14	271	274	139	25	30	0
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	45.7	40.5	40.5	14.7	50.0	50.0	26.1	26.1	26.1	8.7	8.7	
Effective Green, g (s)	53.7	44.5	44.5	18.7	54.0	54.0	30.1	30.1	30.1	12.7	12.7	
Actuated g/C Ratio	0.46	0.38	0.38	0.16	0.46	0.46	0.26	0.26	0.26	0.11	0.11	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	230	1239	551	505	1518	651	402	404	370	182	157	
v/s Ratio Prot	0.02	0.28		c0.10	c0.33		0.17	c0.17		0.01	c0.02	
v/s Ratio Perm	0.11		0.13			0.01			0.10			
v/c Ratio	0.28	0.75	0.35	0.63	0.73	0.02	0.67	0.68	0.38	0.14	0.19	
Uniform Delay, d1	19.3	31.5	26.0	46.0	25.6	17.2	39.1	39.2	35.8	47.3	47.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	2.4	0.3	2.1	1.6	0.0	4.0	4.1	0.5	0.3	0.4	
Delay (s)	19.8	33.9	26.3	48.1	27.3	17.2	43.2	43.3	36.3	47.5	48.0	
Level of Service	B	C	C	D	C	B	D	D	D	D	D	
Approach Delay (s)		30.7			31.6			40.3			47.9	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			33.9				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			117.2				Sum of lost time (s)			11.2		
Intersection Capacity Utilization			68.3%				ICU Level of Service			C		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2024
PM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	359	9	1	401	335	343
Future Volume (vph)	359	9	1	401	335	343
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Flt	0.997				0.924	
Flt Protected	0.954					
Satd. Flow (prot)	1683	0	0	3233	3061	0
Flt Permitted	0.954			0.954		
Satd. Flow (perm)	1683	0	0	3084	3061	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2				373	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			240.9	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Adj. Flow (vph)	390	10	1	436	364	373
Shared Lane Traffic (%)						
Lane Group Flow (vph)	400	0	0	437	737	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2024
PM Peak

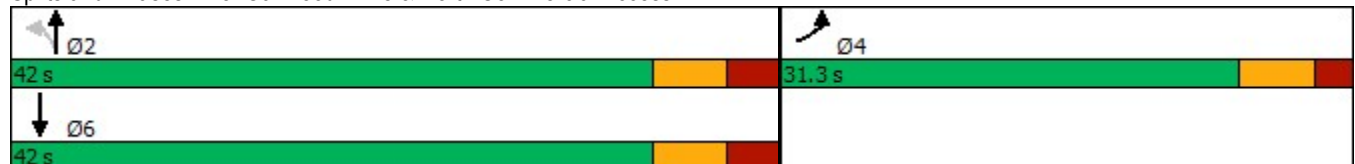


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	24.2			39.2	39.2	
Actuated g/C Ratio	0.35			0.57	0.57	
v/c Ratio	0.67			0.25	0.39	
Control Delay	25.0			8.6	4.9	
Queue Delay	0.0			0.0	0.0	
Total Delay	25.0			8.6	4.9	
LOS	C			A	A	
Approach Delay	25.0			8.6	4.9	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	68.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	11.0
Intersection LOS:	B
Intersection Capacity Utilization:	50.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues
5: Oakwood Drive & North Commercial Access

Future Background 2024
PM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	400	437	737
v/c Ratio	0.67	0.25	0.39
Control Delay	25.0	8.6	4.9
Queue Delay	0.0	0.0	0.0
Total Delay	25.0	8.6	4.9
Queue Length 50th (m)	42.2	13.8	11.2
Queue Length 95th (m)	69.1	23.8	22.4
Internal Link Dist (m)	45.0	216.9	285.0
Turn Bay Length (m)			
Base Capacity (vph)	715	1759	1907
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.56	0.25	0.39
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Background 2024
PM Peak

























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	359	9	1	401	335	343
Future Volume (vph)	359	9	1	401	335	343
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.92	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1681			3233	3061	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1681			3084	3061	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	390	10	1	436	364	373
RTOR Reduction (vph)	1	0	0	0	160	0
Lane Group Flow (vph)	399	0	0	437	577	0
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	20.1			35.2	35.2	
Effective Green, g (s)	24.1			39.2	39.2	
Actuated g/C Ratio	0.35			0.57	0.57	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	590			1762	1749	
v/s Ratio Prot	c0.24				c0.19	
v/s Ratio Perm				0.14		
v/c Ratio	0.68			0.25	0.33	
Uniform Delay, d1	18.9			7.3	7.8	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	3.1			0.3	0.5	
Delay (s)	22.0			7.7	8.3	
Level of Service	C			A	A	
Approach Delay (s)	22.0			7.7	8.3	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	5.3
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2024
 PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	143	0	43	146	31	0	0	53	165	0	81
Future Volume (vph)	48	143	0	43	146	31	0	0	53	165	0	81
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Ped Bike Factor	1.00					0.98						
Fr _t						0.850		0.850				0.850
Fl _t Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1681	1718	0	1648	1718	1504	1735	1475	0	1586	1735	1504
Fl _t Permitted	0.619			0.659						0.950		
Satd. Flow (perm)	1094	1718	0	1143	1718	1471	1735	1475	0	1586	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		632				836
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			122.6			120.6				82.8
Travel Time (s)		19.6			8.8			9.0				6.2
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Adj. Flow (vph)	52	155	0	47	159	34	0	0	58	179	0	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	155	0	47	159	34	0	58	0	179	0	88
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2024
PM Peak

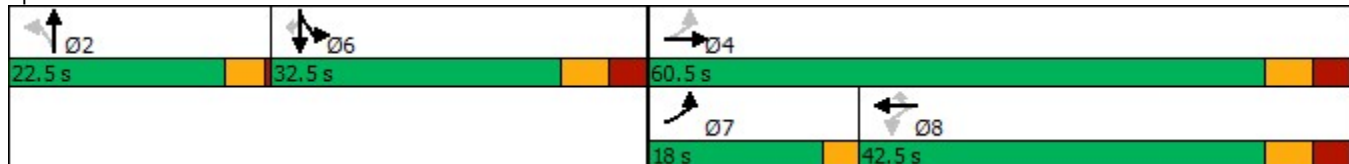


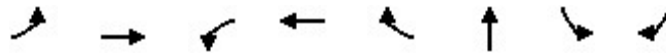
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	Min	Min		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.5	57.0		39.0	39.0	39.0		8.7		35.0		35.0
Actuated g/C Ratio	0.57	0.53		0.36	0.36	0.36		0.08		0.32		0.32
v/c Ratio	0.07	0.17		0.11	0.26	0.06		0.08		0.35		0.08
Control Delay	10.6	13.8		23.9	25.6	0.2		0.2		30.1		0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0		0.0
Total Delay	10.6	13.8		23.9	25.6	0.2		0.2		30.1		0.2
LOS	B	B		C	C	A		A		C		A
Approach Delay		13.0			21.6			0.2				20.2
Approach LOS		B			C			A				C

Intersection Summary

Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 107.7
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.35
 Intersection Signal Delay: 17.2
 Intersection LOS: B
 Intersection Capacity Utilization 55.8%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive





Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBR
Lane Group Flow (vph)	52	155	47	159	34	58	179	88
v/c Ratio	0.07	0.17	0.11	0.26	0.06	0.08	0.35	0.08
Control Delay	10.6	13.8	23.9	25.6	0.2	0.2	30.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	13.8	23.9	25.6	0.2	0.2	30.1	0.2
Queue Length 50th (m)	4.6	16.1	6.5	23.2	0.0	0.0	28.4	0.0
Queue Length 95th (m)	9.9	27.1	14.7	38.9	0.0	0.0	46.9	0.0
Internal Link Dist (m)		248.4		98.6		96.6		
Turn Bay Length (m)			85.0					
Base Capacity (vph)	728	909	413	622	602	808	515	1053
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	0.07	0.17	0.11	0.26	0.06	0.07	0.35	0.08

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2024














PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	143	0	43	146	31	0	0	53	165	0	81
Future Volume (vph)	48	143	0	43	146	31	0	0	53	165	0	81
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5		3.5	3.5	3.5		0.0		3.5		3.5
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00		1.00		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frt	1.00	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)	1679	1718		1648	1718	1471		1475		1586		1504
Flt Permitted	0.62	1.00		0.66	1.00	1.00		1.00		0.95		1.00
Satd. Flow (perm)	1094	1718		1143	1718	1471		1475		1586		1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	155	0	47	159	34	0	0	58	179	0	88
RTOR Reduction (vph)	0	0	0	0	0	22	0	53	0	0	0	59
Lane Group Flow (vph)	52	155	0	47	159	12	0	5	0	179	0	29
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	53.0	53.0		35.0	35.0	35.0		4.7		31.0		31.0
Effective Green, g (s)	57.0	57.0		39.0	39.0	39.0		8.7		35.0		35.0
Actuated g/C Ratio	0.53	0.53		0.36	0.36	0.36		0.08		0.32		0.32
Clearance Time (s)	3.0	7.5		7.5	7.5	7.5		4.0		7.5		7.5
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2		2.2		2.2		2.2
Lane Grp Cap (vph)	682	909		413	622	532		119		515		488
v/s Ratio Prot	0.01	c0.09			c0.09			c0.00		c0.11		
v/s Ratio Perm	0.03			0.04		0.01						0.02
v/c Ratio	0.08	0.17		0.11	0.26	0.02		0.04		0.35		0.06
Uniform Delay, d1	12.3	13.1		22.9	24.1	22.1		45.6		27.7		25.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Incremental Delay, d2	0.2	0.4		0.6	1.0	0.1		0.1		1.9		0.2
Delay (s)	12.6	13.5		23.4	25.1	22.2		45.7		29.5		25.2
Level of Service	B	B		C	C	C		D		C		C
Approach Delay (s)		13.3			24.4			45.7			28.1	
Approach LOS		B			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			24.3				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.25									
Actuated Cycle Length (s)			107.7				Sum of lost time (s)			7.0		
Intersection Capacity Utilization			55.8%				ICU Level of Service			B		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive












Future Background 2024
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	105	7	210	113	10	222
Future Volume (vph)	105	7	210	113	10	222
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.947			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1504	3143	0	1681	3233
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1504	3143	0	1681	3233
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	4%
Adj. Flow (vph)	114	8	228	123	11	241
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	8	351	0	11	241
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	23.2%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis




























8: Montrose Road & Oakwood Drive

Future Background 2024
PM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	105	7	210	113	10	222	
Future Volume (Veh/h)	105	7	210	113	10	222	
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	114	8	228	123	11	241	
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	432	176			351		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	432	176			351		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	79	99			99		
cM capacity (veh/h)	552	844			1219		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	114	8	152	199	11	120	120
Volume Left	114	0	0	0	11	0	0
Volume Right	0	8	0	123	0	0	0
cSH	552	844	1700	1700	1219	1700	1700
Volume to Capacity	0.21	0.01	0.09	0.12	0.01	0.07	0.07
Queue Length 95th (m)	5.9	0.2	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	13.2	9.3	0.0	0.0	8.0	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	13.0	0.0		0.3			
Approach LOS	B						
Intersection Summary							
Average Delay			2.3				
Intersection Capacity Utilization			23.2%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Total 2024
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			 						 	
Traffic Volume (vph)	89	802	5	20	667	215	17	70	94	143	43	81
Future Volume (vph)	89	802	5	20	667	215	17	70	94	143	43	81
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98						
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1437	4595	0	1227	3264	1419	1681	1594	1319	1556	1475	1308
Flt Permitted	0.202			0.258			0.726			0.708		
Satd. Flow (perm)	305	4595	0	333	3264	1385	1285	1594	1319	1160	1475	1308
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				234			102			92
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	2					2						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%
Adj. Flow (vph)	97	872	5	22	725	234	18	76	102	155	47	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	877	0	22	725	234	18	76	102	155	47	88
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

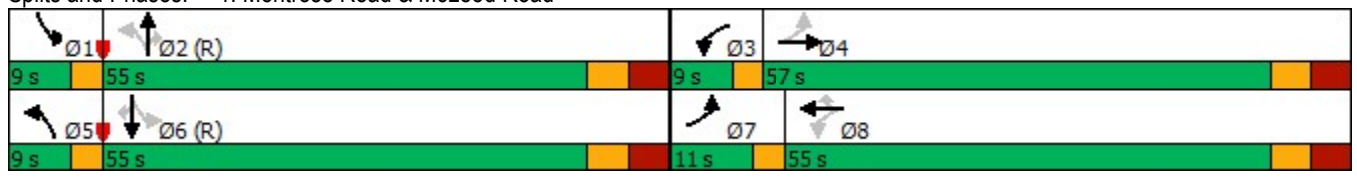
Future Total 2024
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.1	46.1
Total Split (s)	11.0	57.0		9.0	55.0	55.0	9.0	55.0	55.0	9.0	55.0	55.0
Total Split (%)	8.5%	43.8%		6.9%	42.3%	42.3%	6.9%	42.3%	42.3%	6.9%	42.3%	42.3%
Maximum Green (s)	8.0	49.0		6.0	47.0	47.0	6.0	47.0	47.0	6.0	47.0	47.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	59.3	48.2		56.1	40.4	40.4	68.1	52.9	52.9	72.7	63.9	63.9
Actuated g/C Ratio	0.46	0.37		0.43	0.31	0.31	0.52	0.41	0.41	0.56	0.49	0.49
v/c Ratio	0.36	0.51		0.10	0.71	0.40	0.03	0.12	0.17	0.22	0.06	0.13
Control Delay	22.5	32.6		17.4	43.4	5.5	16.6	29.5	7.1	17.0	23.0	5.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.5	32.6		17.4	43.4	5.5	16.6	29.5	7.1	17.0	23.0	5.4
LOS	C	C		B	D	A	B	C	A	B	C	A
Approach Delay		31.6			33.8			16.6			14.5	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 29.2 Intersection LOS: C
 Intersection Capacity Utilization 51.1% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Total 2024

1: Montrose Road & McLeod Road

AM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	97	877	22	725	234	18	76	102	155	47	88
v/c Ratio	0.36	0.51	0.10	0.71	0.40	0.03	0.12	0.17	0.22	0.06	0.13
Control Delay	22.5	32.6	17.4	43.4	5.5	16.6	29.5	7.1	17.0	23.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.5	32.6	17.4	43.4	5.5	16.6	29.5	7.1	17.0	23.0	5.4
Queue Length 50th (m)	14.2	66.2	3.1	86.4	0.0	2.0	11.9	0.0	18.6	5.8	0.0
Queue Length 95th (m)	20.5	69.3	6.6	97.6	16.2	6.9	28.0	13.5	37.4	16.8	10.4
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	270	1891	217	1280	685	703	699	636	696	736	699
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.46	0.10	0.57	0.34	0.03	0.11	0.16	0.22	0.06	0.13

Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Total 2024

1: Montrose Road & McLeod Road

AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	89	802	5	20	667	215	17	70	94	143	43	81	
Future Volume (vph)	89	802	5	20	667	215	17	70	94	143	43	81	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1436	4595		1227	3264	1385	1681	1594	1319	1556	1475	1308	
Flt Permitted	0.20	1.00		0.26	1.00	1.00	0.73	1.00	1.00	0.71	1.00	1.00	
Satd. Flow (perm)	306	4595		333	3264	1385	1285	1594	1319	1159	1475	1308	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	97	872	5	22	725	234	18	76	102	155	47	88	
RTOR Reduction (vph)	0	1	0	0	0	159	0	0	61	0	0	47	
Lane Group Flow (vph)	97	876	0	22	725	75	18	76	41	155	47	41	
Confl. Peds. (#/hr)	2					2							
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	51.5	44.2		41.9	37.6	37.6	50.3	47.7	47.7	62.5	56.9	56.9	
Effective Green, g (s)	55.5	48.2		49.9	41.6	41.6	58.3	51.7	51.7	66.5	60.9	60.9	
Actuated g/C Ratio	0.43	0.37		0.38	0.32	0.32	0.45	0.40	0.40	0.51	0.47	0.47	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	260	1703		184	1044	443	596	633	524	641	690	612	
v/s Ratio Prot	c0.04	0.19		0.01	c0.22		0.00	0.05		c0.03	0.03		
v/s Ratio Perm	0.12			0.04		0.05	0.01		0.03	0.09		0.03	
v/c Ratio	0.37	0.51		0.12	0.69	0.17	0.03	0.12	0.08	0.24	0.07	0.07	
Uniform Delay, d1	24.5	31.8		25.3	38.6	31.8	20.0	24.8	24.3	17.2	19.0	19.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.2		0.2	1.9	0.1	0.0	0.4	0.3	0.1	0.2	0.2	
Delay (s)	25.2	32.0		25.5	40.5	31.9	20.0	25.2	24.6	17.4	19.2	19.2	
Level of Service	C	C		C	D	C	C	C	C	B	B	B	
Approach Delay (s)		31.3			38.1			24.4			18.2		
Approach LOS		C			D			C			B		
Intersection Summary													
HCM 2000 Control Delay			31.9									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.37										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			51.1%									ICU Level of Service	A
Analysis Period (min)			15										

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	870	0	93	567	104	0	0	0	357	121	278
Future Volume (vph)	0	870	0	93	567	104	0	0	0	357	121	278
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00								
Frt					0.977						0.938	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4473	1769	1586	4355	0	0	0	0	3048	1467	1374
Flt Permitted				0.251						0.950		
Satd. Flow (perm)	0	4473	1769	419	4355	0	0	0	0	3048	1467	1374
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					51						52	170
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Adj. Flow (vph)	0	946	0	101	616	113	0	0	0	388	132	302
Shared Lane Traffic (%)												31%
Lane Group Flow (vph)	0	946	0	101	729	0	0	0	0	388	226	208
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

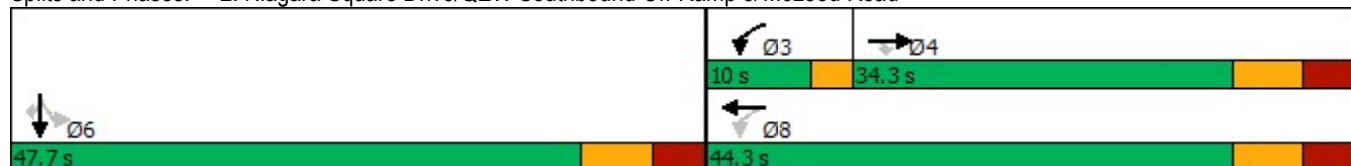


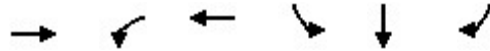
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	-4.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	4.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		26.3		39.0	33.6					19.6	19.6	19.6
Actuated g/C Ratio		0.42		0.62	0.54					0.31	0.31	0.31
v/c Ratio		0.50		0.22	0.31					0.41	0.46	0.38
Control Delay		15.7		6.8	8.1					18.8	17.1	7.2
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		15.7		6.8	8.1					18.8	17.1	7.2
LOS		B		A	A					B	B	A
Approach Delay		15.7			8.0						15.4	
Approach LOS		B			A						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 62.4
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.50
 Intersection Signal Delay: 13.1
 Intersection LOS: B
 Intersection Capacity Utilization 47.8%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road



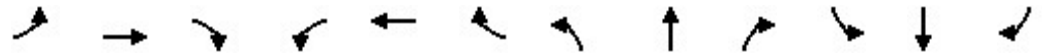


Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	946	101	729	388	226	208
v/c Ratio	0.50	0.22	0.31	0.41	0.46	0.38
Control Delay	15.7	6.8	8.1	18.8	17.1	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.7	6.8	8.1	18.8	17.1	7.2
Queue Length 50th (m)	29.2	3.8	13.6	17.6	16.0	3.1
Queue Length 95th (m)	49.3	11.8	26.1	31.3	37.4	17.7
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2209	473	2886	2158	1054	1022
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.21	0.25	0.18	0.21	0.20

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Future Total 2024
 AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	870	0	93	567	104	0	0	0	357	121	278
Future Volume (vph)	0	870	0	93	567	104	0	0	0	357	121	278
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.98					1.00	0.94	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4473		1586	4353					3048	1466	1374
Flt Permitted		1.00		0.25	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4473		419	4353					3048	1466	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	946	0	101	616	113	0	0	0	388	132	302
RTOR Reduction (vph)	0	0	0	0	23	0	0	0	0	0	36	117
Lane Group Flow (vph)	0	946	0	101	706	0	0	0	0	388	190	91
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		22.2		30.2	30.2					15.4	15.4	15.4
Effective Green, g (s)		26.2		34.2	34.2					19.4	19.4	19.4
Actuated g/C Ratio		0.42		0.55	0.55					0.31	0.31	0.31
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1872		396	2378					944	454	425
v/s Ratio Prot		c0.21		0.04	c0.16						c0.13	
v/s Ratio Perm				0.10						0.13		0.07
v/c Ratio		0.51		0.26	0.30					0.41	0.42	0.21
Uniform Delay, d1		13.4		7.0	7.7					17.1	17.1	16.0
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.2		0.2	0.1					0.2	0.5	0.2
Delay (s)		13.6		7.2	7.7					17.3	17.6	16.1
Level of Service		B		A	A					B	B	B
Approach Delay (s)		13.6			7.7			0.0			17.1	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			12.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			62.6			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			47.8%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

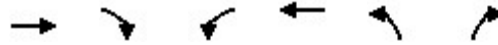
Future Total 2024
AM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	857	370	0	608	87	164
Future Volume (vph)	857	370	0	608	87	164
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Fr _t	0.955					0.850
Fl _t Protected					0.950	
Satd. Flow (prot)	4232	0	0	4473	3166	1446
Fl _t Permitted					0.950	
Satd. Flow (perm)	4232	0	0	4473	3166	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	216					115
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Adj. Flow (vph)	932	402	0	661	95	178
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1334	0	0	661	95	178
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2024
 AM Peak

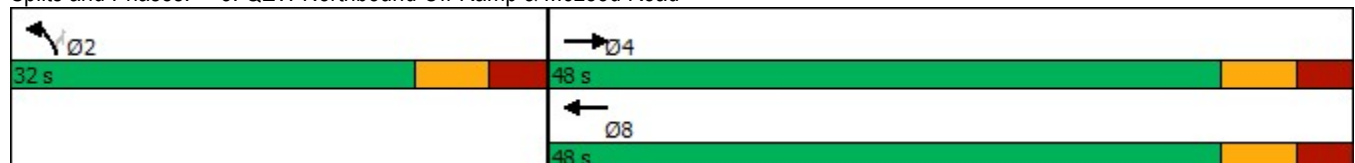


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	48.0			48.0	32.0	32.0
Total Split (%)	60.0%			60.0%	40.0%	40.0%
Maximum Green (s)	40.0			40.0	24.0	24.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	30.1			30.1	13.5	13.5
Actuated g/C Ratio	0.58			0.58	0.26	0.26
v/c Ratio	0.52			0.25	0.12	0.39
Control Delay	6.3			5.7	15.4	9.8
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	6.3			5.7	15.4	9.8
LOS	A			A	B	A
Approach Delay	6.3			5.7	11.7	
Approach LOS	A			A	B	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 51.7
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.52
 Intersection Signal Delay: 6.8
 Intersection Capacity Utilization 44.7%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2024
 AM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1334	661	95	178
v/c Ratio	0.52	0.25	0.12	0.39
Control Delay	6.3	5.7	15.4	9.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.3	5.7	15.4	9.8
Queue Length 50th (m)	16.4	8.4	2.9	3.9
Queue Length 95th (m)	33.0	16.9	9.0	19.0
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3672	3849	1746	849
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	0.36	0.17	0.05	0.21
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2024
AM Peak



























Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	857	370	0	608	87	164
Future Volume (vph)	857	370	0	608	87	164
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.95			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4232			4473	3166	1446
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4232			4473	3166	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	932	402	0	661	95	178
RTOR Reduction (vph)	90	0	0	0	0	85
Lane Group Flow (vph)	1244	0	0	661	95	93
Confl. Peds. (#/hr)		1	1			
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	26.0			26.0	9.4	9.4
Effective Green, g (s)	30.0			30.0	13.4	13.4
Actuated g/C Ratio	0.58			0.58	0.26	0.26
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2470			2610	825	376
v/s Ratio Prot	c0.29			0.15	0.03	
v/s Ratio Perm						c0.06
v/c Ratio	0.50			0.25	0.12	0.25
Uniform Delay, d1	6.3			5.2	14.5	15.0
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.0	0.0	0.3
Delay (s)	6.4			5.3	14.5	15.3
Level of Service	A			A	B	B
Approach Delay (s)	6.4			5.3	15.0	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			7.1		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.42			
Actuated Cycle Length (s)			51.4		Sum of lost time (s)	8.0
Intersection Capacity Utilization			44.7%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Total 2024
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	558	321	189	743	23	255	17	176	7	2	36
Future Volume (vph)	75	558	321	189	743	23	255	17	176	7	2	36
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00	1.00	0.98	1.00	0.98	
Frt			0.850			0.850			0.850		0.857	
Flt Protected	0.950			0.950			0.950	0.958		0.950		
Satd. Flow (prot)	1616	3233	1419	3197	3296	1475	1566	1579	1475	1648	1464	0
Flt Permitted	0.277			0.950			0.950	0.958		0.950		
Satd. Flow (perm)	471	3233	1398	3192	3296	1439	1560	1574	1451	1643	1464	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			349			139			191			39
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	82	607	349	205	808	25	277	18	191	8	2	39
Shared Lane Traffic (%)							47%					
Lane Group Flow (vph)	82	607	349	205	808	25	147	148	191	8	41	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

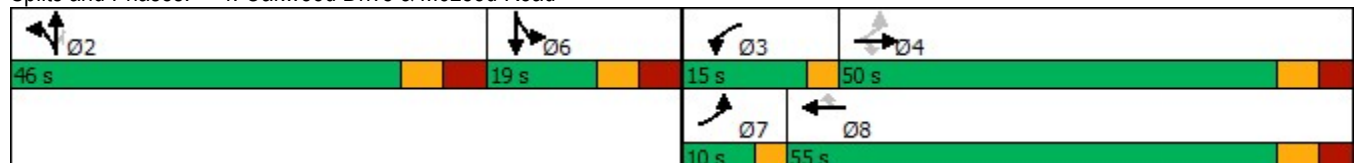
Future Total 2024
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	50.0	50.0	15.0	55.0	55.0	46.0	46.0	46.0	19.0	19.0	
Total Split (%)	7.7%	38.5%	38.5%	11.5%	42.3%	42.3%	35.4%	35.4%	35.4%	14.6%	14.6%	
Maximum Green (s)	7.0	42.4	42.4	12.0	47.4	47.4	37.7	37.7	37.7	10.7	10.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	44.1	27.5	27.5	14.7	33.7	33.7	18.4	18.4	18.4	13.2	13.2	
Actuated g/C Ratio	0.58	0.36	0.36	0.19	0.44	0.44	0.24	0.24	0.24	0.17	0.17	
v/c Ratio	0.18	0.52	0.48	0.33	0.56	0.04	0.39	0.39	0.39	0.03	0.14	
Control Delay	10.4	23.2	5.1	33.6	20.7	0.1	32.3	32.2	7.4	37.7	15.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	10.4	23.2	5.1	33.6	20.7	0.1	32.3	32.2	7.4	37.7	15.4	
LOS	B	C	A	C	C	A	C	C	A	D	B	
Approach Delay		16.1			22.7			22.5			19.0	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 76.5
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 20.0
 Intersection LOS: B
 Intersection Capacity Utilization 53.7%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Total 2024

4: Oakwood Drive & McLeod Road

AM Peak






























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	82	607	349	205	808	25	147	148	191	8	41
v/c Ratio	0.18	0.52	0.48	0.33	0.56	0.04	0.39	0.39	0.39	0.03	0.14
Control Delay	10.4	23.2	5.1	33.6	20.7	0.1	32.3	32.2	7.4	37.7	15.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	23.2	5.1	33.6	20.7	0.1	32.3	32.2	7.4	37.7	15.4
Queue Length 50th (m)	5.6	40.6	0.0	14.6	54.0	0.0	21.1	21.2	0.0	1.1	0.3
Queue Length 95th (m)	14.5	66.5	18.0	30.6	85.0	0.0	44.7	44.8	16.6	5.9	10.2
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	452	2136	1042	730	2341	1062	933	940	941	346	338
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.28	0.33	0.28	0.35	0.02	0.16	0.16	0.20	0.02	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Oakwood Drive & McLeod Road

Future Total 2024
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 		 	 							
Traffic Volume (vph)	75	558	321	189	743	23	255	17	176	7	2	36
Future Volume (vph)	75	558	321	189	743	23	255	17	176	7	2	36
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3233	1400	3197	3296	1441	1566	1579	1453	1648	1467	
Flt Permitted	0.28	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	472	3233	1400	3197	3296	1441	1566	1579	1453	1648	1467	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	607	349	205	808	25	277	18	191	8	2	39
RTOR Reduction (vph)	0	0	226	0	0	15	0	0	148	0	35	0
Lane Group Flow (vph)	82	607	123	205	808	10	147	148	43	8	6	0
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	29.3	24.1	24.1	10.4	29.3	29.3	14.1	14.1	14.1	4.1	4.1	
Effective Green, g (s)	37.3	28.1	28.1	14.4	33.3	33.3	18.1	18.1	18.1	8.1	8.1	
Actuated g/C Ratio	0.47	0.35	0.35	0.18	0.42	0.42	0.23	0.23	0.23	0.10	0.10	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	352	1137	492	576	1373	600	354	357	329	167	148	
v/s Ratio Prot	0.03	0.19		c0.06	c0.25		c0.09	0.09		c0.00	0.00	
v/s Ratio Perm	0.08		0.09			0.01			0.03			
v/c Ratio	0.23	0.53	0.25	0.36	0.59	0.02	0.42	0.41	0.13	0.05	0.04	
Uniform Delay, d1	12.2	20.7	18.4	28.7	18.0	13.7	26.4	26.4	24.6	32.4	32.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.4	0.2	0.3	0.5	0.0	0.6	0.6	0.1	0.1	0.1	
Delay (s)	12.4	21.0	18.6	29.0	18.5	13.7	27.0	26.9	24.8	32.5	32.5	
Level of Service	B	C	B	C	B	B	C	C	C	C	C	
Approach Delay (s)		19.5			20.5			26.1			32.5	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			21.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			79.9			Sum of lost time (s)			11.2			
Intersection Capacity Utilization			53.7%			ICU Level of Service			A			
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2024
AM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	164	3	2	278	252	215
Future Volume (vph)	164	3	2	278	252	215
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Fr't	0.998				0.931	
Flt Protected	0.953					
Satd. Flow (prot)	1650	0	0	3058	2970	0
Flt Permitted	0.953			0.953		
Satd. Flow (perm)	1650	0	0	2914	2970	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1				234	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			239.7	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Adj. Flow (vph)	178	3	2	302	274	234
Shared Lane Traffic (%)						
Lane Group Flow (vph)	181	0	0	304	508	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2024
AM Peak

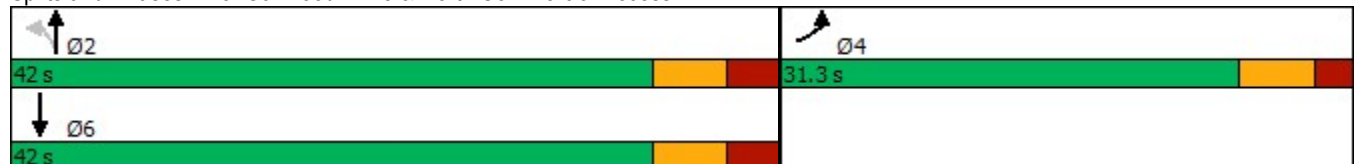


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effct Green (s)	16.1			42.3	42.3	
Actuated g/C Ratio	0.25			0.66	0.66	
v/c Ratio	0.43			0.16	0.25	
Control Delay	22.1			4.8	2.9	
Queue Delay	0.0			0.0	0.0	
Total Delay	22.1			4.8	2.9	
LOS	C			A	A	
Approach Delay	22.1			4.8	2.9	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	63.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.43
Intersection Signal Delay:	7.0
Intersection LOS:	A
Intersection Capacity Utilization:	31.8%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues
5: Oakwood Drive & North Commercial Access

Future Total 2024
AM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	181	304	508
v/c Ratio	0.43	0.16	0.25
Control Delay	22.1	4.8	2.9
Queue Delay	0.0	0.0	0.0
Total Delay	22.1	4.8	2.9
Queue Length 50th (m)	16.4	5.6	5.0
Queue Length 95th (m)	30.9	12.3	12.5
Internal Link Dist (m)	45.0	215.7	285.0
Turn Bay Length (m)			
Base Capacity (vph)	754	1932	2048
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.24	0.16	0.25
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Total 2024
AM Peak

























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	164	3	2	278	252	215
Future Volume (vph)	164	3	2	278	252	215
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.93	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1650			3057	2969	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1650			2914	2969	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	3	2	302	274	234
RTOR Reduction (vph)	1	0	0	0	79	0
Lane Group Flow (vph)	180	0	0	304	429	0
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.1			38.2	38.2	
Effective Green, g (s)	16.1			42.2	42.2	
Actuated g/C Ratio	0.25			0.66	0.66	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	417			1933	1969	
v/s Ratio Prot	c0.11				c0.14	
v/s Ratio Perm				0.10		
v/c Ratio	0.43			0.16	0.22	
Uniform Delay, d1	19.9			4.0	4.2	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.7			0.2	0.3	
Delay (s)	20.6			4.2	4.5	
Level of Service	C			A	A	
Approach Delay (s)	20.6			4.2	4.5	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	5.3
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2024
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	144	0	35	147	7	0	0	79	39	0	21
Future Volume (vph)	27	144	0	35	147	7	0	0	79	39	0	21
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Frt						0.850		0.850				0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1616	1638	0	1648	1669	1367	1735	1475	0	1528	1735	1504
Flt Permitted	0.619			0.657						0.950		
Satd. Flow (perm)	1053	1638	0	1140	1669	1367	1735	1475	0	1528	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		779				837
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			119.4			97.6				82.8
Travel Time (s)		19.6			8.6			7.3				6.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%
Adj. Flow (vph)	29	157	0	38	160	8	0	0	86	42	0	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	157	0	38	160	8	0	86	0	42	0	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6		6

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

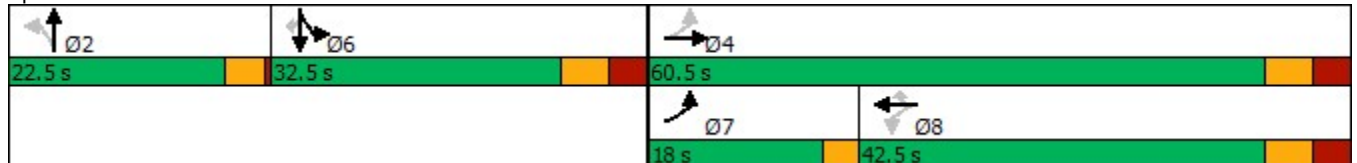
Future Total 2024
 AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	None	None		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.6	57.1		39.1	39.1	39.1		8.7		35.1		35.1
Actuated g/C Ratio	0.58	0.54		0.37	0.37	0.37		0.08		0.33		0.33
v/c Ratio	0.04	0.18		0.09	0.26	0.01		0.10		0.08		0.02
Control Delay	10.3	13.6		23.6	25.4	0.0		0.2		25.9		0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0		0.0
Total Delay	10.3	13.6		23.6	25.4	0.0		0.2		25.9		0.0
LOS	B	B		C	C	A		A		C		A
Approach Delay		13.1			24.1			0.2				16.8
Approach LOS		B			C			A				B

Intersection Summary

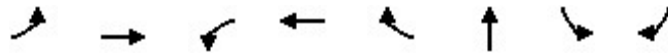
Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 106
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.26
 Intersection Signal Delay: 15.7
 Intersection LOS: B
 Intersection Capacity Utilization 44.8%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive



6: Site Access 1/South Commercial Access & Oakwood Drive

AM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBR
Lane Group Flow (vph)	29	157	38	160	8	86	42	23
v/c Ratio	0.04	0.18	0.09	0.26	0.01	0.10	0.08	0.02
Control Delay	10.3	13.6	23.6	25.4	0.0	0.2	25.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	13.6	23.6	25.4	0.0	0.2	25.9	0.0
Queue Length 50th (m)	2.5	16.4	5.2	23.4	0.0	0.0	6.1	0.0
Queue Length 95th (m)	6.4	27.6	12.5	39.3	0.0	0.0	14.1	0.0
Internal Link Dist (m)		248.4		95.4		73.6		
Turn Bay Length (m)			85.0					
Base Capacity (vph)	712	881	419	615	572	927	505	1057
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	0.04	0.18	0.09	0.26	0.01	0.09	0.08	0.02

Intersection Summary










HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2024
 AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	144	0	35	147	7	0	0	79	39	0	21
Future Volume (vph)	27	144	0	35	147	7	0	0	79	39	0	21
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5		3.5	3.5	3.5		0.0		3.5		3.5
Lane Util. Factor	1.00	1.00		1.00	1.00	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)	1616	1638		1648	1669	1367		1475		1528		1504
Flt Permitted	0.62	1.00		0.66	1.00	1.00		1.00		0.95		1.00
Satd. Flow (perm)	1054	1638		1140	1669	1367		1475		1528		1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	157	0	38	160	8	0	0	86	42	0	23
RTOR Reduction (vph)	0	0	0	0	0	5	0	80	0	0	0	15
Lane Group Flow (vph)	29	157	0	38	160	3	0	6	0	42	0	8
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	53.1	53.1		35.1	35.1	35.1		3.7		31.0		31.0
Effective Green, g (s)	57.1	57.1		39.1	39.1	39.1		7.7		35.0		35.0
Actuated g/C Ratio	0.53	0.53		0.37	0.37	0.37		0.07		0.33		0.33
Clearance Time (s)	3.0	7.5		7.5	7.5	7.5		4.0		7.5		7.5
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2		2.2		2.2		2.2
Lane Grp Cap (vph)	663	875		417	611	500		106		500		492
v/s Ratio Prot	0.01	c0.10			c0.10			c0.00		c0.03		
v/s Ratio Perm	0.02			0.03		0.00						0.01
v/c Ratio	0.04	0.18		0.09	0.26	0.01		0.06		0.08		0.02
Uniform Delay, d1	11.8	12.8		22.2	23.7	21.5		46.2		24.8		24.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Incremental Delay, d2	0.1	0.4		0.4	1.0	0.0		0.1		0.3		0.1
Delay (s)	11.9	13.2		22.6	24.8	21.5		46.3		25.1		24.3
Level of Service	B	B		C	C	C		D		C		C
Approach Delay (s)		13.0			24.3			46.3			24.9	
Approach LOS		B			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			24.0									C
HCM 2000 Volume to Capacity ratio			0.16									
Actuated Cycle Length (s)			106.8							7.0		
Intersection Capacity Utilization			44.8%									A
Analysis Period (min)			15									
c Critical Lane Group												










Lanes, Volumes, Timings
7: Oakwood Drive & Site Access 2

Future Total 2024
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	5	166	2	2	166
Future Volume (vph)	11	5	166	2	2	166
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.960		0.999			
Flt Protected	0.966					0.999
Satd. Flow (prot)	1609	0	1733	0	0	1733
Flt Permitted	0.966					0.999
Satd. Flow (perm)	1609	0	1733	0	0	1733
Link Speed (k/h)	48		50			60
Link Distance (m)	39.5		2126.3			272.4
Travel Time (s)	3.0		153.1			16.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	5	180	2	2	180
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	0	182	0	0	182
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	21.2%		ICU Level of Service A			
Analysis Period (min)	15					














HCM Unsignalized Intersection Capacity Analysis
7: Oakwood Drive & Site Access 2

Future Total 2024
AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	5	166	2	2	166
Future Volume (Veh/h)	11	5	166	2	2	166
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	5	180	2	2	180
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type						
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked	0.96					272
vC, conflicting volume	365	181			182	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	323	181			182	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	646	862			1393	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	17	182	182			
Volume Left	12	0	2			
Volume Right	5	2	0			
cSH	697	1700	1393			
Volume to Capacity	0.02	0.11	0.00			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	10.3	0.0	0.1			
Lane LOS	B		A			
Approach Delay (s)	10.3	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization		21.2%		ICU Level of Service		A
Analysis Period (min)			15			














Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Total 2024
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	52	6	128	66	10	143
Future Volume (vph)	52	6	128	66	10	143
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.949			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1432	2973	0	1601	3264
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1432	2973	0	1601	3264
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	8%	6%	5%	3%
Adj. Flow (vph)	57	7	139	72	11	155
Shared Lane Traffic (%)						
Lane Group Flow (vph)	57	7	211	0	11	155
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	19.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive

Future Total 2024
AM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	52	6	128	66	10	143	
Future Volume (Veh/h)	52	6	128	66	10	143	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	57	7	139	72	11	155	
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	274	106			211		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	274	106			211		
tC, single (s)	6.8	7.0			4.2		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	92	99			99		
cM capacity (veh/h)	692	919			1335		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	57	7	93	118	11	78	78
Volume Left	57	0	0	0	11	0	0
Volume Right	0	7	0	72	0	0	0
cSH	692	919	1700	1700	1335	1700	1700
Volume to Capacity	0.08	0.01	0.05	0.07	0.01	0.05	0.05
Queue Length 95th (m)	2.0	0.2	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	10.7	8.9	0.0	0.0	7.7	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	10.5		0.0		0.5		
Approach LOS	B						
Intersection Summary							
Average Delay			1.7				
Intersection Capacity Utilization			19.0%	ICU Level of Service	A		
Analysis Period (min)			15				

Lanes, Volumes, Timings
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive

Future Total 2024
 AM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (vph)	263	1	0	190	0	11
Future Volume (vph)	263	1	0	190	0	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.999					0.865
Flt Protected						
Satd. Flow (prot)	3293	0	0	3296	0	1501
Flt Permitted						
Satd. Flow (perm)	3293	0	0	3296	0	1501
Link Speed (k/h)	50			50	48	
Link Distance (m)	119.4			239.7	74.2	
Travel Time (s)	8.6			17.3	5.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	286	1	0	207	0	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	287	0	0	207	0	12
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Yield	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	17.9%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive
























Future Total 2024
 AM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	263	1	0	190	0	11
Future Volume (Veh/h)	263	1	0	190	0	11
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	286	1	0	207	0	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	119			240		
pX, platoon unblocked						
vC, conflicting volume			286	390	144	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			286	390	144	
tC, single (s)			4.1	6.8	6.9	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			100	100	99	
cM capacity (veh/h)			1273	586	878	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	191	96	104	104	12	
Volume Left	0	0	0	0	0	
Volume Right	0	1	0	0	12	
cSH	1700	1700	1700	1700	878	
Volume to Capacity	0.11	0.06	0.06	0.06	0.01	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.3	
Control Delay (s)	0.0	0.0	0.0	0.0	9.2	
Lane LOS					A	
Approach Delay (s)	0.0		0.0		9.2	
Approach LOS					A	
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			17.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Total 2024
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	743	30	87	862	268	27	107	215	335	132	88
Future Volume (vph)	88	743	30	87	862	268	27	107	215	335	132	88
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.97						
Frt		0.994				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1514	4617	0	1542	3296	1460	1681	1685	1475	1664	1669	1446
Flt Permitted	0.127			0.236			0.666			0.674		
Satd. Flow (perm)	202	4617	0	383	3296	1411	1178	1685	1475	1181	1669	1446
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				289			155			96
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	7					7						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%
Adj. Flow (vph)	96	808	33	95	937	291	29	116	234	364	143	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	96	841	0	95	937	291	29	116	234	364	143	96
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

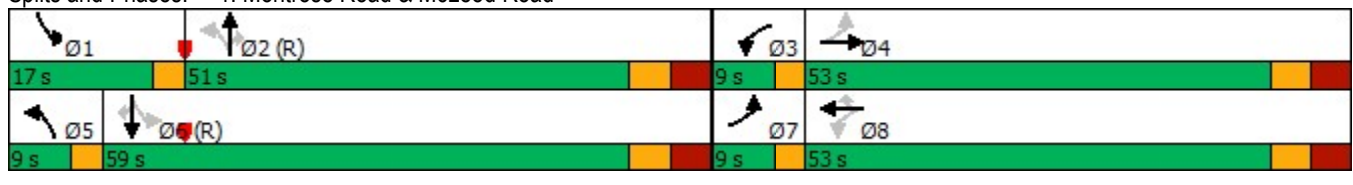
Future Total 2024
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.0	46.0
Total Split (s)	9.0	53.0		9.0	53.0	53.0	9.0	51.0	51.0	17.0	59.0	59.0
Total Split (%)	6.9%	40.8%		6.9%	40.8%	40.8%	6.9%	39.2%	39.2%	13.1%	45.4%	45.4%
Maximum Green (s)	6.0	45.0		6.0	45.0	45.0	6.0	43.0	43.0	14.0	51.0	51.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	60.5	46.5		60.5	46.5	46.5	63.8	48.8	48.8	71.5	61.1	61.1
Actuated g/C Ratio	0.47	0.36		0.47	0.36	0.36	0.49	0.38	0.38	0.55	0.47	0.47
v/c Ratio	0.49	0.51		0.36	0.79	0.42	0.05	0.18	0.36	0.51	0.18	0.13
Control Delay	28.0	33.5		23.0	43.0	5.1	14.9	29.1	12.1	20.4	22.6	4.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	33.5		23.0	43.0	5.1	14.9	29.1	12.1	20.4	22.6	4.7
LOS	C	C		C	D	A	B	C	B	C	C	A
Approach Delay		32.9			33.2			17.5			18.4	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 28.6 Intersection LOS: C
 Intersection Capacity Utilization 68.1% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Total 2024

1: Montrose Road & McLeod Road

PM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	96	841	95	937	291	29	116	234	364	143	96
v/c Ratio	0.49	0.51	0.36	0.79	0.42	0.05	0.18	0.36	0.51	0.18	0.13
Control Delay	28.0	33.5	23.0	43.0	5.1	14.9	29.1	12.1	20.4	22.6	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	33.5	23.0	43.0	5.1	14.9	29.1	12.1	20.4	22.6	4.7
Queue Length 50th (m)	13.3	59.4	13.1	109.3	0.3	3.4	20.3	13.6	53.9	22.7	0.0
Queue Length 95th (m)	23.5	72.0	23.2	134.2	18.3	8.3	34.4	33.9	77.4	37.3	10.2
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	194	1743	267	1242	711	616	633	650	719	784	730
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.48	0.36	0.75	0.41	0.05	0.18	0.36	0.51	0.18	0.13

Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Total 2024

1: Montrose Road & McLeod Road

PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	88	743	30	87	862	268	27	107	215	335	132	88	
Future Volume (vph)	88	743	30	87	862	268	27	107	215	335	132	88	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1514	4617		1542	3296	1411	1681	1685	1475	1664	1669	1446	
Flt Permitted	0.13	1.00		0.24	1.00	1.00	0.67	1.00	1.00	0.67	1.00	1.00	
Satd. Flow (perm)	203	4617		384	3296	1411	1178	1685	1475	1181	1669	1446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	96	808	33	95	937	291	29	116	234	364	143	96	
RTOR Reduction (vph)	0	3	0	0	0	186	0	0	97	0	0	52	
Lane Group Flow (vph)	96	838	0	95	937	105	29	116	137	364	143	44	
Confl. Peds. (#/hr)	7					7							
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	48.5	42.5		48.5	42.5	42.5	48.4	44.8	44.8	62.5	55.9	55.9	
Effective Green, g (s)	55.5	46.5		55.5	46.5	46.5	56.4	48.8	48.8	66.5	59.9	59.9	
Actuated g/C Ratio	0.43	0.36		0.43	0.36	0.36	0.43	0.38	0.38	0.51	0.46	0.46	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	187	1651		253	1178	504	540	632	553	673	769	666	
v/s Ratio Prot	c0.04	0.18		0.03	c0.28		0.00	0.07		c0.08	0.09		
v/s Ratio Perm	0.18			0.13		0.07	0.02		0.09	0.20		0.03	
v/c Ratio	0.51	0.51		0.38	0.80	0.21	0.05	0.18	0.25	0.54	0.19	0.07	
Uniform Delay, d1	26.2	32.8		23.5	37.5	29.0	21.2	27.2	28.0	19.9	20.7	19.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	0.2		0.7	3.7	0.2	0.0	0.6	1.1	0.7	0.5	0.2	
Delay (s)	27.9	32.9		24.1	41.2	29.1	21.2	27.9	29.0	20.6	21.2	19.7	
Level of Service	C	C		C	D	C	C	C	C	C	C	B	
Approach Delay (s)		32.4			37.3			28.1			20.6		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			31.7									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.55										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			68.1%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings

Future Total 2024

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖↗	↗	↖
Traffic Volume (vph)	0	1082	0	143	717	144	0	0	0	521	114	289
Future Volume (vph)	0	1082	0	143	717	144	0	0	0	521	114	289
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00	1.00							
Frt					0.975						0.932	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4736	1769	1616	4539	0	0	0	0	3136	1528	1401
Flt Permitted				0.160						0.950		
Satd. Flow (perm)	0	4736	1769	272	4539	0	0	0	0	3136	1528	1401
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					58						62	99
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)	3		3	3		3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Adj. Flow (vph)	0	1176	0	155	779	157	0	0	0	566	124	314
Shared Lane Traffic (%)												33%
Lane Group Flow (vph)	0	1176	0	155	936	0	0	0	0	566	228	210
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

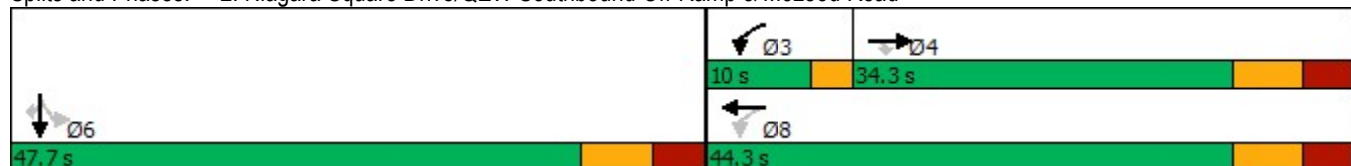


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	0.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	8.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		28.2		43.4	38.0					23.9	23.9	23.9
Actuated g/C Ratio		0.40		0.61	0.53					0.34	0.34	0.34
v/c Ratio		0.63		0.42	0.38					0.54	0.41	0.39
Control Delay		19.8		10.7	10.2					21.1	15.3	11.9
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		19.8		10.7	10.2					21.1	15.3	11.9
LOS		B		B	B					C	B	B
Approach Delay		19.8			10.3						17.9	
Approach LOS		B			B						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 71.1
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 16.0
 Intersection LOS: B
 Intersection Capacity Utilization 58.3%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

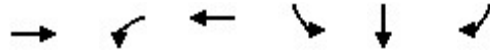


Queues

Future Total 2024

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

PM Peak



Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1176	155	936	566	228	210
v/c Ratio	0.63	0.42	0.38	0.54	0.41	0.39
Control Delay	19.8	10.7	10.2	21.1	15.3	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	10.7	10.2	21.1	15.3	11.9
Queue Length 50th (m)	45.0	7.9	22.9	32.3	17.7	11.5
Queue Length 95th (m)	69.7	20.1	39.5	45.6	35.2	27.3
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2026	377	2614	1923	961	897
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.41	0.36	0.29	0.24	0.23

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Future Total 2024
PM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘	↑↑↑					↖	↘	↗
Traffic Volume (vph)	0	1082	0	143	717	144	0	0	0	521	114	289
Future Volume (vph)	0	1082	0	143	717	144	0	0	0	521	114	289
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.97					1.00	0.93	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4736		1616	4539					3136	1527	1401
Flt Permitted		1.00		0.16	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4736		272	4539					3136	1527	1401
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1176	0	155	779	157	0	0	0	566	124	314
RTOR Reduction (vph)	0	0	0	0	27	0	0	0	0	0	41	66
Lane Group Flow (vph)	0	1176	0	155	909	0	0	0	0	566	187	144
Confl. Peds. (#/hr)	3		3	3		3						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		24.2		34.0	34.0					19.9	19.9	19.9
Effective Green, g (s)		28.2		38.0	38.0					23.9	23.9	23.9
Actuated g/C Ratio		0.40		0.54	0.54					0.34	0.34	0.34
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1883		350	2432					1057	514	472
v/s Ratio Prot		c0.25		c0.07	0.20						0.12	
v/s Ratio Perm				0.17						c0.18		0.10
v/c Ratio		0.62		0.44	0.37					0.54	0.36	0.31
Uniform Delay, d1		17.1		9.2	9.5					19.0	17.8	17.4
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.6		0.7	0.1					0.4	0.3	0.3
Delay (s)		17.7		9.9	9.6					19.4	18.1	17.6
Level of Service		B		A	A					B	B	B
Approach Delay (s)		17.7			9.7			0.0			18.7	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			15.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			70.9			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			58.3%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

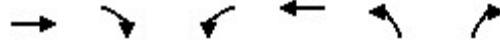
Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2024
PM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1179	381	0	891	118	166
Future Volume (vph)	1179	381	0	891	118	166
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Fr _t	0.963					0.850
Fl _t Protected					0.950	
Satd. Flow (prot)	4467	0	0	4690	3197	1489
Fl _t Permitted					0.950	
Satd. Flow (perm)	4467	0	0	4690	3197	1489
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	171					54
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Adj. Flow (vph)	1282	414	0	968	128	180
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1696	0	0	968	128	180
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2024
 PM Peak

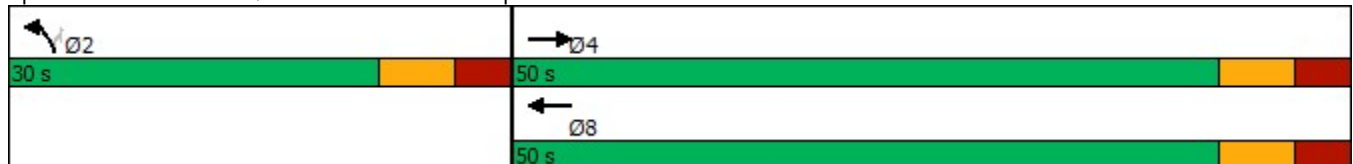


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	50.0			50.0	30.0	30.0
Total Split (%)	62.5%			62.5%	37.5%	37.5%
Maximum Green (s)	42.0			42.0	22.0	22.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	38.2			38.2	15.2	15.2
Actuated g/C Ratio	0.62			0.62	0.25	0.25
v/c Ratio	0.60			0.33	0.16	0.44
Control Delay	7.5			6.2	19.8	18.5
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	7.5			6.2	19.8	18.5
LOS	A			A	B	B
Approach Delay	7.5			6.2	19.0	
Approach LOS	A			A	B	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 61.6
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 8.3
 Intersection Capacity Utilization 51.9%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2024
 PM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1696	968	128	180
v/c Ratio	0.60	0.33	0.16	0.44
Control Delay	7.5	6.2	19.8	18.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.5	6.2	19.8	18.5
Queue Length 50th (m)	30.1	15.6	5.6	11.4
Queue Length 95th (m)	55.3	28.6	13.0	30.4
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3450	3580	1379	673
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	0.49	0.27	0.09	0.27
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2024
PM Peak



























Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1179	381	0	891	118	166
Future Volume (vph)	1179	381	0	891	118	166
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.96			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4470			4690	3197	1489
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4470			4690	3197	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1282	414	0	968	128	180
RTOR Reduction (vph)	65	0	0	0	0	41
Lane Group Flow (vph)	1631	0	0	968	128	139
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	34.1			34.1	11.1	11.1
Effective Green, g (s)	38.1			38.1	15.1	15.1
Actuated g/C Ratio	0.62			0.62	0.25	0.25
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2782			2919	788	367
v/s Ratio Prot	c0.36			0.21	0.04	
v/s Ratio Perm						c0.09
v/c Ratio	0.59			0.33	0.16	0.38
Uniform Delay, d1	6.9			5.5	18.1	19.2
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			0.0	0.1	0.5
Delay (s)	7.1			5.5	18.2	19.6
Level of Service	A			A	B	B
Approach Delay (s)	7.1			5.5	19.0	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			7.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			61.2		Sum of lost time (s)	8.0
Intersection Capacity Utilization			51.9%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Total 2024
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	854	467	292	1014	28	489	12	369	23	18	81
Future Volume (vph)	59	854	467	292	1014	28	489	12	369	23	18	81
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	0.98	0.98	0.99	1.00	0.97	
Frt			0.850			0.850			0.850		0.878	
Flt Protected	0.950			0.950			0.950	0.955		0.950		
Satd. Flow (prot)	1616	3264	1475	3166	3296	1446	1566	1575	1460	1681	1449	0
Flt Permitted	0.160			0.950			0.950	0.955		0.950		
Satd. Flow (perm)	272	3264	1452	3161	3296	1414	1533	1544	1441	1680	1449	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			508			139			352			88
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		148.8			245.9			309.0			281.5	
Travel Time (s)		10.7			17.7			22.2			20.3	
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Adj. Flow (vph)	64	928	508	317	1102	30	532	13	401	25	20	88
Shared Lane Traffic (%)							49%					
Lane Group Flow (vph)	64	928	508	317	1102	30	271	274	401	25	108	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

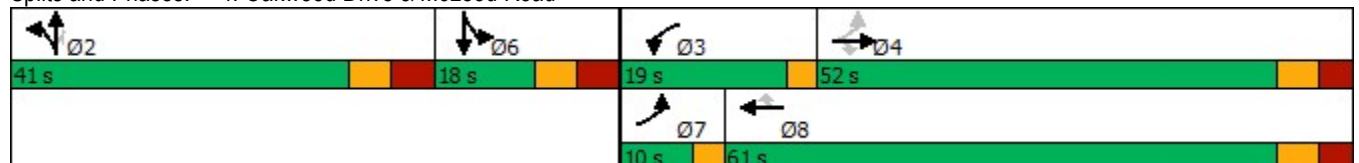
Future Total 2024
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	52.0	52.0	19.0	61.0	61.0	41.0	41.0	41.0	18.0	18.0	
Total Split (%)	7.7%	40.0%	40.0%	14.6%	46.9%	46.9%	31.5%	31.5%	31.5%	13.8%	13.8%	
Maximum Green (s)	7.0	44.4	44.4	16.0	53.4	53.4	32.7	32.7	32.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	59.3	43.8	43.8	18.8	54.0	54.0	30.2	30.2	30.2	12.8	12.8	
Actuated g/C Ratio	0.51	0.37	0.37	0.16	0.46	0.46	0.26	0.26	0.26	0.11	0.11	
v/c Ratio	0.24	0.76	0.59	0.63	0.72	0.04	0.67	0.67	0.63	0.14	0.46	
Control Delay	15.4	37.5	5.5	53.9	30.2	0.1	48.9	49.0	11.4	54.0	22.8	
Queue Delay	0.0	1.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	15.4	38.7	5.7	53.9	30.2	0.1	48.9	49.0	11.4	54.0	22.8	
LOS	B	D	A	D	C	A	D	D	B	D	C	
Approach Delay		26.5			34.7			33.0			28.7	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 116.9
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 31.1
 Intersection LOS: C
 Intersection Capacity Utilization 68.3%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Total 2024

4: Oakwood Drive & McLeod Road

PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	64	928	508	317	1102	30	271	274	401	25	108
v/c Ratio	0.24	0.76	0.59	0.63	0.72	0.04	0.67	0.67	0.63	0.14	0.46
Control Delay	15.4	37.5	5.5	53.9	30.2	0.1	48.9	49.0	11.4	54.0	22.8
Queue Delay	0.0	1.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	38.7	5.7	53.9	30.2	0.1	48.9	49.0	11.4	54.0	22.8
Queue Length 50th (m)	6.5	100.5	0.0	37.6	111.8	0.0	62.4	63.1	9.2	5.7	4.6
Queue Length 95th (m)	14.2	134.3	24.0	55.4	149.1	0.0	95.0	95.5	40.5	14.7	22.6
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	268	1378	906	552	1650	777	501	504	700	201	250
Starvation Cap Reductn	0	236	61	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.24	0.81	0.60	0.57	0.67	0.04	0.54	0.54	0.57	0.12	0.43

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Oakwood Drive & McLeod Road

Future Total 2024
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	59	854	467	292	1014	28	489	12	369	23	18	81	
Future Volume (vph)	59	854	467	292	1014	28	489	12	369	23	18	81	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00		
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.97		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00		
Satd. Flow (prot)	1616	3264	1452	3166	3296	1415	1566	1575	1441	1681	1452		
Flt Permitted	0.16	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00		
Satd. Flow (perm)	273	3264	1452	3166	3296	1415	1566	1575	1441	1681	1452		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	64	928	508	317	1102	30	532	13	401	25	20	88	
RTOR Reduction (vph)	0	0	315	0	0	16	0	0	262	0	78	0	
Lane Group Flow (vph)	64	928	193	317	1102	14	271	274	139	25	30	0	
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6	
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%	
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA		
Protected Phases	7	4		3	8		2	2		6	6		
Permitted Phases	4		4			8			2				
Actuated Green, G (s)	45.7	40.5	40.5	14.7	50.0	50.0	26.1	26.1	26.1	8.7	8.7		
Effective Green, g (s)	53.7	44.5	44.5	18.7	54.0	54.0	30.1	30.1	30.1	12.7	12.7		
Actuated g/C Ratio	0.46	0.38	0.38	0.16	0.46	0.46	0.26	0.26	0.26	0.11	0.11		
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3		
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
Lane Grp Cap (vph)	230	1239	551	505	1518	651	402	404	370	182	157		
v/s Ratio Prot	0.02	0.28		c0.10	c0.33		0.17	c0.17		0.01	c0.02		
v/s Ratio Perm	0.11		0.13			0.01			0.10				
v/c Ratio	0.28	0.75	0.35	0.63	0.73	0.02	0.67	0.68	0.38	0.14	0.19		
Uniform Delay, d1	19.3	31.5	26.0	46.0	25.6	17.2	39.1	39.2	35.8	47.3	47.6		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.5	2.4	0.3	2.1	1.6	0.0	4.0	4.1	0.5	0.3	0.4		
Delay (s)	19.8	33.9	26.3	48.1	27.3	17.2	43.2	43.3	36.3	47.5	48.0		
Level of Service	B	C	C	D	C	B	D	D	D	D	D		
Approach Delay (s)		30.7			31.6			40.3			47.9		
Approach LOS		C			C			D			D		
Intersection Summary													
HCM 2000 Control Delay			33.9		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.63										
Actuated Cycle Length (s)			117.2		Sum of lost time (s)					11.2			
Intersection Capacity Utilization			68.3%		ICU Level of Service					C			
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2024
PM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	359	9	1	401	335	343
Future Volume (vph)	359	9	1	401	335	343
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.997				0.924	
Flt Protected	0.954					
Satd. Flow (prot)	1683	0	0	3233	3061	0
Flt Permitted	0.954			0.954		
Satd. Flow (perm)	1683	0	0	3084	3061	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2				373	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			240.9	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Adj. Flow (vph)	390	10	1	436	364	373
Shared Lane Traffic (%)						
Lane Group Flow (vph)	400	0	0	437	737	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2024
PM Peak

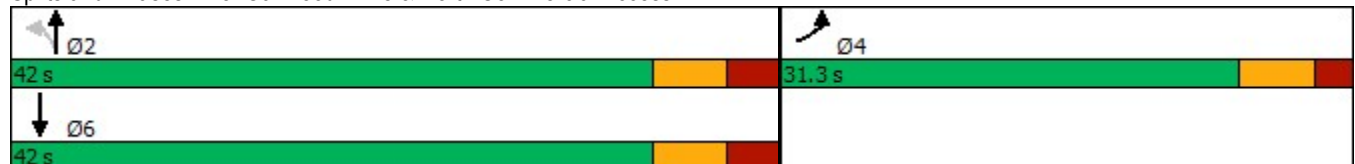


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effct Green (s)	24.2			39.2	39.2	
Actuated g/C Ratio	0.35			0.57	0.57	
v/c Ratio	0.67			0.25	0.39	
Control Delay	25.0			8.6	4.9	
Queue Delay	0.0			0.0	0.0	
Total Delay	25.0			8.6	4.9	
LOS	C			A	A	
Approach Delay	25.0			8.6	4.9	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	68.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	11.0
Intersection LOS:	B
Intersection Capacity Utilization:	50.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues

Future Total 2024

5: Oakwood Drive & North Commercial Access

PM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	400	437	737
v/c Ratio	0.67	0.25	0.39
Control Delay	25.0	8.6	4.9
Queue Delay	0.0	0.0	0.0
Total Delay	25.0	8.6	4.9
Queue Length 50th (m)	42.2	13.8	11.2
Queue Length 95th (m)	69.1	23.8	22.4
Internal Link Dist (m)	45.0	216.9	285.0
Turn Bay Length (m)			
Base Capacity (vph)	715	1759	1907
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.56	0.25	0.39
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Total 2024
PM Peak

























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	359	9	1	401	335	343
Future Volume (vph)	359	9	1	401	335	343
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.92	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1681			3233	3061	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1681			3084	3061	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	390	10	1	436	364	373
RTOR Reduction (vph)	1	0	0	0	160	0
Lane Group Flow (vph)	399	0	0	437	577	0
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	20.1			35.2	35.2	
Effective Green, g (s)	24.1			39.2	39.2	
Actuated g/C Ratio	0.35			0.57	0.57	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	590			1762	1749	
v/s Ratio Prot	c0.24				c0.19	
v/s Ratio Perm				0.14		
v/c Ratio	0.68			0.25	0.33	
Uniform Delay, d1	18.9			7.3	7.8	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	3.1			0.3	0.5	
Delay (s)	22.0			7.7	8.3	
Level of Service	C			A	A	
Approach Delay (s)	22.0			7.7	8.3	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	5.3
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2024
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	143	0	43	146	31	0	0	53	165	0	81
Future Volume (vph)	48	143	0	43	146	31	0	0	53	165	0	81
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Ped Bike Factor	1.00					0.98						
Fr _t						0.850		0.850				0.850
Fl _t Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1681	1718	0	1648	1718	1504	1735	1475	0	1586	1735	1504
Fl _t Permitted	0.619			0.659						0.950		
Satd. Flow (perm)	1094	1718	0	1143	1718	1471	1735	1475	0	1586	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		632				836
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			122.6			120.6				82.8
Travel Time (s)		19.6			8.8			9.0				6.2
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Adj. Flow (vph)	52	155	0	47	159	34	0	0	58	179	0	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	155	0	47	159	34	0	58	0	179	0	88
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2024
 PM Peak

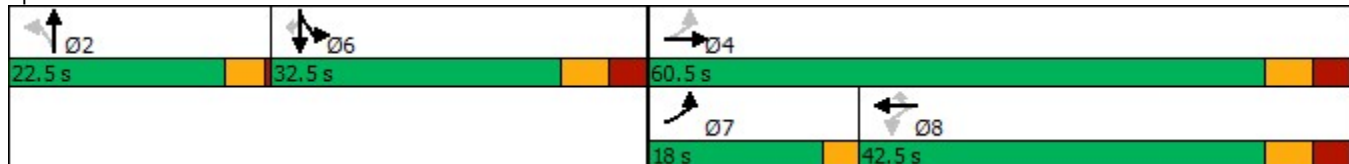


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	Min	Min		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.5	57.0		39.0	39.0	39.0		8.7		35.0		35.0
Actuated g/C Ratio	0.57	0.53		0.36	0.36	0.36		0.08		0.32		0.32
v/c Ratio	0.07	0.17		0.11	0.26	0.06		0.08		0.35		0.08
Control Delay	10.6	13.8		23.9	25.6	0.2		0.2		30.1		0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0		0.0
Total Delay	10.6	13.8		23.9	25.6	0.2		0.2		30.1		0.2
LOS	B	B		C	C	A		A		C		A
Approach Delay		13.0			21.6			0.2				20.2
Approach LOS		B			C			A				C

Intersection Summary

Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 107.7
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.35
 Intersection Signal Delay: 17.2
 Intersection LOS: B
 Intersection Capacity Utilization 55.8%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive

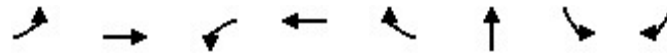


Queues

Future Total 2024

6: Site Access 1/South Commercial Access & Oakwood Drive

PM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBR
Lane Group Flow (vph)	52	155	47	159	34	58	179	88
v/c Ratio	0.07	0.17	0.11	0.26	0.06	0.08	0.35	0.08
Control Delay	10.6	13.8	23.9	25.6	0.2	0.2	30.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	13.8	23.9	25.6	0.2	0.2	30.1	0.2
Queue Length 50th (m)	4.6	16.1	6.5	23.2	0.0	0.0	28.4	0.0
Queue Length 95th (m)	9.9	27.1	14.7	38.9	0.0	0.0	46.9	0.0
Internal Link Dist (m)		248.4		98.6		96.6		
Turn Bay Length (m)			85.0					
Base Capacity (vph)	728	909	413	622	602	808	515	1053
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	0.07	0.17	0.11	0.26	0.06	0.07	0.35	0.08

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive










Future Total 2024
 PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	143	0	43	146	31	0	0	53	165	0	81
Future Volume (vph)	48	143	0	43	146	31	0	0	53	165	0	81
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5		3.5	3.5	3.5		0.0		3.5		3.5
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00		1.00		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frt	1.00	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)	1679	1718		1648	1718	1471		1475		1586		1504
Flt Permitted	0.62	1.00		0.66	1.00	1.00		1.00		0.95		1.00
Satd. Flow (perm)	1094	1718		1143	1718	1471		1475		1586		1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	155	0	47	159	34	0	0	58	179	0	88
RTOR Reduction (vph)	0	0	0	0	0	22	0	53	0	0	0	59
Lane Group Flow (vph)	52	155	0	47	159	12	0	5	0	179	0	29
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	53.0	53.0		35.0	35.0	35.0		4.7		31.0		31.0
Effective Green, g (s)	57.0	57.0		39.0	39.0	39.0		8.7		35.0		35.0
Actuated g/C Ratio	0.53	0.53		0.36	0.36	0.36		0.08		0.32		0.32
Clearance Time (s)	3.0	7.5		7.5	7.5	7.5		4.0		7.5		7.5
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2		2.2		2.2		2.2
Lane Grp Cap (vph)	682	909		413	622	532		119		515		488
v/s Ratio Prot	0.01	c0.09			c0.09			c0.00		c0.11		
v/s Ratio Perm	0.03			0.04		0.01						0.02
v/c Ratio	0.08	0.17		0.11	0.26	0.02		0.04		0.35		0.06
Uniform Delay, d1	12.3	13.1		22.9	24.1	22.1		45.6		27.7		25.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Incremental Delay, d2	0.2	0.4		0.6	1.0	0.1		0.1		1.9		0.2
Delay (s)	12.6	13.5		23.4	25.1	22.2		45.7		29.5		25.2
Level of Service	B	B		C	C	C		D		C		C
Approach Delay (s)		13.3			24.4			45.7			28.1	
Approach LOS		B			C			D				C
Intersection Summary												
HCM 2000 Control Delay			24.3				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.25									
Actuated Cycle Length (s)			107.7				Sum of lost time (s)			7.0		
Intersection Capacity Utilization			55.8%				ICU Level of Service			B		
Analysis Period (min)			15									

c Critical Lane Group










Lanes, Volumes, Timings
7: Oakwood Drive & Site Access 2

Future Total 2024
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	7	4	188	4	3	224
Future Volume (vph)	7	4	188	4	3	224
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.955		0.997			
Flt Protected	0.968					0.999
Satd. Flow (prot)	1604	0	1730	0	0	1733
Flt Permitted	0.968					0.999
Satd. Flow (perm)	1604	0	1730	0	0	1733
Link Speed (k/h)	48		50			60
Link Distance (m)	39.5		2126.3			272.4
Travel Time (s)	3.0		153.1			16.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	4	204	4	3	243
Shared Lane Traffic (%)						
Lane Group Flow (vph)	12	0	208	0	0	246
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	25.4%			ICU Level of Service A		
Analysis Period (min)	15					














HCM Unsignalized Intersection Capacity Analysis
7: Oakwood Drive & Site Access 2

Future Total 2024
PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	7	4	188	4	3	224
Future Volume (Veh/h)	7	4	188	4	3	224
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	4	204	4	3	243
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	272					
pX, platoon unblocked	0.96					
vC, conflicting volume	455	206			208	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	415	206			208	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	571	835			1363	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	12	208	246			
Volume Left	8	0	3			
Volume Right	4	4	0			
cSH	638	1700	1363			
Volume to Capacity	0.02	0.12	0.00			
Queue Length 95th (m)	0.4	0.0	0.1			
Control Delay (s)	10.8	0.0	0.1			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			25.4%	ICU Level of Service	A	
Analysis Period (min)			15			














Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Total 2024
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	105	7	210	113	10	222
Future Volume (vph)	105	7	210	113	10	222
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.947			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1504	3143	0	1681	3233
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1504	3143	0	1681	3233
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	4%
Adj. Flow (vph)	114	8	228	123	11	241
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	8	351	0	11	241
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	23.2%			ICU Level of Service A		
Analysis Period (min)	15					

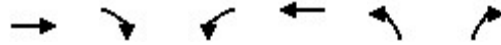
HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive

Future Total 2024
PM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	105	7	210	113	10	222	
Future Volume (Veh/h)	105	7	210	113	10	222	
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	114	8	228	123	11	241	
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	432	176			351		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	432	176			351		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	79	99			99		
cM capacity (veh/h)	552	844			1219		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	114	8	152	199	11	120	120
Volume Left	114	0	0	0	11	0	0
Volume Right	0	8	0	123	0	0	0
cSH	552	844	1700	1700	1219	1700	1700
Volume to Capacity	0.21	0.01	0.09	0.12	0.01	0.07	0.07
Queue Length 95th (m)	5.9	0.2	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	13.2	9.3	0.0	0.0	8.0	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	13.0	0.0		0.3			
Approach LOS	B						
Intersection Summary							
Average Delay			2.3				
Intersection Capacity Utilization			23.2%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive

Future Total 2024
 PM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↑
Traffic Volume (vph)	361	1	0	219	0	7
Future Volume (vph)	361	1	0	219	0	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Flt						0.865
Flt Protected						
Satd. Flow (prot)	3296	0	0	3296	0	1501
Flt Permitted						
Satd. Flow (perm)	3296	0	0	3296	0	1501
Link Speed (k/h)	50			50	48	
Link Distance (m)	122.6			240.9	86.6	
Travel Time (s)	8.8			17.3	6.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	392	1	0	238	0	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	393	0	0	238	0	8
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Yield	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	20.9%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive
























Future Total 2024
 PM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	361	1	0	219	0	7
Future Volume (Veh/h)	361	1	0	219	0	7
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	392	1	0	238	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	123			241		
pX, platoon unblocked						
vC, conflicting volume			392		512	196
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			392		512	196
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1163		492	812
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	261	132	119	119	8	
Volume Left	0	0	0	0	0	
Volume Right	0	1	0	0	8	
cSH	1700	1700	1700	1700	812	
Volume to Capacity	0.15	0.08	0.07	0.07	0.01	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.2	
Control Delay (s)	0.0	0.0	0.0	0.0	9.5	
Lane LOS					A	
Approach Delay (s)	0.0		0.0		9.5	
Approach LOS					A	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			20.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Background 2029
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	872	6	23	708	237	19	78	104	158	47	90
Future Volume (vph)	98	872	6	23	708	237	19	78	104	158	47	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98						
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1437	4594	0	1227	3264	1419	1681	1594	1319	1556	1475	1308
Flt Permitted	0.193			0.235			0.724			0.702		
Satd. Flow (perm)	292	4594	0	304	3264	1385	1281	1594	1319	1150	1475	1308
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				258			113			98
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	2					2						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%
Adj. Flow (vph)	107	948	7	25	770	258	21	85	113	172	51	98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	955	0	25	770	258	21	85	113	172	51	98
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

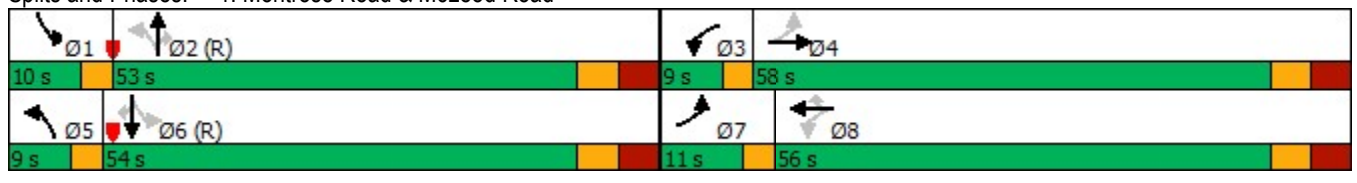
Future Background 2029
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.1	46.1
Total Split (s)	11.0	58.0		9.0	56.0	56.0	9.0	53.0	53.0	10.0	54.0	54.0
Total Split (%)	8.5%	44.6%		6.9%	43.1%	43.1%	6.9%	40.8%	40.8%	7.7%	41.5%	41.5%
Maximum Green (s)	8.0	50.0		6.0	48.0	48.0	6.0	45.0	45.0	7.0	46.0	46.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	62.2	51.0		58.6	42.8	42.8	64.2	48.9	48.9	69.8	59.1	59.1
Actuated g/C Ratio	0.48	0.39		0.45	0.33	0.33	0.49	0.38	0.38	0.54	0.45	0.45
v/c Ratio	0.39	0.53		0.12	0.72	0.41	0.03	0.14	0.20	0.26	0.08	0.15
Control Delay	21.6	31.1		16.4	41.8	5.2	18.0	32.5	7.5	18.8	25.7	6.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	31.1		16.4	41.8	5.2	18.0	32.5	7.5	18.8	25.7	6.1
LOS	C	C		B	D	A	B	C	A	B	C	A
Approach Delay		30.2			32.3			18.2			16.0	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 28.3 Intersection LOS: C
 Intersection Capacity Utilization 53.7% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Background 2029

1: Montrose Road & McLeod Road

AM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	107	955	25	770	258	21	85	113	172	51	98
v/c Ratio	0.39	0.53	0.12	0.72	0.41	0.03	0.14	0.20	0.26	0.08	0.15
Control Delay	21.6	31.1	16.4	41.8	5.2	18.0	32.5	7.5	18.8	25.7	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	31.1	16.4	41.8	5.2	18.0	32.5	7.5	18.8	25.7	6.1
Queue Length 50th (m)	15.1	70.9	3.3	90.6	0.0	2.4	14.2	0.0	22.2	7.6	0.0
Queue Length 95th (m)	21.4	74.1	6.8	102.4	16.5	7.9	32.4	15.0	42.8	18.8	12.3
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	275	1934	213	1305	708	663	661	613	670	686	661
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.49	0.12	0.59	0.36	0.03	0.13	0.18	0.26	0.07	0.15

Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Background 2029

1: Montrose Road & McLeod Road

AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	98	872	6	23	708	237	19	78	104	158	47	90	
Future Volume (vph)	98	872	6	23	708	237	19	78	104	158	47	90	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1437	4594		1227	3264	1385	1681	1594	1319	1556	1475	1308	
Flt Permitted	0.19	1.00		0.23	1.00	1.00	0.72	1.00	1.00	0.70	1.00	1.00	
Satd. Flow (perm)	291	4594		303	3264	1385	1281	1594	1319	1150	1475	1308	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	107	948	7	25	770	258	21	85	113	172	51	98	
RTOR Reduction (vph)	0	1	0	0	0	171	0	0	72	0	0	55	
Lane Group Flow (vph)	107	954	0	25	770	87	21	85	41	172	51	43	
Confl. Peds. (#/hr)	2					2							
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	54.4	47.0		44.4	40.0	40.0	47.5	43.6	43.6	59.6	52.7	52.7	
Effective Green, g (s)	58.4	51.0		52.4	44.0	44.0	55.5	47.6	47.6	63.6	56.7	56.7	
Actuated g/C Ratio	0.45	0.39		0.40	0.34	0.34	0.43	0.37	0.37	0.49	0.44	0.44	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	266	1802		181	1104	468	571	583	482	615	643	570	
v/s Ratio Prot	c0.05	0.21		0.01	c0.24		0.00	0.05		c0.04	0.03		
v/s Ratio Perm	0.13			0.05		0.06	0.01		0.03	0.10		0.03	
v/c Ratio	0.40	0.53		0.14	0.70	0.19	0.04	0.15	0.09	0.28	0.08	0.07	
Uniform Delay, d1	23.2	30.3		23.9	37.2	30.4	21.6	27.6	27.0	19.1	21.4	21.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.2		0.3	1.8	0.1	0.0	0.5	0.4	0.2	0.2	0.3	
Delay (s)	23.9	30.5		24.2	39.0	30.5	21.6	28.1	27.3	19.2	21.6	21.6	
Level of Service	C	C		C	D	C	C	C	C	B	C	C	
Approach Delay (s)		29.9			36.6			27.1			20.4		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			31.1									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.40										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			53.7%									ICU Level of Service	A
Analysis Period (min)			15										

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑↑					↑↑	↑	↑
Traffic Volume (vph)	0	947	0	101	598	115	0	0	0	379	134	307
Future Volume (vph)	0	947	0	101	598	115	0	0	0	379	134	307
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00								
Frt					0.976						0.938	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4473	1769	1586	4351	0	0	0	0	3048	1467	1374
Flt Permitted				0.219						0.950		
Satd. Flow (perm)	0	4473	1769	365	4351	0	0	0	0	3048	1467	1374
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					54						52	152
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Adj. Flow (vph)	0	1029	0	110	650	125	0	0	0	412	146	334
Shared Lane Traffic (%)												31%
Lane Group Flow (vph)	0	1029	0	110	775	0	0	0	0	412	250	230
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

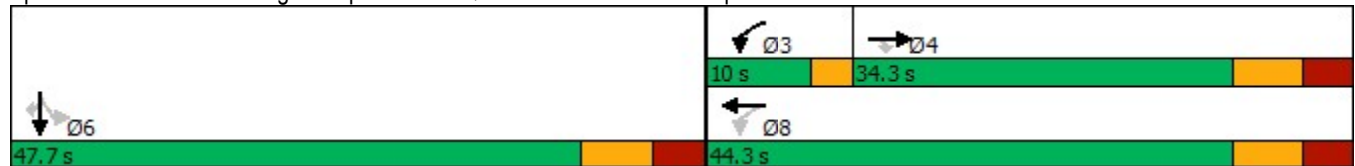


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	-4.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	4.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		27.3		40.1	34.6					20.7	20.7	20.7
Actuated g/C Ratio		0.42		0.62	0.54					0.32	0.32	0.32
v/c Ratio		0.55		0.26	0.33					0.42	0.50	0.42
Control Delay		16.8		7.7	8.8					19.2	18.2	9.5
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		16.8		7.7	8.8					19.2	18.2	9.5
LOS		B		A	A					B	B	A
Approach Delay		16.8			8.6						16.4	
Approach LOS		B			A						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 64.6
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.55
 Intersection Signal Delay: 14.1
 Intersection LOS: B
 Intersection Capacity Utilization 51.3%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road





Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1029	110	775	412	250	230
v/c Ratio	0.55	0.26	0.33	0.42	0.50	0.42
Control Delay	16.8	7.7	8.8	19.2	18.2	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	7.7	8.8	19.2	18.2	9.5
Queue Length 50th (m)	33.6	4.4	15.3	20.3	20.0	7.2
Queue Length 95th (m)	58.1	13.9	30.4	33.0	41.8	23.8
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2146	441	2803	2096	1025	992
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.25	0.28	0.20	0.24	0.23

Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Background 2029

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	947	0	101	598	115	0	0	0	379	134	307
Future Volume (vph)	0	947	0	101	598	115	0	0	0	379	134	307
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.98					1.00	0.94	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4473		1586	4350					3048	1466	1374
Flt Permitted		1.00		0.22	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4473		365	4350					3048	1466	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1029	0	110	650	125	0	0	0	412	146	334
RTOR Reduction (vph)	0	0	0	0	25	0	0	0	0	0	35	104
Lane Group Flow (vph)	0	1029	0	110	750	0	0	0	0	412	215	126
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		23.2		31.2	31.2					16.6	16.6	16.6
Effective Green, g (s)		27.2		35.2	35.2					20.6	20.6	20.6
Actuated g/C Ratio		0.42		0.54	0.54					0.32	0.32	0.32
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1877		367	2362					968	466	436
v/s Ratio Prot		c0.23		0.04	c0.17						c0.15	
v/s Ratio Perm				0.12						0.14		0.09
v/c Ratio		0.55		0.30	0.32					0.43	0.46	0.29
Uniform Delay, d1		14.2		7.5	8.2					17.4	17.7	16.6
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.3		0.3	0.1					0.2	0.5	0.3
Delay (s)		14.4		7.8	8.2					17.7	18.2	16.9
Level of Service		B		A	A					B	B	B
Approach Delay (s)		14.4			8.2			0.0			17.6	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			13.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			64.8			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			51.3%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

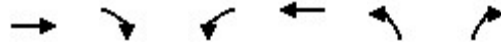
Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2029
AM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	918	409	0	642	96	181
Future Volume (vph)	918	409	0	642	96	181
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Frt	0.954					0.850
Flt Protected					0.950	
Satd. Flow (prot)	4227	0	0	4473	3166	1446
Flt Permitted					0.950	
Satd. Flow (perm)	4227	0	0	4473	3166	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	224					98
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Adj. Flow (vph)	998	445	0	698	104	197
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1443	0	0	698	104	197
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2029
 AM Peak

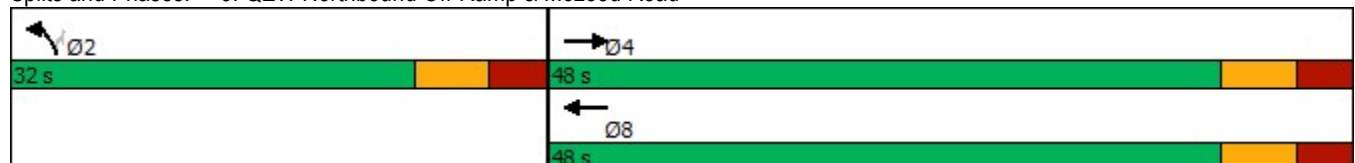


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	48.0			48.0	32.0	32.0
Total Split (%)	60.0%			60.0%	40.0%	40.0%
Maximum Green (s)	40.0			40.0	24.0	24.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	32.2			32.2	14.5	14.5
Actuated g/C Ratio	0.59			0.59	0.26	0.26
v/c Ratio	0.56			0.27	0.12	0.43
Control Delay	6.8			6.0	17.1	13.2
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	6.8			6.0	17.1	13.2
LOS	A			A	B	B
Approach Delay	6.8			6.0	14.6	
Approach LOS	A			A	B	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 54.9
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 7.6
 Intersection Capacity Utilization 48.1%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2029
 AM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1443	698	104	197
v/c Ratio	0.56	0.27	0.12	0.43
Control Delay	6.8	6.0	17.1	13.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.8	6.0	17.1	13.2
Queue Length 50th (m)	19.7	9.5	3.6	7.0
Queue Length 95th (m)	40.9	19.7	10.6	26.7
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3521	3684	1659	804
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	0.41	0.19	0.06	0.25
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2029
AM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↔↔	↔
Traffic Volume (vph)	918	409	0	642	96	181
Future Volume (vph)	918	409	0	642	96	181
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.95			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4226			4473	3166	1446
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4226			4473	3166	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	998	445	0	698	104	197
RTOR Reduction (vph)	92	0	0	0	0	72
Lane Group Flow (vph)	1351	0	0	698	104	125
Confl. Peds. (#/hr)		1	1			
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	28.1			28.1	10.4	10.4
Effective Green, g (s)	32.1			32.1	14.4	14.4
Actuated g/C Ratio	0.59			0.59	0.26	0.26
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2489			2634	836	382
v/s Ratio Prot	c0.32			0.16	0.03	
v/s Ratio Perm						c0.09
v/c Ratio	0.54			0.26	0.12	0.33
Uniform Delay, d1	6.8			5.5	15.3	16.1
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.2			0.0	0.0	0.4
Delay (s)	7.0			5.5	15.3	16.5
Level of Service	A			A	B	B
Approach Delay (s)	7.0			5.5	16.1	
Approach LOS	A			A	B	

























Intersection Summary

HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Background 2029
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	616	327	197	820	25	199	19	171	8	2	40
Future Volume (vph)	82	616	327	197	820	25	199	19	171	8	2	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00	1.00	0.98	1.00	0.98	
Frt			0.850			0.850			0.850		0.857	
Flt Protected	0.950			0.950			0.950	0.961		0.950		
Satd. Flow (prot)	1616	3233	1419	3197	3296	1475	1566	1584	1475	1648	1464	0
Flt Permitted	0.245			0.950			0.950	0.961		0.950		
Satd. Flow (perm)	416	3233	1398	3192	3296	1439	1560	1579	1451	1643	1464	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			355			139			186			43
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	89	670	355	214	891	27	216	21	186	9	2	43
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	89	670	355	214	891	27	119	118	186	9	45	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

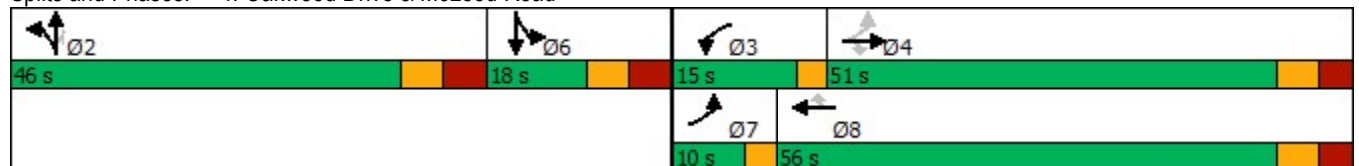
Future Background 2029
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	51.0	51.0	15.0	56.0	56.0	46.0	46.0	46.0	18.0	18.0	
Total Split (%)	7.7%	39.2%	39.2%	11.5%	43.1%	43.1%	35.4%	35.4%	35.4%	13.8%	13.8%	
Maximum Green (s)	7.0	43.4	43.4	12.0	48.4	48.4	37.7	37.7	37.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	46.2	29.7	29.7	14.9	36.0	36.0	16.9	16.9	16.9	13.1	13.1	
Actuated g/C Ratio	0.60	0.38	0.38	0.19	0.47	0.47	0.22	0.22	0.22	0.17	0.17	
v/c Ratio	0.21	0.54	0.47	0.35	0.58	0.04	0.35	0.34	0.40	0.03	0.16	
Control Delay	9.4	22.0	4.6	33.7	19.6	0.1	34.0	33.8	8.2	37.6	15.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	9.4	22.0	4.6	33.7	19.6	0.1	34.0	33.8	8.2	37.6	15.0	
LOS	A	C	A	C	B	A	C	C	A	D	B	
Approach Delay		15.5			21.8			22.6			18.8	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 77.2
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.58
 Intersection Signal Delay: 19.3
 Intersection LOS: B
 Intersection Capacity Utilization 54.4%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Background 2029

4: Oakwood Drive & McLeod Road

AM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	89	670	355	214	891	27	119	118	186	9	45
v/c Ratio	0.21	0.54	0.47	0.35	0.58	0.04	0.35	0.34	0.40	0.03	0.16
Control Delay	9.4	22.0	4.6	33.7	19.6	0.1	34.0	33.8	8.2	37.6	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	22.0	4.6	33.7	19.6	0.1	34.0	33.8	8.2	37.6	15.0
Queue Length 50th (m)	5.9	45.1	0.0	15.5	59.7	0.0	17.5	17.4	0.0	1.3	0.3
Queue Length 95th (m)	14.2	70.4	16.9	31.8	90.4	0.0	38.6	38.3	17.0	6.3	10.6
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	434	2151	1048	717	2362	1070	916	926	926	317	316
Starvation Cap Reductn	0	43	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.21	0.32	0.34	0.30	0.38	0.03	0.13	0.13	0.20	0.03	0.14

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Oakwood Drive & McLeod Road

Future Background 2029
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	616	327	197	820	25	199	19	171	8	2	40
Future Volume (vph)	82	616	327	197	820	25	199	19	171	8	2	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3233	1400	3197	3296	1441	1566	1583	1453	1648	1466	
Flt Permitted	0.24	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	417	3233	1400	3197	3296	1441	1566	1583	1453	1648	1466	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	670	355	214	891	27	216	21	186	9	2	43
RTOR Reduction (vph)	0	0	221	0	0	15	0	0	148	0	39	0
Lane Group Flow (vph)	89	670	134	214	891	12	119	118	38	9	6	0
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	31.7	26.4	26.4	10.5	31.6	31.6	12.5	12.5	12.5	4.1	4.1	
Effective Green, g (s)	39.7	30.4	30.4	14.5	35.6	35.6	16.5	16.5	16.5	8.1	8.1	
Actuated g/C Ratio	0.49	0.38	0.38	0.18	0.44	0.44	0.20	0.20	0.20	0.10	0.10	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	343	1217	527	574	1453	635	320	323	297	165	147	
v/s Ratio Prot	0.03	0.21		c0.07	c0.27		c0.08	0.07		c0.01	0.00	
v/s Ratio Perm	0.10		0.10			0.01			0.03			
v/c Ratio	0.26	0.55	0.25	0.37	0.61	0.02	0.37	0.37	0.13	0.05	0.04	
Uniform Delay, d1	11.4	19.8	17.3	29.1	17.3	12.7	27.6	27.6	26.2	32.8	32.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.4	0.2	0.3	0.7	0.0	0.5	0.5	0.1	0.1	0.1	
Delay (s)	11.7	20.2	17.5	29.4	17.9	12.7	28.2	28.1	26.4	32.9	32.9	
Level of Service	B	C	B	C	B	B	C	C	C	C	C	
Approach Delay (s)		18.7			20.0			27.4			32.9	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			20.8				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.44									
Actuated Cycle Length (s)			80.7				Sum of lost time (s)			11.2		
Intersection Capacity Utilization			54.4%				ICU Level of Service			A		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2029
AM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	181	3	2	202	237	237
Future Volume (vph)	181	3	2	202	237	237
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.998				0.925	
Flt Protected	0.953					
Satd. Flow (prot)	1650	0	0	3059	2962	0
Flt Permitted	0.953			0.952		
Satd. Flow (perm)	1650	0	0	2912	2962	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1				258	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			239.7	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Adj. Flow (vph)	197	3	2	220	258	258
Shared Lane Traffic (%)						
Lane Group Flow (vph)	200	0	0	222	516	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2029
AM Peak

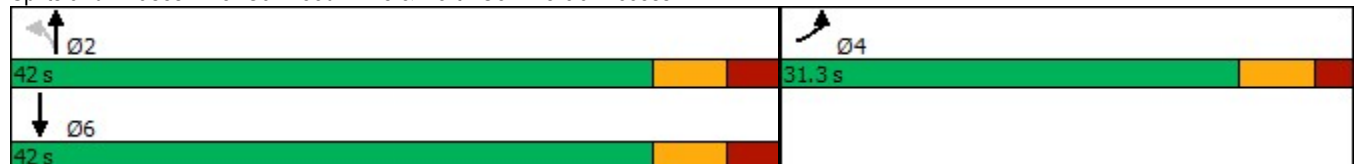


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effct Green (s)	16.9			41.9	41.9	
Actuated g/C Ratio	0.26			0.65	0.65	
v/c Ratio	0.46			0.12	0.25	
Control Delay	22.3			5.0	2.9	
Queue Delay	0.0			0.0	0.0	
Total Delay	22.3			5.0	2.9	
LOS	C			A	A	
Approach Delay	22.3			5.0	2.9	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	64.1
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.46
Intersection Signal Delay:	7.6
Intersection LOS:	A
Intersection Capacity Utilization	33.1%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



5: Oakwood Drive & North Commercial Access

AM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	200	222	516
v/c Ratio	0.46	0.12	0.25
Control Delay	22.3	5.0	2.9
Queue Delay	0.0	0.0	0.0
Total Delay	22.3	5.0	2.9
Queue Length 50th (m)	18.3	4.1	4.9
Queue Length 95th (m)	33.8	9.8	12.7
Internal Link Dist (m)	45.0	215.7	285.0
Turn Bay Length (m)			
Base Capacity (vph)	751	1902	2024
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.27	0.12	0.25
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Background 2029
AM Peak

























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑↑	↑↑	
Traffic Volume (vph)	181	3	2	202	237	237
Future Volume (vph)	181	3	2	202	237	237
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.93	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1650			3057	2962	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1650			2912	2962	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	3	2	220	258	258
RTOR Reduction (vph)	1	0	0	0	89	0
Lane Group Flow (vph)	199	0	0	222	427	0
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.9			37.9	37.9	
Effective Green, g (s)	16.9			41.9	41.9	
Actuated g/C Ratio	0.26			0.65	0.65	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	435			1903	1936	
v/s Ratio Prot	c0.12				c0.14	
v/s Ratio Perm				0.08		
v/c Ratio	0.46			0.12	0.22	
Uniform Delay, d1	19.8			4.2	4.5	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.8			0.1	0.3	
Delay (s)	20.5			4.3	4.8	
Level of Service	C			A	A	
Approach Delay (s)	20.5			4.3	4.8	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	5.3
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2029
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	154	0	0	160	8	0	0	0	43	0	23
Future Volume (vph)	29	154	0	0	160	8	0	0	0	43	0	23
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1616	1638	0	1735	1669	1367	1735	1735	0	1528	1735	1504
Flt Permitted	0.615									0.950		
Satd. Flow (perm)	1046	1638	0	1735	1669	1367	1735	1735	0	1528	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109						821
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			119.4			97.6				82.8
Travel Time (s)		19.6			8.6			7.3				6.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%
Adj. Flow (vph)	32	167	0	0	174	9	0	0	0	47	0	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	167	0	0	174	9	0	0	0	47	0	25
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm			Split		Perm
Protected Phases	7	4			8			2		6		6

Lanes, Volumes, Timings
6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2029
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	None	None		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.5	57.0		39.0	39.0	39.0				35.0		35.0
Actuated g/C Ratio	0.62	0.58		0.39	0.39	0.39				0.35		0.35
v/c Ratio	0.04	0.18		0.26	0.01	0.01				0.09		0.02
Control Delay	7.4	10.5		21.7	0.0	0.0				22.0		0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Total Delay	7.4	10.5		21.7	0.0	0.0				22.0		0.0
LOS	A	B		C	A	A				C		A
Approach Delay		10.0		20.6							14.4	
Approach LOS		B		C							B	

Intersection Summary

Area Type: Other

Cycle Length: 115.5

Actuated Cycle Length: 99

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

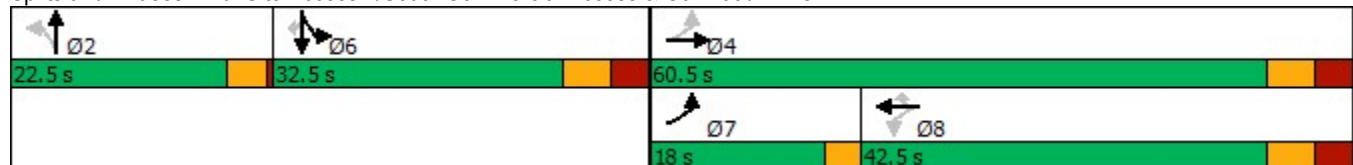
Maximum v/c Ratio: 0.26

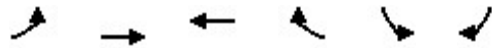
Intersection Signal Delay: 15.0 Intersection LOS: B

Intersection Capacity Utilization 41.2% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive



























Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	32	167	174	9	47	25
v/c Ratio	0.04	0.18	0.26	0.01	0.09	0.02
Control Delay	7.4	10.5	21.7	0.0	22.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.4	10.5	21.7	0.0	22.0	0.0
Queue Length 50th (m)	2.2	14.1	22.1	0.0	6.0	0.0
Queue Length 95th (m)	5.5	24.1	37.5	0.0	13.7	0.0
Internal Link Dist (m)		248.4	95.4			
Turn Bay Length (m)						
Base Capacity (vph)	759	943	657	604	540	1062
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.18	0.26	0.01	0.09	0.02
Intersection Summary						














HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2029
 AM Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	29	154	0	0	160	8	0	0	0	43	0	23	
Future Volume (vph)	29	154	0	0	160	8	0	0	0	43	0	23	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	3.5			3.5	3.5				3.5		3.5	
Lane Util. Factor	1.00	1.00			1.00	1.00				1.00		1.00	
Frt	1.00	1.00			1.00	0.85				1.00		0.85	
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00	
Satd. Flow (prot)	1616	1638			1669	1367				1528		1504	
Flt Permitted	0.61	1.00			1.00	1.00				0.95		1.00	
Satd. Flow (perm)	1046	1638			1669	1367				1528		1504	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	32	167	0	0	174	9	0	0	0	47	0	25	
RTOR Reduction (vph)	0	0	0	0	0	5	0	0	0	0	0	16	
Lane Group Flow (vph)	32	167	0	0	174	4	0	0	0	47	0	9	
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm			Split		Perm	
Protected Phases	7	4			8			2		6	6		
Permitted Phases	4			8		8	2					6	
Actuated Green, G (s)	53.0	53.0			35.0	35.0				31.0		31.0	
Effective Green, g (s)	57.0	57.0			39.0	39.0				35.0		35.0	
Actuated g/C Ratio	0.58	0.58			0.39	0.39				0.35		0.35	
Clearance Time (s)	3.0	7.5			7.5	7.5				7.5		7.5	
Vehicle Extension (s)	2.4	2.2			2.2	2.2				2.2		2.2	
Lane Grp Cap (vph)	711	943			657	538				540		531	
v/s Ratio Prot	0.01	c0.10			c0.10					c0.03			
v/s Ratio Perm	0.02					0.00						0.01	
v/c Ratio	0.05	0.18			0.26	0.01				0.09		0.02	
Uniform Delay, d1	9.1	9.9			20.3	18.2				21.3		20.8	
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00	
Incremental Delay, d2	0.1	0.4			1.0	0.0				0.3		0.1	
Delay (s)	9.2	10.3			21.3	18.3				21.7		20.9	
Level of Service	A	B			C	B				C		C	
Approach Delay (s)		10.2			21.1			0.0			21.4		
Approach LOS		B			C			A			C		
Intersection Summary													
HCM 2000 Control Delay			16.4		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.18										
Actuated Cycle Length (s)			99.0		Sum of lost time (s)					7.0			
Intersection Capacity Utilization			41.2%		ICU Level of Service					A			
Analysis Period (min)			15										
c Critical Lane Group													












Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Background 2029
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	45	7	141	69	11	158
Future Volume (vph)	45	7	141	69	11	158
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.951			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1432	2979	0	1601	3264
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1432	2979	0	1601	3264
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	8%	6%	5%	3%
Adj. Flow (vph)	49	8	153	75	12	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	49	8	228	0	12	172
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	19.9%		ICU Level of Service A			
Analysis Period (min)	15					



























HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive

Future Background 2029
AM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	45	7	141	69	11	158	
Future Volume (Veh/h)	45	7	141	69	11	158	
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	49	8	153	75	12	172	
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	300	114			228		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	300	114			228		
tC, single (s)	6.8	7.0			4.2		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	93	99			99		
cM capacity (veh/h)	666	907			1316		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	49	8	102	126	12	86	86
Volume Left	49	0	0	0	12	0	0
Volume Right	0	8	0	75	0	0	0
cSH	666	907	1700	1700	1316	1700	1700
Volume to Capacity	0.07	0.01	0.06	0.07	0.01	0.05	0.05
Queue Length 95th (m)	1.8	0.2	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	10.8	9.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	10.6	0.0		0.5			
Approach LOS	B						
Intersection Summary							
Average Delay			1.5				
Intersection Capacity Utilization			19.9%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Background 2029
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			 							
Traffic Volume (vph)	97	809	34	96	932	296	30	118	237	370	146	97
Future Volume (vph)	97	809	34	96	932	296	30	118	237	370	146	97
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.97						
Frt		0.994				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1514	4617	0	1542	3296	1460	1681	1685	1475	1664	1669	1446
Flt Permitted	0.111			0.218			0.656			0.650		
Satd. Flow (perm)	177	4617	0	354	3296	1411	1161	1685	1475	1139	1669	1446
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				303			139			105
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	7					7						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%
Adj. Flow (vph)	105	879	37	104	1013	322	33	128	258	402	159	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	916	0	104	1013	322	33	128	258	402	159	105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Background 2029
PM Peak

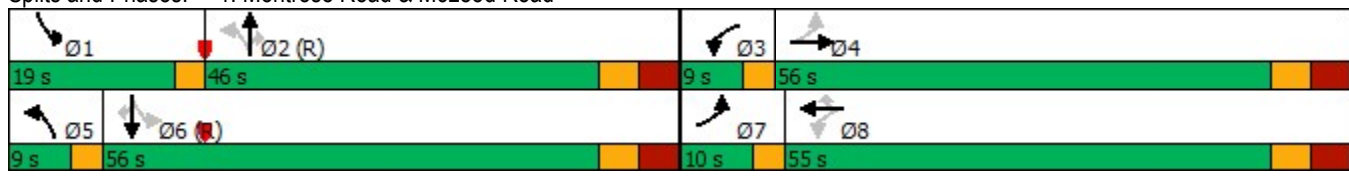


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.0	46.0
Total Split (s)	10.0	56.0		9.0	55.0	55.0	9.0	46.0	46.0	19.0	56.0	56.0
Total Split (%)	7.7%	43.1%		6.9%	42.3%	42.3%	6.9%	35.4%	35.4%	14.6%	43.1%	43.1%
Maximum Green (s)	7.0	48.0		6.0	47.0	47.0	6.0	38.0	38.0	16.0	48.0	48.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	63.9	49.9		63.9	48.9	48.9	58.7	43.7	43.7	68.1	57.7	57.7
Actuated g/C Ratio	0.49	0.38		0.49	0.38	0.38	0.45	0.34	0.34	0.52	0.44	0.44
v/c Ratio	0.53	0.52		0.39	0.82	0.45	0.06	0.23	0.44	0.59	0.21	0.15
Control Delay	27.3	31.5		21.9	42.6	5.8	16.7	33.2	18.0	24.4	25.0	5.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	31.5		21.9	42.6	5.8	16.7	33.2	18.0	24.4	25.0	5.0
LOS	C	C		C	D	A	B	C	B	C	C	A
Approach Delay		31.0			32.8			22.6			21.5	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 29.0
 Intersection Capacity Utilization 72.7%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Background 2029

1: Montrose Road & McLeod Road

PM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	105	916	104	1013	322	33	128	258	402	159	105
v/c Ratio	0.53	0.52	0.39	0.82	0.45	0.06	0.23	0.44	0.59	0.21	0.15
Control Delay	27.3	31.5	21.9	42.6	5.8	16.7	33.2	18.0	24.4	25.0	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	31.5	21.9	42.6	5.8	16.7	33.2	18.0	24.4	25.0	5.0
Queue Length 50th (m)	13.8	63.1	13.7	118.6	3.0	4.1	24.0	22.9	65.0	26.7	0.0
Queue Length 95th (m)	24.2	76.1	23.9	145.3	22.4	9.6	40.0	47.5	92.1	42.8	11.2
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	199	1850	265	1293	737	564	565	587	679	740	699
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.50	0.39	0.78	0.44	0.06	0.23	0.44	0.59	0.21	0.15

Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Background 2029

1: Montrose Road & McLeod Road

PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	97	809	34	96	932	296	30	118	237	370	146	97	
Future Volume (vph)	97	809	34	96	932	296	30	118	237	370	146	97	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1514	4617		1542	3296	1411	1681	1685	1475	1664	1669	1446	
Flt Permitted	0.11	1.00		0.22	1.00	1.00	0.66	1.00	1.00	0.65	1.00	1.00	
Satd. Flow (perm)	177	4617		353	3296	1411	1161	1685	1475	1138	1669	1446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	105	879	37	104	1013	322	33	128	258	402	159	105	
RTOR Reduction (vph)	0	4	0	0	0	189	0	0	92	0	0	59	
Lane Group Flow (vph)	105	912	0	104	1013	133	33	128	166	402	159	46	
Confl. Peds. (#/hr)	7					7							
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	52.9	45.9		50.9	44.9	44.9	43.3	39.7	39.7	59.1	52.5	52.5	
Effective Green, g (s)	58.9	49.9		58.9	48.9	48.9	51.3	43.7	43.7	63.1	56.5	56.5	
Actuated g/C Ratio	0.45	0.38		0.45	0.38	0.38	0.39	0.34	0.34	0.49	0.43	0.43	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	193	1772		251	1239	530	488	566	495	634	725	628	
v/s Ratio Prot	c0.05	0.20		0.03	c0.31		0.00	0.08		c0.10	0.10		
v/s Ratio Perm	0.20			0.16		0.09	0.02		0.11	0.21		0.03	
v/c Ratio	0.54	0.51		0.41	0.82	0.25	0.07	0.23	0.33	0.63	0.22	0.07	
Uniform Delay, d1	25.1	30.8		21.7	36.5	27.9	24.3	31.0	32.3	22.8	23.0	21.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.5	0.2		0.8	4.2	0.2	0.0	0.9	1.8	1.8	0.7	0.2	
Delay (s)	27.6	30.9		22.5	40.7	28.1	24.3	31.9	34.1	24.6	23.7	21.7	
Level of Service	C	C		C	D	C	C	C	C	C	C	C	
Approach Delay (s)		30.6			36.6			32.7			23.9		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			32.0									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.61										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			72.7%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖↗	↘	↗
Traffic Volume (vph)	0	1183	0	155	772	159	0	0	0	548	126	319
Future Volume (vph)	0	1183	0	155	772	159	0	0	0	548	126	319
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00	1.00							
Frt					0.974						0.932	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4736	1769	1616	4533	0	0	0	0	3136	1528	1401
Flt Permitted				0.143						0.950		
Satd. Flow (perm)	0	4736	1769	243	4533	0	0	0	0	3136	1528	1401
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					60						62	98
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)	3		3	3		3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Adj. Flow (vph)	0	1286	0	168	839	173	0	0	0	596	137	347
Shared Lane Traffic (%)												33%
Lane Group Flow (vph)	0	1286	0	168	1012	0	0	0	0	596	252	232
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

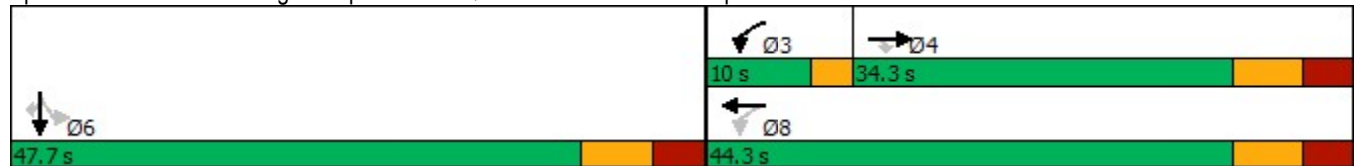


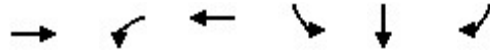
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	0.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	8.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		28.9		44.1	38.7					25.4	25.4	25.4
Actuated g/C Ratio		0.39		0.60	0.53					0.35	0.35	0.35
v/c Ratio		0.69		0.48	0.42					0.55	0.44	0.42
Control Delay		21.7		13.6	11.1					21.3	16.2	12.8
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		21.7		13.6	11.1					21.3	16.2	12.8
LOS		C		B	B					C	B	B
Approach Delay		21.7			11.5						18.3	
Approach LOS		C			B						B	

Intersection Summary

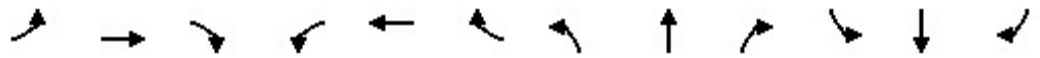
Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 73.3
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 17.2
 Intersection LOS: B
 Intersection Capacity Utilization 61.9%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road





Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1286	168	1012	596	252	232
v/c Ratio	0.69	0.48	0.42	0.55	0.44	0.42
Control Delay	21.7	13.6	11.1	21.3	16.2	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	13.6	11.1	21.3	16.2	12.8
Queue Length 50th (m)	51.9	9.0	26.1	34.3	20.7	14.2
Queue Length 95th (m)	81.4	25.9	45.9	48.0	39.5	31.2
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	1963	354	2532	1864	933	872
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.47	0.40	0.32	0.27	0.27
Intersection Summary						



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖↗	↘	↗
Traffic Volume (vph)	0	1183	0	155	772	159	0	0	0	548	126	319
Future Volume (vph)	0	1183	0	155	772	159	0	0	0	548	126	319
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.97					1.00	0.93	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4736		1616	4536					3136	1527	1401
Flt Permitted		1.00		0.14	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4736		244	4536					3136	1527	1401
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1286	0	168	839	173	0	0	0	596	137	347
RTOR Reduction (vph)	0	0	0	0	28	0	0	0	0	0	40	64
Lane Group Flow (vph)	0	1286	0	168	984	0	0	0	0	596	212	168
Confl. Peds. (#/hr)	3		3	3		3						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		24.9		34.7	34.7					21.4	21.4	21.4
Effective Green, g (s)		28.9		38.7	38.7					25.4	25.4	25.4
Actuated g/C Ratio		0.40		0.53	0.53					0.35	0.35	0.35
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1872		331	2401					1089	530	486
v/s Ratio Prot		c0.27		c0.07	0.22						0.14	
v/s Ratio Perm				0.19						c0.19		0.12
v/c Ratio		0.69		0.51	0.41					0.55	0.40	0.35
Uniform Delay, d1		18.3		10.3	10.3					19.2	18.1	17.7
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		1.0		0.9	0.1					0.4	0.4	0.3
Delay (s)		19.3		11.2	10.4					19.7	18.4	18.0
Level of Service		B		B	B					B	B	B
Approach Delay (s)		19.3			10.5			0.0			19.0	
Approach LOS		B			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			16.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			73.1			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			61.9%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2029
PM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1263	421	0	964	130	184
Future Volume (vph)	1263	421	0	964	130	184
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Frt	0.962					0.850
Flt Protected					0.950	
Satd. Flow (prot)	4462	0	0	4690	3197	1489
Flt Permitted					0.950	
Satd. Flow (perm)	4462	0	0	4690	3197	1489
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	188					50
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Adj. Flow (vph)	1373	458	0	1048	141	200
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1831	0	0	1048	141	200
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2029
 PM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	52.0			52.0	28.0	28.0
Total Split (%)	65.0%			65.0%	35.0%	35.0%
Maximum Green (s)	44.0			44.0	20.0	20.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	41.2			41.2	16.6	16.6
Actuated g/C Ratio	0.62			0.62	0.25	0.25
v/c Ratio	0.64			0.36	0.18	0.49
Control Delay	8.4			6.7	21.2	21.1
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	8.4			6.7	21.2	21.1
LOS	A			A	C	C
Approach Delay	8.4			6.7	21.1	
Approach LOS	A			A	C	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 66
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 9.2
 Intersection Capacity Utilization 55.8%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2029
 PM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1831	1048	141	200
v/c Ratio	0.64	0.36	0.18	0.49
Control Delay	8.4	6.7	21.2	21.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.4	6.7	21.2	21.1
Queue Length 50th (m)	37.9	19.0	7.2	15.9
Queue Length 95th (m)	68.0	34.2	14.4	35.7
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3383	3507	1195	588
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	0.54	0.30	0.12	0.34
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2029
PM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1263	421	0	964	130	184
Future Volume (vph)	1263	421	0	964	130	184
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.96			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4465			4690	3197	1489
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4465			4690	3197	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1373	458	0	1048	141	200
RTOR Reduction (vph)	70	0	0	0	0	37
Lane Group Flow (vph)	1761	0	0	1048	141	163
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	37.1			37.1	12.4	12.4
Effective Green, g (s)	41.1			41.1	16.4	16.4
Actuated g/C Ratio	0.63			0.63	0.25	0.25
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2801			2942	800	372
v/s Ratio Prot	c0.39			0.22	0.04	
v/s Ratio Perm						c0.11
v/c Ratio	0.63			0.36	0.18	0.44
Uniform Delay, d1	7.5			5.9	19.3	20.7
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.4			0.1	0.1	0.6
Delay (s)	7.9			5.9	19.3	21.3
Level of Service	A			A	B	C
Approach Delay (s)	7.9			5.9	20.5	
Approach LOS	A			A	C	

























Intersection Summary

HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	65.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Background 2029
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	943	477	312	1120	31	490	13	387	25	20	90
Future Volume (vph)	65	943	477	312	1120	31	490	13	387	25	20	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	0.98	0.98	0.99	1.00	0.97	
Fr _t			0.850			0.850			0.850		0.877	
Fl _t Protected	0.950			0.950			0.950	0.955		0.950		
Satd. Flow (prot)	1616	3264	1475	3166	3296	1446	1566	1575	1460	1681	1448	0
Fl _t Permitted	0.115			0.950			0.950	0.955		0.950		
Satd. Flow (perm)	196	3264	1452	3161	3296	1414	1534	1545	1441	1680	1448	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			518			139			319			98
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Adj. Flow (vph)	71	1025	518	339	1217	34	533	14	421	27	22	98
Shared Lane Traffic (%)							49%					
Lane Group Flow (vph)	71	1025	518	339	1217	34	272	275	421	27	120	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

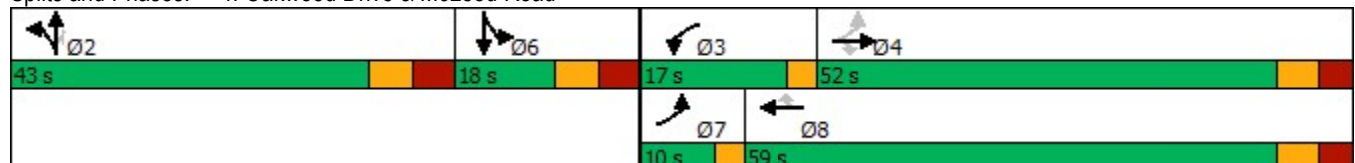
Future Background 2029
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	52.0	52.0	17.0	59.0	59.0	43.0	43.0	43.0	18.0	18.0	
Total Split (%)	7.7%	40.0%	40.0%	13.1%	45.4%	45.4%	33.1%	33.1%	33.1%	13.8%	13.8%	
Maximum Green (s)	7.0	44.4	44.4	14.0	51.4	51.4	34.7	34.7	34.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	61.2	45.8	45.8	17.7	55.0	55.0	30.9	30.9	30.9	12.8	12.8	
Actuated g/C Ratio	0.52	0.39	0.39	0.15	0.46	0.46	0.26	0.26	0.26	0.11	0.11	
v/c Ratio	0.31	0.81	0.59	0.72	0.80	0.05	0.67	0.67	0.69	0.15	0.49	
Control Delay	17.1	39.7	5.4	59.1	33.7	0.1	48.2	48.3	16.3	54.1	22.9	
Queue Delay	0.0	3.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.1	43.1	5.6	59.1	33.7	0.1	48.2	48.3	16.3	54.1	22.9	
LOS	B	D	A	E	C	A	D	D	B	D	C	
Approach Delay		29.9			38.4			34.4			28.6	
Approach LOS		C			D			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 118.6
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 34.0
 Intersection LOS: C
 Intersection Capacity Utilization 72.7%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Background 2029

4: Oakwood Drive & McLeod Road

PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	71	1025	518	339	1217	34	272	275	421	27	120
v/c Ratio	0.31	0.81	0.59	0.72	0.80	0.05	0.67	0.67	0.69	0.15	0.49
Control Delay	17.1	39.7	5.4	59.1	33.7	0.1	48.2	48.3	16.3	54.1	22.9
Queue Delay	0.0	3.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.1	43.1	5.6	59.1	33.7	0.1	48.2	48.3	16.3	54.1	22.9
Queue Length 50th (m)	7.2	112.1	0.0	40.4	129.7	0.0	61.1	62.0	19.7	6.0	4.9
Queue Length 95th (m)	16.1	153.7	24.5	#62.7	178.1	0.0	93.2	94.0	56.9	15.8	24.4
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	235	1347	903	486	1557	741	517	520	689	196	255
Starvation Cap Reductn	0	227	61	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.30	0.92	0.62	0.70	0.78	0.05	0.53	0.53	0.61	0.14	0.47




























Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
4: Oakwood Drive & McLeod Road

Future Background 2029
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 		 	 							
Traffic Volume (vph)	65	943	477	312	1120	31	490	13	387	25	20	90
Future Volume (vph)	65	943	477	312	1120	31	490	13	387	25	20	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3264	1452	3166	3296	1415	1566	1575	1441	1681	1451	
Flt Permitted	0.11	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	195	3264	1452	3166	3296	1415	1566	1575	1441	1681	1451	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	1025	518	339	1217	34	533	14	421	27	22	98
RTOR Reduction (vph)	0	0	316	0	0	18	0	0	236	0	88	0
Lane Group Flow (vph)	71	1025	202	339	1217	16	272	275	185	27	32	0
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	47.8	42.5	42.5	13.7	50.9	50.9	26.9	26.9	26.9	8.7	8.7	
Effective Green, g (s)	55.8	46.5	46.5	17.7	54.9	54.9	30.9	30.9	30.9	12.7	12.7	
Actuated g/C Ratio	0.47	0.39	0.39	0.15	0.46	0.46	0.26	0.26	0.26	0.11	0.11	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	202	1275	567	470	1520	652	406	408	374	179	154	
v/s Ratio Prot	0.03	0.31		c0.11	c0.37		0.17	c0.17		0.02	c0.02	
v/s Ratio Perm	0.14		0.14			0.01			0.13			
v/c Ratio	0.35	0.80	0.36	0.72	0.80	0.02	0.67	0.67	0.49	0.15	0.21	
Uniform Delay, d1	20.4	32.2	25.7	48.3	27.4	17.5	39.5	39.5	37.4	48.3	48.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	3.7	0.3	5.1	3.0	0.0	3.8	4.0	0.7	0.3	0.5	
Delay (s)	21.1	35.9	25.9	53.4	30.4	17.5	43.2	43.5	38.2	48.5	49.1	
Level of Service	C	D	C	D	C	B	D	D	D	D	D	
Approach Delay (s)		32.0			35.0			41.1			49.0	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			35.7	HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			119.0	Sum of lost time (s)				11.2				
Intersection Capacity Utilization			72.7%	ICU Level of Service				C				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2029
PM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	396	9	1	374	320	379
Future Volume (vph)	396	9	1	374	320	379
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Flt	0.997				0.919	
Flt Protected	0.953					
Satd. Flow (prot)	1681	0	0	3233	3048	0
Flt Permitted	0.953			0.954		
Satd. Flow (perm)	1681	0	0	3084	3048	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2				412	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			240.9	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Adj. Flow (vph)	430	10	1	407	348	412
Shared Lane Traffic (%)						
Lane Group Flow (vph)	440	0	0	408	760	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2029
PM Peak

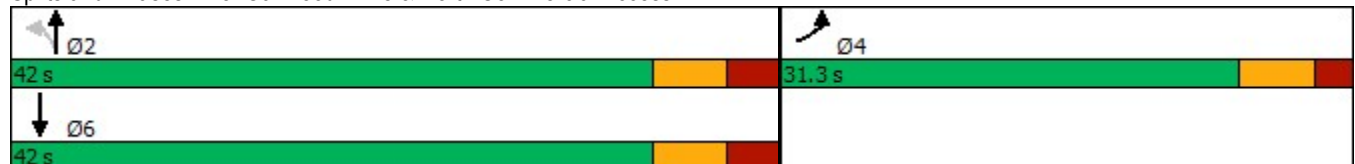


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	25.3			39.1	39.1	
Actuated g/C Ratio	0.36			0.56	0.56	
v/c Ratio	0.72			0.24	0.40	
Control Delay	26.6			8.8	4.7	
Queue Delay	0.0			0.0	0.0	
Total Delay	26.6			8.8	4.7	
LOS	C			A	A	
Approach Delay	26.6			8.8	4.7	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	69.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.72
Intersection Signal Delay:	11.8
Intersection LOS:	B
Intersection Capacity Utilization	53.9%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



5: Oakwood Drive & North Commercial Access

PM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	440	408	760
v/c Ratio	0.72	0.24	0.40
Control Delay	26.6	8.8	4.7
Queue Delay	0.0	0.0	0.0
Total Delay	26.6	8.8	4.7
Queue Length 50th (m)	48.0	13.9	11.6
Queue Length 95th (m)	78.0	22.3	21.7
Internal Link Dist (m)	45.0	216.9	285.0
Turn Bay Length (m)			
Base Capacity (vph)	703	1731	1891
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.63	0.24	0.40
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Background 2029
PM Peak



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	396	9	1	374	320	379
Future Volume (vph)	396	9	1	374	320	379
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.92	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1682			3233	3047	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1682			3084	3047	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	430	10	1	407	348	412
RTOR Reduction (vph)	1	0	0	0	181	0
Lane Group Flow (vph)	439	0	0	408	579	0
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	21.2			35.1	35.1	
Effective Green, g (s)	25.2			39.1	39.1	
Actuated g/C Ratio	0.36			0.56	0.56	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	609			1732	1711	
v/s Ratio Prot	c0.26				c0.19	
v/s Ratio Perm				0.13		
v/c Ratio	0.72			0.24	0.34	
Uniform Delay, d1	19.2			7.7	8.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	4.2			0.3	0.5	
Delay (s)	23.3			8.0	8.8	
Level of Service	C			A	A	
Approach Delay (s)	23.3			8.0	8.8	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	69.6	Sum of lost time (s)	5.3
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	154	0	0	157	34	0	0	0	182	0	89
Future Volume (vph)	53	154	0	0	157	34	0	0	0	182	0	89
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Ped Bike Factor	1.00					0.98						
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1681	1718	0	1735	1718	1504	1735	1735	0	1586	1735	1504
Flt Permitted	0.603									0.950		
Satd. Flow (perm)	1065	1718	0	1735	1718	1471	1735	1735	0	1586	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109						822
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			122.6			120.6				82.8
Travel Time (s)		19.6			8.8			9.0				6.2
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Adj. Flow (vph)	58	167	0	0	171	37	0	0	0	198	0	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	167	0	0	171	37	0	0	0	198	0	97
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2029
 PM Peak

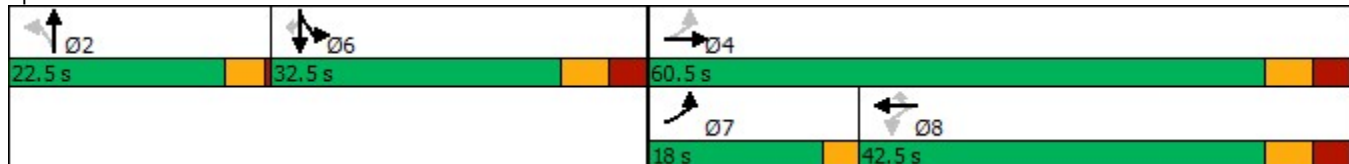


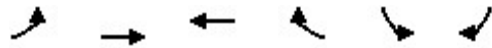
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm			Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	Min	Min		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.5	57.0			39.0	39.0				35.0		35.0
Actuated g/C Ratio	0.57	0.53			0.36	0.36				0.32		0.32
v/c Ratio	0.08	0.18			0.27	0.06				0.38		0.09
Control Delay	10.6	13.9			25.9	0.2				30.8		0.2
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	10.6	13.9			25.9	0.2				30.8		0.2
LOS	B	B			C	A				C		A
Approach Delay		13.1			21.3							20.7
Approach LOS		B			C							C

Intersection Summary

Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 107.7
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.38
 Intersection Signal Delay: 18.5
 Intersection LOS: B
 Intersection Capacity Utilization 50.1%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	58	167	171	37	198	97
v/c Ratio	0.08	0.18	0.27	0.06	0.38	0.09
Control Delay	10.6	13.9	25.9	0.2	30.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	13.9	25.9	0.2	30.8	0.2
Queue Length 50th (m)	5.1	17.5	25.2	0.0	31.9	0.0
Queue Length 95th (m)	10.7	29.0	41.7	0.0	51.9	0.0
Internal Link Dist (m)		248.4	98.6			
Turn Bay Length (m)						
Base Capacity (vph)	716	909	622	602	515	1043
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.18	0.27	0.06	0.38	0.09
Intersection Summary						

HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive












Future Background 2029
 PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	154	0	0	157	34	0	0	0	182	0	89
Future Volume (vph)	53	154	0	0	157	34	0	0	0	182	0	89
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5			3.5	3.5				3.5		3.5
Lane Util. Factor	1.00	1.00			1.00	1.00				1.00		1.00
Frbp, ped/bikes	1.00	1.00			1.00	0.98				1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	1.00			1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1680	1718			1718	1471				1586		1504
Flt Permitted	0.60	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1066	1718			1718	1471				1586		1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	167	0	0	171	37	0	0	0	198	0	97
RTOR Reduction (vph)	0	0	0	0	0	24	0	0	0	0	0	65
Lane Group Flow (vph)	58	167	0	0	171	13	0	0	0	198	0	32
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm			Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	53.0	53.0			35.0	35.0				31.0		31.0
Effective Green, g (s)	57.0	57.0			39.0	39.0				35.0		35.0
Actuated g/C Ratio	0.53	0.53			0.36	0.36				0.32		0.32
Clearance Time (s)	3.0	7.5			7.5	7.5				7.5		7.5
Vehicle Extension (s)	2.4	2.2			2.2	2.2				2.2		2.2
Lane Grp Cap (vph)	672	909			622	532				515		488
v/s Ratio Prot	0.02	c0.10			c0.10					c0.12		
v/s Ratio Perm	0.03					0.01						0.02
v/c Ratio	0.09	0.18			0.27	0.03				0.38		0.06
Uniform Delay, d1	12.4	13.2			24.3	22.1				28.0		25.1
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	0.3	0.4			1.1	0.1				2.2		0.3
Delay (s)	12.6	13.7			25.4	22.2				30.2		25.3
Level of Service	B	B			C	C				C		C
Approach Delay (s)		13.4			24.9			0.0			28.6	
Approach LOS		B			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			22.8		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.27									
Actuated Cycle Length (s)			107.7		Sum of lost time (s)					7.0		
Intersection Capacity Utilization			50.1%		ICU Level of Service					A		
Analysis Period (min)			15									

c Critical Lane Group














Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Background 2029
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	108	8	232	119	11	245
Future Volume (vph)	108	8	232	119	11	245
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.949			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1504	3149	0	1681	3233
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1504	3149	0	1681	3233
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	4%
Adj. Flow (vph)	117	9	252	129	12	266
Shared Lane Traffic (%)						
Lane Group Flow (vph)	117	9	381	0	12	266
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	24.3%			ICU Level of Service A		
Analysis Period (min)	15					




























HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive

Future Background 2029
PM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	108	8	232	119	11	245	
Future Volume (Veh/h)	108	8	232	119	11	245	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	117	9	252	129	12	266	
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	474	190			381		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	474	190			381		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	77	99			99		
cM capacity (veh/h)	519	825			1189		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	117	9	168	213	12	133	133
Volume Left	117	0	0	0	12	0	0
Volume Right	0	9	0	129	0	0	0
cSH	519	825	1700	1700	1189	1700	1700
Volume to Capacity	0.23	0.01	0.10	0.13	0.01	0.08	0.08
Queue Length 95th (m)	6.5	0.3	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	13.9	9.4	0.0	0.0	8.1	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	13.6		0.0		0.3		
Approach LOS	B						
Intersection Summary							
Average Delay			2.3				
Intersection Capacity Utilization			24.3%	ICU Level of Service	A		
Analysis Period (min)			15				

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Total 2029
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			 						 	
Traffic Volume (vph)	98	884	6	23	734	237	19	78	104	158	47	90
Future Volume (vph)	98	884	6	23	734	237	19	78	104	158	47	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98						
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1437	4594	0	1227	3264	1419	1681	1594	1319	1556	1475	1308
Flt Permitted	0.185			0.233			0.724			0.702		
Satd. Flow (perm)	280	4594	0	301	3264	1385	1281	1594	1319	1150	1475	1308
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				258			113			98
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	2					2						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%
Adj. Flow (vph)	107	961	7	25	798	258	21	85	113	172	51	98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	968	0	25	798	258	21	85	113	172	51	98
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

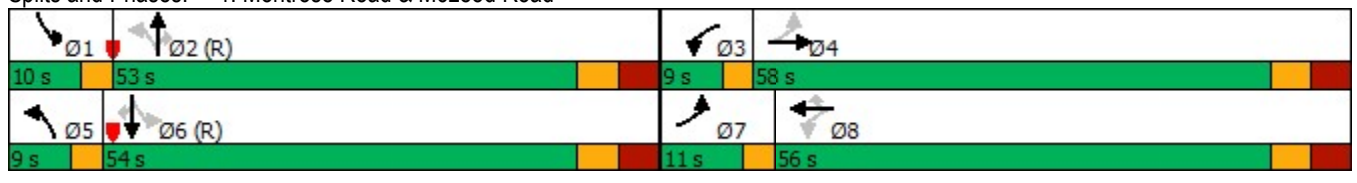
Future Total 2029
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.1	46.1
Total Split (s)	11.0	58.0		9.0	56.0	56.0	9.0	53.0	53.0	10.0	54.0	54.0
Total Split (%)	8.5%	44.6%		6.9%	43.1%	43.1%	6.9%	40.8%	40.8%	7.7%	41.5%	41.5%
Maximum Green (s)	8.0	50.0		6.0	48.0	48.0	6.0	45.0	45.0	7.0	46.0	46.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	63.3	52.2		59.7	43.9	43.9	62.9	47.6	47.6	68.7	58.0	58.0
Actuated g/C Ratio	0.49	0.40		0.46	0.34	0.34	0.48	0.37	0.37	0.53	0.45	0.45
v/c Ratio	0.39	0.53		0.12	0.72	0.40	0.03	0.15	0.20	0.26	0.08	0.15
Control Delay	21.0	30.3		15.8	41.3	5.0	18.7	33.6	7.8	19.6	26.6	6.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	30.3		15.8	41.3	5.0	18.7	33.6	7.8	19.6	26.6	6.3
LOS	C	C		B	D	A	B	C	A	B	C	A
Approach Delay		29.4			32.0			18.9			16.6	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 28.1 Intersection LOS: C
 Intersection Capacity Utilization 54.4% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Total 2029

1: Montrose Road & McLeod Road

AM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	107	968	25	798	258	21	85	113	172	51	98
v/c Ratio	0.39	0.53	0.12	0.72	0.40	0.03	0.15	0.20	0.26	0.08	0.15
Control Delay	21.0	30.3	15.8	41.3	5.0	18.7	33.6	7.8	19.6	26.6	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	30.3	15.8	41.3	5.0	18.7	33.6	7.8	19.6	26.6	6.3
Queue Length 50th (m)	14.8	71.2	3.3	93.7	0.0	2.5	14.4	0.0	22.6	7.7	0.0
Queue Length 95th (m)	20.7	73.2	6.6	104.8	16.1	8.1	33.1	15.3	43.9	19.2	12.5
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	273	1947	214	1307	709	651	656	609	661	679	655
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.50	0.12	0.61	0.36	0.03	0.13	0.19	0.26	0.08	0.15

Intersection Summary

HCM Signalized Intersection Capacity Analysis

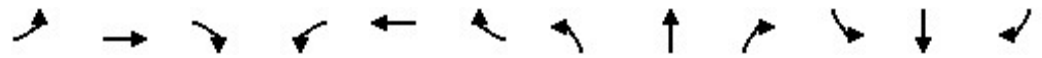
Future Total 2029

1: Montrose Road & McLeod Road

AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	98	884	6	23	734	237	19	78	104	158	47	90	
Future Volume (vph)	98	884	6	23	734	237	19	78	104	158	47	90	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1437	4594		1227	3264	1385	1681	1594	1319	1556	1475	1308	
Flt Permitted	0.18	1.00		0.23	1.00	1.00	0.72	1.00	1.00	0.70	1.00	1.00	
Satd. Flow (perm)	279	4594		301	3264	1385	1281	1594	1319	1150	1475	1308	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	107	961	7	25	798	258	21	85	113	172	51	98	
RTOR Reduction (vph)	0	1	0	0	0	168	0	0	73	0	0	56	
Lane Group Flow (vph)	107	967	0	25	798	90	21	85	40	172	51	42	
Confl. Peds. (#/hr)	2					2							
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	55.5	48.2		45.4	41.1	41.1	46.3	42.4	42.4	58.5	51.6	51.6	
Effective Green, g (s)	59.5	52.2		53.4	45.1	45.1	54.3	46.4	46.4	62.5	55.6	55.6	
Actuated g/C Ratio	0.46	0.40		0.41	0.35	0.35	0.42	0.36	0.36	0.48	0.43	0.43	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	264	1844		182	1132	480	559	568	470	606	630	559	
v/s Ratio Prot	c0.05	0.21		0.01	c0.24		0.00	0.05		c0.04	0.03		
v/s Ratio Perm	0.14			0.05		0.06	0.01		0.03	0.10		0.03	
v/c Ratio	0.41	0.52		0.14	0.70	0.19	0.04	0.15	0.09	0.28	0.08	0.07	
Uniform Delay, d1	22.7	29.5		23.3	36.7	29.6	22.3	28.4	27.7	19.7	22.1	22.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.2		0.3	1.9	0.1	0.0	0.6	0.4	0.2	0.3	0.3	
Delay (s)	23.5	29.7		23.6	38.6	29.8	22.3	29.0	28.1	19.9	22.3	22.3	
Level of Service	C	C		C	D	C	C	C	C	B	C	C	
Approach Delay (s)		29.1			36.1			27.9			21.0		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			30.8									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.41										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			54.4%									ICU Level of Service	A
Analysis Period (min)			15										

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖↗	↗	↖
Traffic Volume (vph)	0	959	0	101	624	115	0	0	0	393	134	307
Future Volume (vph)	0	959	0	101	624	115	0	0	0	393	134	307
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00								
Frt					0.977						0.938	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4473	1769	1586	4355	0	0	0	0	3048	1467	1374
Flt Permitted				0.214						0.950		
Satd. Flow (perm)	0	4473	1769	357	4355	0	0	0	0	3048	1467	1374
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					51						52	140
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Adj. Flow (vph)	0	1042	0	110	678	125	0	0	0	427	146	334
Shared Lane Traffic (%)												31%
Lane Group Flow (vph)	0	1042	0	110	803	0	0	0	0	427	250	230
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

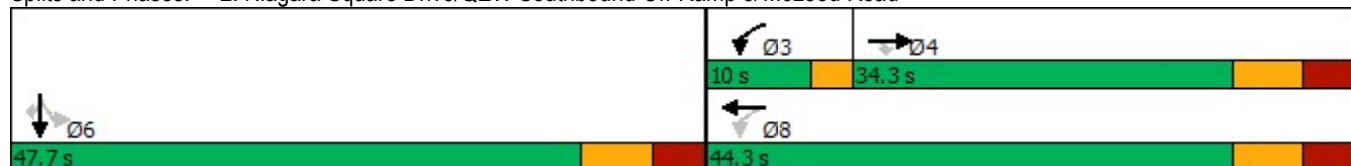


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	-4.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	4.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		27.4		40.2	34.7					20.8	20.8	20.8
Actuated g/C Ratio		0.42		0.62	0.54					0.32	0.32	0.32
v/c Ratio		0.55		0.26	0.34					0.44	0.49	0.43
Control Delay		16.9		7.7	8.9					19.4	18.2	10.4
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		16.9		7.7	8.9					19.4	18.2	10.4
LOS		B		A	A					B	B	B
Approach Delay		16.9			8.8						16.8	
Approach LOS		B			A						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 64.8
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.55
 Intersection Signal Delay: 14.3
 Intersection LOS: B
 Intersection Capacity Utilization 51.5%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

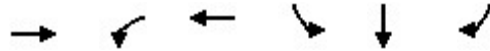


Queues

Future Total 2029

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

AM Peak



Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1042	110	803	427	250	230
v/c Ratio	0.55	0.26	0.34	0.44	0.49	0.43
Control Delay	16.9	7.7	8.9	19.4	18.2	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	7.7	8.9	19.4	18.2	10.4
Queue Length 50th (m)	34.2	4.4	16.1	21.2	20.1	8.4
Queue Length 95th (m)	58.9	13.9	31.8	34.2	41.8	25.6
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2140	437	2797	2091	1022	986
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.25	0.29	0.20	0.24	0.23

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Future Total 2029
AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘	↑↑↑					↖	↘	↗
Traffic Volume (vph)	0	959	0	101	624	115	0	0	0	393	134	307
Future Volume (vph)	0	959	0	101	624	115	0	0	0	393	134	307
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.98					1.00	0.94	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4473		1586	4353					3048	1466	1374
Flt Permitted		1.00		0.21	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4473		358	4353					3048	1466	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1042	0	110	678	125	0	0	0	427	146	334
RTOR Reduction (vph)	0	0	0	0	23	0	0	0	0	0	35	95
Lane Group Flow (vph)	0	1042	0	110	780	0	0	0	0	427	215	135
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		23.3		31.3	31.3					16.7	16.7	16.7
Effective Green, g (s)		27.3		35.3	35.3					20.7	20.7	20.7
Actuated g/C Ratio		0.42		0.54	0.54					0.32	0.32	0.32
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1878		364	2364					970	466	437
v/s Ratio Prot		c0.23		0.04	c0.18						c0.15	
v/s Ratio Perm				0.12						0.14		0.10
v/c Ratio		0.55		0.30	0.33					0.44	0.46	0.31
Uniform Delay, d1		14.3		7.5	8.3					17.6	17.7	16.7
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.3		0.3	0.1					0.2	0.5	0.3
Delay (s)		14.5		7.9	8.3					17.8	18.2	17.0
Level of Service		B		A	A					B	B	B
Approach Delay (s)		14.5			8.3			0.0			17.7	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			13.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			65.0			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			51.5%			ICU Level of Service				A		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

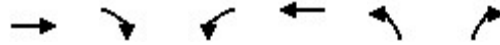
Future Total 2029
AM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	943	409	0	668	96	181
Future Volume (vph)	943	409	0	668	96	181
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Frt	0.955					0.850
Flt Protected					0.950	
Satd. Flow (prot)	4232	0	0	4473	3166	1446
Flt Permitted					0.950	
Satd. Flow (perm)	4232	0	0	4473	3166	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	217					91
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Adj. Flow (vph)	1025	445	0	726	104	197
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1470	0	0	726	104	197
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2029
 AM Peak

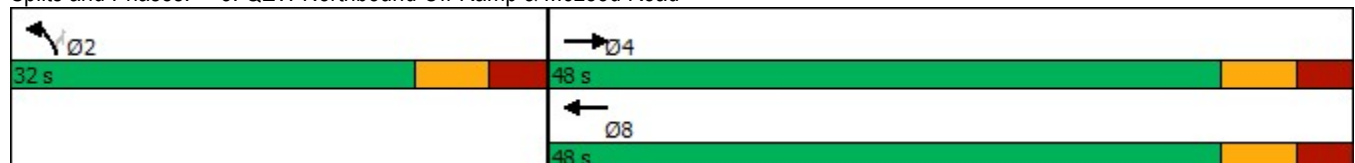


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	48.0			48.0	32.0	32.0
Total Split (%)	60.0%			60.0%	40.0%	40.0%
Maximum Green (s)	40.0			40.0	24.0	24.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	33.1			33.1	14.7	14.7
Actuated g/C Ratio	0.59			0.59	0.26	0.26
v/c Ratio	0.57			0.27	0.12	0.44
Control Delay	7.0			6.1	17.2	14.0
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	7.0			6.1	17.2	14.0
LOS	A			A	B	B
Approach Delay	7.0			6.1	15.1	
Approach LOS	A			A	B	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 56
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 7.7
 Intersection LOS: A
 Intersection Capacity Utilization 48.6%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2029
 AM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1470	726	104	197
v/c Ratio	0.57	0.27	0.12	0.44
Control Delay	7.0	6.1	17.2	14.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.0	6.1	17.2	14.0
Queue Length 50th (m)	21.1	10.2	3.7	7.7
Queue Length 95th (m)	42.9	20.6	10.7	27.6
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3452	3604	1623	785
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	0.43	0.20	0.06	0.25
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2029
 AM Peak



























Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	943	409	0	668	96	181
Future Volume (vph)	943	409	0	668	96	181
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.95			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4231			4473	3166	1446
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4231			4473	3166	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1025	445	0	726	104	197
RTOR Reduction (vph)	88	0	0	0	0	67
Lane Group Flow (vph)	1382	0	0	726	104	130
Confl. Peds. (#/hr)		1	1			
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	29.0			29.0	10.6	10.6
Effective Green, g (s)	33.0			33.0	14.6	14.6
Actuated g/C Ratio	0.59			0.59	0.26	0.26
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2511			2654	831	379
v/s Ratio Prot	c0.33			0.16	0.03	
v/s Ratio Perm						c0.09
v/c Ratio	0.55			0.27	0.13	0.34
Uniform Delay, d1	6.8			5.5	15.6	16.6
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.2			0.0	0.0	0.4
Delay (s)	7.0			5.5	15.7	17.0
Level of Service	A			A	B	B
Approach Delay (s)	7.0			5.5	16.5	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			7.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			55.6		Sum of lost time (s)	8.0
Intersection Capacity Utilization			48.6%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Total 2029
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	616	352	208	820	25	273	19	192	8	2	40
Future Volume (vph)	82	616	352	208	820	25	273	19	192	8	2	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00	1.00	0.98	1.00	0.98	
Frt			0.850			0.850			0.850		0.857	
Flt Protected	0.950			0.950			0.950	0.958		0.950		
Satd. Flow (prot)	1616	3233	1419	3197	3296	1475	1566	1579	1475	1648	1464	0
Flt Permitted	0.242			0.950			0.950	0.958		0.950		
Satd. Flow (perm)	411	3233	1398	3192	3296	1439	1560	1574	1451	1643	1464	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			383			139			209			43
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		148.8			245.9			309.0			281.5	
Travel Time (s)		10.7			17.7			22.2			20.3	
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	89	670	383	226	891	27	297	21	209	9	2	43
Shared Lane Traffic (%)							47%					
Lane Group Flow (vph)	89	670	383	226	891	27	157	161	209	9	45	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

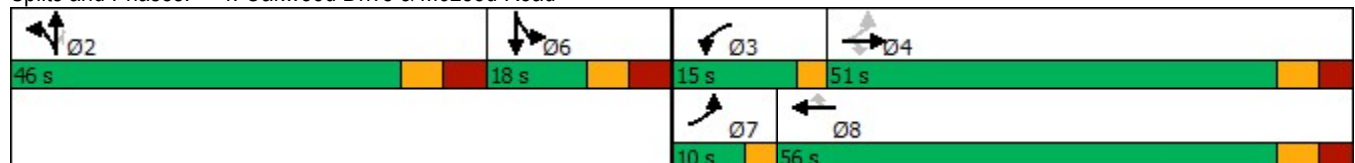
Future Total 2029
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	51.0	51.0	15.0	56.0	56.0	46.0	46.0	46.0	18.0	18.0	
Total Split (%)	7.7%	39.2%	39.2%	11.5%	43.1%	43.1%	35.4%	35.4%	35.4%	13.8%	13.8%	
Maximum Green (s)	7.0	43.4	43.4	12.0	48.4	48.4	37.7	37.7	37.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	47.5	30.9	30.9	15.3	37.5	37.5	19.5	19.5	19.5	13.2	13.2	
Actuated g/C Ratio	0.58	0.38	0.38	0.19	0.46	0.46	0.24	0.24	0.24	0.16	0.16	
v/c Ratio	0.22	0.55	0.50	0.38	0.59	0.04	0.42	0.43	0.41	0.03	0.16	
Control Delay	10.8	23.7	4.9	36.5	21.2	0.1	34.5	34.6	7.5	40.8	16.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	10.8	23.7	4.9	36.5	21.2	0.1	34.5	34.6	7.5	40.8	16.0	
LOS	B	C	A	D	C	A	C	C	A	D	B	
Approach Delay		16.4			23.7			23.8			20.1	
Approach LOS		B			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 81.4
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 20.8
 Intersection LOS: C
 Intersection Capacity Utilization 56.4%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road















Queues

Future Total 2029

4: Oakwood Drive & McLeod Road

























AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	
Lane Group Flow (vph)	89	670	383	226	891	27	157	161	209	9	45	
v/c Ratio	0.22	0.55	0.50	0.38	0.59	0.04	0.42	0.43	0.41	0.03	0.16	
Control Delay	10.8	23.7	4.9	36.5	21.2	0.1	34.5	34.6	7.5	40.8	16.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	10.8	23.7	4.9	36.5	21.2	0.1	34.5	34.6	7.5	40.8	16.0	
Queue Length 50th (m)	6.4	48.2	0.0	17.4	63.4	0.0	24.3	25.0	0.0	1.3	0.3	
Queue Length 95th (m)	15.9	76.1	18.5	35.9	98.3	0.0	50.6	51.5	17.8	6.7	11.1	
Internal Link Dist (m)		124.8			221.9			285.0			257.5	
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		
Base Capacity (vph)	419	2061	1030	688	2270	1034	878	886	905	303	304	
Starvation Cap Reductn	0	58	6	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	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	
Reduced v/c Ratio	0.21	0.33	0.37	0.33	0.39	0.03	0.18	0.18	0.23	0.03	0.15	
Intersection Summary												

HCM Signalized Intersection Capacity Analysis

4: Oakwood Drive & McLeod Road

Future Total 2029
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	82	616	352	208	820	25	273	19	192	8	2	40
Future Volume (vph)	82	616	352	208	820	25	273	19	192	8	2	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3233	1400	3197	3296	1441	1566	1579	1453	1648	1465	
Flt Permitted	0.24	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	412	3233	1400	3197	3296	1441	1566	1579	1453	1648	1465	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	670	383	226	891	27	297	21	209	9	2	43
RTOR Reduction (vph)	0	0	241	0	0	15	0	0	162	0	39	0
Lane Group Flow (vph)	89	670	142	226	891	12	157	161	47	9	6	0
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	32.8	27.5	27.5	10.9	33.1	33.1	15.1	15.1	15.1	4.1	4.1	
Effective Green, g (s)	40.8	31.5	31.5	14.9	37.1	37.1	19.1	19.1	19.1	8.1	8.1	
Actuated g/C Ratio	0.48	0.37	0.37	0.18	0.44	0.44	0.23	0.23	0.23	0.10	0.10	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	330	1200	520	561	1442	630	352	355	327	157	139	
v/s Ratio Prot	0.03	0.21		c0.07	c0.27		0.10	c0.10		c0.01	0.00	
v/s Ratio Perm	0.10		0.10			0.01			0.03			
v/c Ratio	0.27	0.56	0.27	0.40	0.62	0.02	0.45	0.45	0.14	0.06	0.04	
Uniform Delay, d1	12.5	21.1	18.6	31.0	18.4	13.5	28.3	28.3	26.3	34.9	34.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.5	0.2	0.3	0.7	0.0	0.7	0.7	0.1	0.1	0.1	
Delay (s)	12.8	21.6	18.9	31.3	19.1	13.5	29.0	29.0	26.5	35.0	34.9	
Level of Service	B	C	B	C	B	B	C	C	C	C	C	
Approach Delay (s)		20.0			21.4			28.0			34.9	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.3		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			84.8		Sum of lost time (s)					11.2		
Intersection Capacity Utilization			56.4%		ICU Level of Service					B		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2029
AM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	181	3	2	297	274	237
Future Volume (vph)	181	3	2	297	274	237
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.998				0.930	
Flt Protected	0.953					
Satd. Flow (prot)	1650	0	0	3058	2968	0
Flt Permitted	0.953			0.953		
Satd. Flow (perm)	1650	0	0	2914	2968	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1				258	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			239.7	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Adj. Flow (vph)	197	3	2	323	298	258
Shared Lane Traffic (%)						
Lane Group Flow (vph)	200	0	0	325	556	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2029
AM Peak

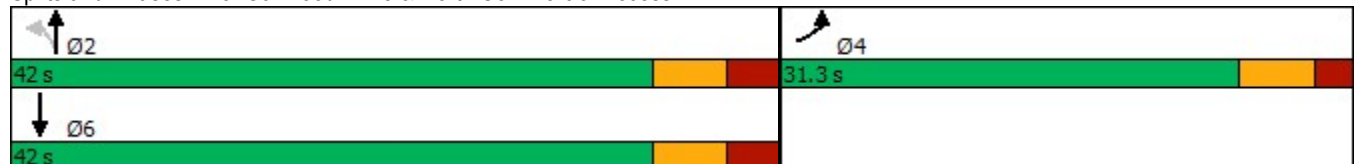


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effct Green (s)	16.9			41.9	41.9	
Actuated g/C Ratio	0.26			0.65	0.65	
v/c Ratio	0.46			0.17	0.27	
Control Delay	22.3			5.2	3.2	
Queue Delay	0.0			0.0	0.0	
Total Delay	22.3			5.2	3.2	
LOS	C			A	A	
Approach Delay	22.3			5.2	3.2	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	64.1
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.46
Intersection Signal Delay:	7.3
Intersection LOS:	A
Intersection Capacity Utilization	34.2%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues

Future Total 2029

5: Oakwood Drive & North Commercial Access

AM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	200	325	556
v/c Ratio	0.46	0.17	0.27
Control Delay	22.3	5.2	3.2
Queue Delay	0.0	0.0	0.0
Total Delay	22.3	5.2	3.2
Queue Length 50th (m)	18.3	6.4	5.7
Queue Length 95th (m)	33.8	13.9	14.2
Internal Link Dist (m)	45.0	215.7	285.0
Turn Bay Length (m)			
Base Capacity (vph)	751	1904	2029
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.27	0.17	0.27
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Total 2029
AM Peak

























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	181	3	2	297	274	237
Future Volume (vph)	181	3	2	297	274	237
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.93	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1650			3057	2969	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1650			2914	2969	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	3	2	323	298	258
RTOR Reduction (vph)	1	0	0	0	89	0
Lane Group Flow (vph)	199	0	0	325	467	0
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	12.9			37.9	37.9	
Effective Green, g (s)	16.9			41.9	41.9	
Actuated g/C Ratio	0.26			0.65	0.65	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	435			1904	1940	
v/s Ratio Prot	c0.12				c0.16	
v/s Ratio Perm				0.11		
v/c Ratio	0.46			0.17	0.24	
Uniform Delay, d1	19.8			4.3	4.6	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.8			0.2	0.3	
Delay (s)	20.5			4.5	4.9	
Level of Service	C			A	A	
Approach Delay (s)	20.5			4.5	4.9	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	5.3
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2029
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	159	0	35	162	8	0	0	79	43	0	23
Future Volume (vph)	29	159	0	35	162	8	0	0	79	43	0	23
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Frt						0.850		0.850				0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1616	1638	0	1648	1669	1367	1735	1475	0	1528	1735	1504
Flt Permitted	0.598			0.648						0.950		
Satd. Flow (perm)	1017	1638	0	1124	1669	1367	1735	1475	0	1528	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		751				819
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			119.4			97.6				82.8
Travel Time (s)		19.6			8.6			7.3				6.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%
Adj. Flow (vph)	32	173	0	38	176	9	0	0	86	47	0	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	173	0	38	176	9	0	86	0	47	0	25
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6		6

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

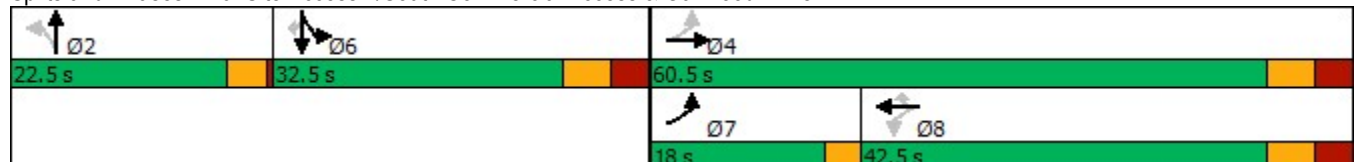
Future Total 2029
 AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	None	None		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.6	57.1		39.1	39.1	39.1		8.7		35.1		35.1
Actuated g/C Ratio	0.58	0.54		0.37	0.37	0.37		0.08		0.33		0.33
v/c Ratio	0.05	0.20		0.09	0.29	0.02		0.11		0.09		0.02
Control Delay	10.4	13.8		23.6	25.8	0.0		0.3		26.1		0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0		0.0
Total Delay	10.4	13.8		23.6	25.8	0.0		0.3		26.1		0.0
LOS	B	B		C	C	A		A		C		A
Approach Delay		13.3			24.4			0.3				17.0
Approach LOS		B			C			A				B

Intersection Summary

Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 106
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.29
 Intersection Signal Delay: 16.1
 Intersection LOS: B
 Intersection Capacity Utilization 45.1%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive

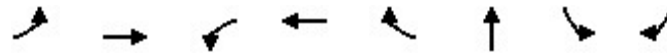


Queues

Future Total 2029

6: Site Access 1/South Commercial Access & Oakwood Drive

AM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBR
Lane Group Flow (vph)	32	173	38	176	9	86	47	25
v/c Ratio	0.05	0.20	0.09	0.29	0.02	0.11	0.09	0.02
Control Delay	10.4	13.8	23.6	25.8	0.0	0.3	26.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	13.8	23.6	25.8	0.0	0.3	26.1	0.0
Queue Length 50th (m)	2.8	18.2	5.2	26.0	0.0	0.0	6.8	0.0
Queue Length 95th (m)	6.9	30.3	12.5	43.1	0.0	0.0	15.2	0.0
Internal Link Dist (m)		248.4		95.4		73.6		
Turn Bay Length (m)			85.0					
Base Capacity (vph)	698	881	414	615	572	905	505	1045
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	0.09	0.29	0.02	0.10	0.09	0.02

Intersection Summary










HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2029
 AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	29	159	0	35	162	8	0	0	79	43	0	23	
Future Volume (vph)	29	159	0	35	162	8	0	0	79	43	0	23	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	3.5		3.5	3.5	3.5		0.0		3.5		3.5	
Lane Util. Factor	1.00	1.00		1.00	1.00	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)	1616	1638		1648	1669	1367		1475		1528		1504	
Flt Permitted	0.60	1.00		0.65	1.00	1.00		1.00		0.95		1.00	
Satd. Flow (perm)	1017	1638		1124	1669	1367		1475		1528		1504	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	32	173	0	38	176	9	0	0	86	47	0	25	
RTOR Reduction (vph)	0	0	0	0	0	6	0	80	0	0	0	17	
Lane Group Flow (vph)	32	173	0	38	176	3	0	6	0	47	0	8	
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm	
Protected Phases	7	4			8			2		6	6		
Permitted Phases	4			8		8	2					6	
Actuated Green, G (s)	53.1	53.1		35.1	35.1	35.1		3.7		31.0		31.0	
Effective Green, g (s)	57.1	57.1		39.1	39.1	39.1		7.7		35.0		35.0	
Actuated g/C Ratio	0.53	0.53		0.37	0.37	0.37		0.07		0.33		0.33	
Clearance Time (s)	3.0	7.5		7.5	7.5	7.5		4.0		7.5		7.5	
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2		2.2		2.2		2.2	
Lane Grp Cap (vph)	650	875		411	611	500		106		500		492	
v/s Ratio Prot	0.01	c0.11			c0.11			c0.00		c0.03			
v/s Ratio Perm	0.02			0.03		0.00						0.01	
v/c Ratio	0.05	0.20		0.09	0.29	0.01		0.06		0.09		0.02	
Uniform Delay, d1	11.8	12.9		22.2	24.0	21.5		46.2		24.9		24.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2	0.1	0.5		0.4	1.2	0.0		0.1		0.4		0.1	
Delay (s)	12.0	13.4		22.7	25.2	21.5		46.3		25.3		24.3	
Level of Service	B	B		C	C	C		D		C		C	
Approach Delay (s)		13.2			24.6			46.3			24.9		
Approach LOS		B			C			D			C		
Intersection Summary													
HCM 2000 Control Delay			23.8		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.18										
Actuated Cycle Length (s)			106.8		Sum of lost time (s)					7.0			
Intersection Capacity Utilization			45.1%		ICU Level of Service					A			
Analysis Period (min)			15										
c Critical Lane Group													










Lanes, Volumes, Timings
7: Oakwood Drive & Site Access 2

Future Total 2029
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	5	184	2	2	184
Future Volume (vph)	11	5	184	2	2	184
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.960		0.999			
Flt Protected	0.966					
Satd. Flow (prot)	1609	0	1733	0	0	1735
Flt Permitted	0.966					
Satd. Flow (perm)	1609	0	1733	0	0	1735
Link Speed (k/h)	48		50			60
Link Distance (m)	39.5		2126.3			272.4
Travel Time (s)	3.0		153.1			16.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	5	200	2	2	200
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	0	202	0	0	202
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	22.2%			ICU Level of Service A		
Analysis Period (min)	15					














HCM Unsignalized Intersection Capacity Analysis
7: Oakwood Drive & Site Access 2

Future Total 2029
AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	5	184	2	2	184
Future Volume (Veh/h)	11	5	184	2	2	184
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	5	200	2	2	200
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						272
pX, platoon unblocked	0.95					
vC, conflicting volume	405	201			202	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	352	201			202	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	615	840			1370	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	17	202	202			
Volume Left	12	0	2			
Volume Right	5	2	0			
cSH	667	1700	1370			
Volume to Capacity	0.03	0.12	0.00			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	10.5	0.0	0.1			
Lane LOS	B		A			
Approach Delay (s)	10.5	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			22.2%		ICU Level of Service	A
Analysis Period (min)			15			














Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Total 2029
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	56	7	141	72	11	158
Future Volume (vph)	56	7	141	72	11	158
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.949			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1432	2973	0	1601	3264
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1432	2973	0	1601	3264
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	8%	6%	5%	3%
Adj. Flow (vph)	61	8	153	78	12	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	61	8	231	0	12	172
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	20.0%		ICU Level of Service A			
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive

Future Total 2029
AM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	56	7	141	72	11	158	
Future Volume (Veh/h)	56	7	141	72	11	158	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	61	8	153	78	12	172	
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	302	116			231		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	302	116			231		
tC, single (s)	6.8	7.0			4.2		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	91	99			99		
cM capacity (veh/h)	665	905			1312		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	61	8	102	129	12	86	86
Volume Left	61	0	0	0	12	0	0
Volume Right	0	8	0	78	0	0	0
cSH	665	905	1700	1700	1312	1700	1700
Volume to Capacity	0.09	0.01	0.06	0.08	0.01	0.05	0.05
Queue Length 95th (m)	2.3	0.2	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	11.0	9.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	10.7		0.0		0.5		
Approach LOS	B						
Intersection Summary							
Average Delay			1.7				
Intersection Capacity Utilization			20.0%	ICU Level of Service	A		
Analysis Period (min)			15				

Lanes, Volumes, Timings
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive

Future Total 2029
 AM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (vph)	281	1	0	206	0	11
Future Volume (vph)	281	1	0	206	0	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t						0.865
Fl _t Protected						
Satd. Flow (prot)	3296	0	0	3296	0	1501
Fl _t Permitted						
Satd. Flow (perm)	3296	0	0	3296	0	1501
Link Speed (k/h)	50			50	48	
Link Distance (m)	119.4			239.7	74.2	
Travel Time (s)	8.6			17.3	5.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	305	1	0	224	0	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	306	0	0	224	0	12
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Yield	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	18.5%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive
























Future Total 2029
 AM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	281	1	0	206	0	11
Future Volume (Veh/h)	281	1	0	206	0	11
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	305	1	0	224	0	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	119			240		
pX, platoon unblocked						
vC, conflicting volume				305	418	153
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol				305	418	153
tC, single (s)				4.1	6.8	6.9
tC, 2 stage (s)						
tF (s)				2.2	3.5	3.3
p0 queue free %				100	100	99
cM capacity (veh/h)				1253	563	866
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	203	103	112	112	12	
Volume Left	0	0	0	0	0	
Volume Right	0	1	0	0	12	
cSH	1700	1700	1700	1700	866	
Volume to Capacity	0.12	0.06	0.07	0.07	0.01	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.3	
Control Delay (s)	0.0	0.0	0.0	0.0	9.2	
Lane LOS						A
Approach Delay (s)	0.0		0.0		9.2	
Approach LOS						A
Intersection Summary						
Average Delay				0.2		
Intersection Capacity Utilization				18.5%	ICU Level of Service	A
Analysis Period (min)				15		

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Total 2029
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	819	34	96	950	296	30	118	237	370	146	97
Future Volume (vph)	97	819	34	96	950	296	30	118	237	370	146	97
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.97						
Frt		0.994				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1514	4617	0	1542	3296	1460	1681	1685	1475	1664	1669	1446
Flt Permitted	0.105			0.214			0.656			0.649		
Satd. Flow (perm)	167	4617	0	347	3296	1411	1161	1685	1475	1137	1669	1446
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				297			137			105
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	7					7						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%
Adj. Flow (vph)	105	890	37	104	1033	322	33	128	258	402	159	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	927	0	104	1033	322	33	128	258	402	159	105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

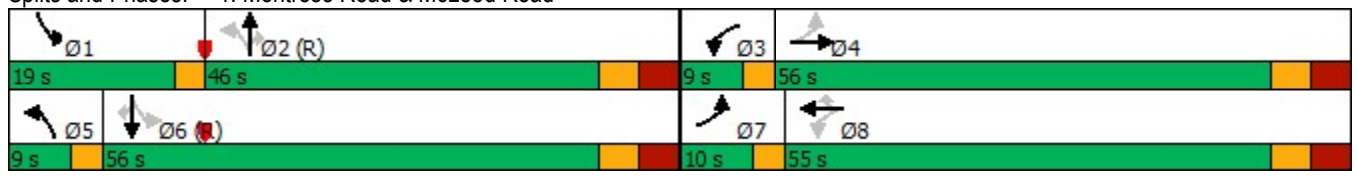
Future Total 2029
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.0	46.0
Total Split (s)	10.0	56.0		9.0	55.0	55.0	9.0	46.0	46.0	19.0	56.0	56.0
Total Split (%)	7.7%	43.1%		6.9%	42.3%	42.3%	6.9%	35.4%	35.4%	14.6%	43.1%	43.1%
Maximum Green (s)	7.0	48.0		6.0	47.0	47.0	6.0	38.0	38.0	16.0	48.0	48.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	64.2	50.2		64.2	49.2	49.2	58.5	43.5	43.5	67.8	57.4	57.4
Actuated g/C Ratio	0.49	0.39		0.49	0.38	0.38	0.45	0.33	0.33	0.52	0.44	0.44
v/c Ratio	0.54	0.52		0.40	0.83	0.45	0.06	0.23	0.44	0.60	0.22	0.15
Control Delay	28.3	31.4		21.9	43.1	6.1	16.7	33.2	18.3	24.6	25.1	5.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	31.4		21.9	43.1	6.1	16.7	33.2	18.3	24.6	25.1	5.0
LOS	C	C		C	D	A	B	C	B	C	C	A
Approach Delay		31.1			33.4			22.8			21.6	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 29.3
 Intersection Capacity Utilization 73.3%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Total 2029

1: Montrose Road & McLeod Road

PM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	105	927	104	1033	322	33	128	258	402	159	105
v/c Ratio	0.54	0.52	0.40	0.83	0.45	0.06	0.23	0.44	0.60	0.22	0.15
Control Delay	28.3	31.4	21.9	43.1	6.1	16.7	33.2	18.3	24.6	25.1	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	31.4	21.9	43.1	6.1	16.7	33.2	18.3	24.6	25.1	5.0
Queue Length 50th (m)	13.8	64.1	13.7	122.0	3.9	4.1	24.0	23.3	65.0	26.7	0.0
Queue Length 95th (m)	25.3	77.2	23.9	149.1	23.9	9.6	40.0	48.0	92.1	42.8	11.2
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	196	1850	263	1293	734	562	563	584	675	736	696
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.50	0.40	0.80	0.44	0.06	0.23	0.44	0.60	0.22	0.15

Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Total 2029

1: Montrose Road & McLeod Road

PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	97	819	34	96	950	296	30	118	237	370	146	97	
Future Volume (vph)	97	819	34	96	950	296	30	118	237	370	146	97	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1514	4617		1542	3296	1411	1681	1685	1475	1664	1669	1446	
Flt Permitted	0.10	1.00		0.21	1.00	1.00	0.66	1.00	1.00	0.65	1.00	1.00	
Satd. Flow (perm)	167	4617		348	3296	1411	1161	1685	1475	1137	1669	1446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	105	890	37	104	1033	322	33	128	258	402	159	105	
RTOR Reduction (vph)	0	4	0	0	0	185	0	0	91	0	0	60	
Lane Group Flow (vph)	105	923	0	104	1033	137	33	128	167	402	159	45	
Confl. Peds. (#/hr)	7					7							
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	53.2	46.2		51.2	45.2	45.2	43.1	39.5	39.5	58.8	52.2	52.2	
Effective Green, g (s)	59.2	50.2		59.2	49.2	49.2	51.1	43.5	43.5	62.8	56.2	56.2	
Actuated g/C Ratio	0.46	0.39		0.46	0.38	0.38	0.39	0.33	0.33	0.48	0.43	0.43	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	190	1782		250	1247	534	486	563	493	631	721	625	
v/s Ratio Prot	c0.05	0.20		0.03	c0.31		0.00	0.08		c0.10	0.10		
v/s Ratio Perm	0.20			0.16		0.10	0.02		0.11	0.21		0.03	
v/c Ratio	0.55	0.52		0.42	0.83	0.26	0.07	0.23	0.34	0.64	0.22	0.07	
Uniform Delay, d1	25.2	30.6		21.6	36.6	27.8	24.4	31.1	32.5	23.0	23.2	21.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.8	0.2		0.8	4.6	0.2	0.0	0.9	1.9	1.9	0.7	0.2	
Delay (s)	28.0	30.8		22.4	41.2	28.0	24.5	32.1	34.3	24.8	23.9	21.9	
Level of Service	C	C		C	D	C	C	C	C	C	C	C	
Approach Delay (s)		30.5			36.9			32.9			24.1		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			32.2									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.62										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			73.3%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖↗	↘	↗
Traffic Volume (vph)	0	1193	0	155	790	159	0	0	0	573	126	319
Future Volume (vph)	0	1193	0	155	790	159	0	0	0	573	126	319
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00	1.00							
Frt					0.975						0.932	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4736	1769	1616	4539	0	0	0	0	3136	1528	1401
Flt Permitted				0.143						0.950		
Satd. Flow (perm)	0	4736	1769	243	4539	0	0	0	0	3136	1528	1401
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					58						62	98
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)	3		3	3		3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Adj. Flow (vph)	0	1297	0	168	859	173	0	0	0	623	137	347
Shared Lane Traffic (%)												33%
Lane Group Flow (vph)	0	1297	0	168	1032	0	0	0	0	623	252	232
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

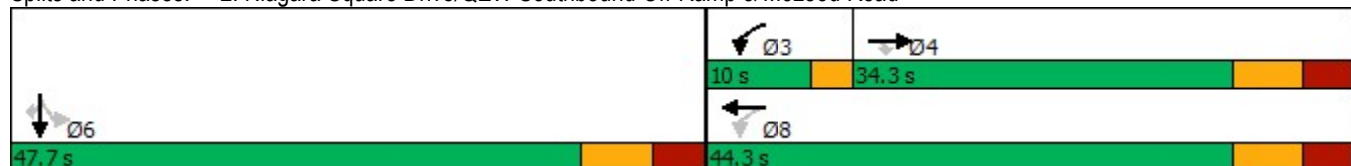


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	0.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	8.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		28.9		44.2	38.8					26.2	26.2	26.2
Actuated g/C Ratio		0.39		0.60	0.52					0.35	0.35	0.35
v/c Ratio		0.70		0.48	0.43					0.56	0.44	0.42
Control Delay		22.3		14.0	11.6					21.4	16.0	12.6
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		22.3		14.0	11.6					21.4	16.0	12.6
LOS		C		B	B					C	B	B
Approach Delay		22.3			11.9						18.3	
Approach LOS		C			B						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 74.1
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 17.6
 Intersection LOS: B
 Intersection Capacity Utilization 62.9%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

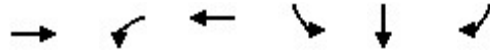


Queues

Future Total 2029

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

PM Peak



Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1297	168	1032	623	252	232
v/c Ratio	0.70	0.48	0.43	0.56	0.44	0.42
Control Delay	22.3	14.0	11.6	21.4	16.0	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.3	14.0	11.6	21.4	16.0	12.6
Queue Length 50th (m)	53.5	9.3	27.6	36.3	20.7	14.2
Queue Length 95th (m)	83.9	26.4	48.2	50.5	39.2	31.2
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	1943	351	2509	1844	924	864
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.48	0.41	0.34	0.27	0.27

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Future Total 2029
PM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	1193	0	155	790	159	0	0	0	573	126	319
Future Volume (vph)	0	1193	0	155	790	159	0	0	0	573	126	319
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.97					1.00	0.93	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4736		1616	4539					3136	1527	1401
Flt Permitted		1.00		0.14	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4736		243	4539					3136	1527	1401
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1297	0	168	859	173	0	0	0	623	137	347
RTOR Reduction (vph)	0	0	0	0	28	0	0	0	0	0	40	63
Lane Group Flow (vph)	0	1297	0	168	1004	0	0	0	0	623	212	169
Confl. Peds. (#/hr)	3		3	3		3						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		25.0		34.8	34.8					22.1	22.1	22.1
Effective Green, g (s)		29.0		38.8	38.8					26.1	26.1	26.1
Actuated g/C Ratio		0.39		0.53	0.53					0.35	0.35	0.35
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1858		328	2383					1107	539	494
v/s Ratio Prot		c0.27		c0.07	0.22						0.14	
v/s Ratio Perm				0.19						c0.20		0.12
v/c Ratio		0.70		0.51	0.42					0.56	0.39	0.34
Uniform Delay, d1		18.8		10.7	10.7					19.3	18.0	17.6
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		1.1		1.0	0.1					0.5	0.3	0.3
Delay (s)		19.9		11.7	10.8					19.8	18.3	17.9
Level of Service		B		B	B					B	B	B
Approach Delay (s)		19.9			10.9			0.0			19.1	
Approach LOS		B			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			16.6			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			73.9			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			62.9%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2029
PM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1298	421	0	982	130	184
Future Volume (vph)	1298	421	0	982	130	184
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Fr _t	0.963					0.850
Fl _t Protected					0.950	
Satd. Flow (prot)	4467	0	0	4690	3197	1489
Fl _t Permitted					0.950	
Satd. Flow (perm)	4467	0	0	4690	3197	1489
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	183					46
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Adj. Flow (vph)	1411	458	0	1067	141	200
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1869	0	0	1067	141	200
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2029
 PM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	52.0			52.0	28.0	28.0
Total Split (%)	65.0%			65.0%	35.0%	35.0%
Maximum Green (s)	44.0			44.0	20.0	20.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	41.9			41.9	16.7	16.7
Actuated g/C Ratio	0.63			0.63	0.25	0.25
v/c Ratio	0.65			0.36	0.18	0.49
Control Delay	8.6			6.7	21.2	21.7
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	8.6			6.7	21.2	21.7
LOS	A			A	C	C
Approach Delay	8.6			6.7	21.5	
Approach LOS	A			A	C	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 66.8
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 9.3
 Intersection Capacity Utilization 56.6%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road







Future Total 2029
 PM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1869	1067	141	200
v/c Ratio	0.65	0.36	0.18	0.49
Control Delay	8.6	6.7	21.2	21.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.6	6.7	21.2	21.7
Queue Length 50th (m)	39.9	19.6	7.3	16.7
Queue Length 95th (m)	71.2	35.1	14.4	36.2
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3338	3454	1177	577
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	0.56	0.31	0.12	0.35
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
 3: QEW Northbound Off-Ramp & McLeod Road

























Future Total 2029
 PM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↔	↔
Traffic Volume (vph)	1298	421	0	982	130	184
Future Volume (vph)	1298	421	0	982	130	184
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.96			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4469			4690	3197	1489
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4469			4690	3197	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1411	458	0	1067	141	200
RTOR Reduction (vph)	68	0	0	0	0	35
Lane Group Flow (vph)	1801	0	0	1067	141	166
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	37.8			37.8	12.6	12.6
Effective Green, g (s)	41.8			41.8	16.6	16.6
Actuated g/C Ratio	0.63			0.63	0.25	0.25
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2813			2952	799	372
v/s Ratio Prot	c0.40			0.23	0.04	
v/s Ratio Perm						c0.11
v/c Ratio	0.64			0.36	0.18	0.44
Uniform Delay, d1	7.6			5.9	19.5	21.0
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.4			0.1	0.1	0.6
Delay (s)	8.1			6.0	19.6	21.6
Level of Service	A			A	B	C
Approach Delay (s)	8.1			6.0	20.8	
Approach LOS	A			A	C	
Intersection Summary						
HCM 2000 Control Delay			8.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			66.4		Sum of lost time (s)	8.0
Intersection Capacity Utilization			56.6%		ICU Level of Service	B
Analysis Period (min)			15			

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Total 2029
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	943	512	322	1120	31	536	13	405	25	20	90
Future Volume (vph)	65	943	512	322	1120	31	536	13	405	25	20	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	0.98	0.98	0.99	1.00	0.97	
Frt			0.850			0.850			0.850		0.877	
Flt Protected	0.950			0.950			0.950	0.955		0.950		
Satd. Flow (prot)	1616	3264	1475	3166	3296	1446	1566	1575	1460	1681	1448	0
Flt Permitted	0.111			0.950			0.950	0.955		0.950		
Satd. Flow (perm)	189	3264	1452	3161	3296	1414	1534	1545	1441	1680	1448	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			557			139			319			98
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Adj. Flow (vph)	71	1025	557	350	1217	34	583	14	440	27	22	98
Shared Lane Traffic (%)							49%					
Lane Group Flow (vph)	71	1025	557	350	1217	34	297	300	440	27	120	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

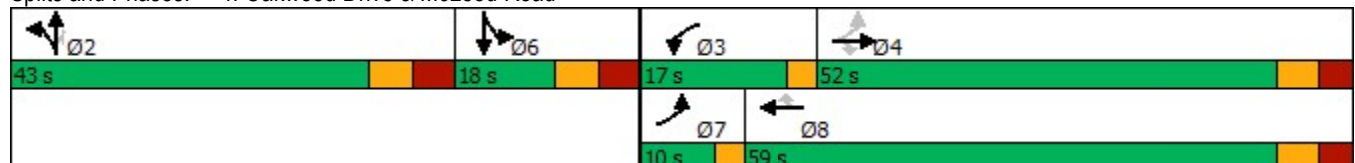
Future Total 2029
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	52.0	52.0	17.0	59.0	59.0	43.0	43.0	43.0	18.0	18.0	
Total Split (%)	7.7%	40.0%	40.0%	13.1%	45.4%	45.4%	33.1%	33.1%	33.1%	13.8%	13.8%	
Maximum Green (s)	7.0	44.4	44.4	14.0	51.4	51.4	34.7	34.7	34.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	61.7	46.2	46.2	17.9	55.5	55.5	32.7	32.7	32.7	12.8	12.8	
Actuated g/C Ratio	0.51	0.38	0.38	0.15	0.46	0.46	0.27	0.27	0.27	0.11	0.11	
v/c Ratio	0.32	0.82	0.62	0.75	0.80	0.05	0.70	0.70	0.71	0.15	0.50	
Control Delay	17.8	40.9	5.6	61.8	34.8	0.1	49.7	49.9	17.8	54.8	23.1	
Queue Delay	0.0	4.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.8	45.4	5.9	61.8	34.8	0.1	49.7	49.9	17.8	54.8	23.1	
LOS	B	D	A	E	C	A	D	D	B	D	C	
Approach Delay		30.9			40.0			36.2			29.0	
Approach LOS		C			D			D			C	

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	120.9
Natural Cycle:	110
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.82
Intersection Signal Delay:	35.4
Intersection LOS:	D
Intersection Capacity Utilization:	73.9%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Total 2029

4: Oakwood Drive & McLeod Road

PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	71	1025	557	350	1217	34	297	300	440	27	120
v/c Ratio	0.32	0.82	0.62	0.75	0.80	0.05	0.70	0.70	0.71	0.15	0.50
Control Delay	17.8	40.9	5.6	61.8	34.8	0.1	49.7	49.9	17.8	54.8	23.1
Queue Delay	0.0	4.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	45.4	5.9	61.8	34.8	0.1	49.7	49.9	17.8	54.8	23.1
Queue Length 50th (m)	7.7	117.5	0.0	43.3	136.7	0.0	68.1	68.8	25.0	6.2	5.1
Queue Length 95th (m)	16.1	153.7	25.5	#66.3	178.1	0.0	102.3	103.3	64.4	15.8	24.4
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	227	1320	919	476	1528	730	506	509	682	192	252
Starvation Cap Reductn	0	223	57	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.31	0.93	0.65	0.74	0.80	0.05	0.59	0.59	0.65	0.14	0.48

Intersection Summary

























95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

4: Oakwood Drive & McLeod Road

Future Total 2029
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	943	512	322	1120	31	536	13	405	25	20	90
Future Volume (vph)	65	943	512	322	1120	31	536	13	405	25	20	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3264	1452	3166	3296	1415	1566	1574	1441	1681	1450	
Flt Permitted	0.11	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	190	3264	1452	3166	3296	1415	1566	1574	1441	1681	1450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	1025	557	350	1217	34	583	14	440	27	22	98
RTOR Reduction (vph)	0	0	341	0	0	18	0	0	233	0	88	0
Lane Group Flow (vph)	71	1025	216	350	1217	16	297	300	207	27	32	0
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	48.3	43.0	43.0	13.8	51.5	51.5	28.7	28.7	28.7	8.7	8.7	
Effective Green, g (s)	56.3	47.0	47.0	17.8	55.5	55.5	32.7	32.7	32.7	12.7	12.7	
Actuated g/C Ratio	0.46	0.39	0.39	0.15	0.46	0.46	0.27	0.27	0.27	0.10	0.10	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	197	1263	562	464	1506	646	421	423	388	175	151	
v/s Ratio Prot	0.03	0.31		c0.11	c0.37		0.19	c0.19		0.02	c0.02	
v/s Ratio Perm	0.14		0.15			0.01			0.14			
v/c Ratio	0.36	0.81	0.38	0.75	0.81	0.02	0.71	0.71	0.53	0.15	0.21	
Uniform Delay, d1	21.2	33.2	26.8	49.7	28.4	18.1	40.0	40.1	37.8	49.5	49.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	4.0	0.3	6.5	3.2	0.0	4.9	5.0	1.1	0.3	0.5	
Delay (s)	22.0	37.2	27.1	56.2	31.6	18.1	44.9	45.1	38.9	49.8	50.3	
Level of Service	C	D	C	E	C	B	D	D	D	D	D	
Approach Delay (s)		33.2			36.7			42.4			50.2	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			37.2				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			121.4				Sum of lost time (s)			11.2		
Intersection Capacity Utilization			73.9%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2029
PM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	396	9	1	437	365	379
Future Volume (vph)	396	9	1	437	365	379
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Fr _t	0.997				0.924	
Fl _t Protected	0.953					
Satd. Flow (prot)	1681	0	0	3233	3061	0
Fl _t Permitted	0.953			0.954		
Satd. Flow (perm)	1681	0	0	3084	3061	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2				412	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			240.9	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Adj. Flow (vph)	430	10	1	475	397	412
Shared Lane Traffic (%)						
Lane Group Flow (vph)	440	0	0	476	809	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2029
PM Peak

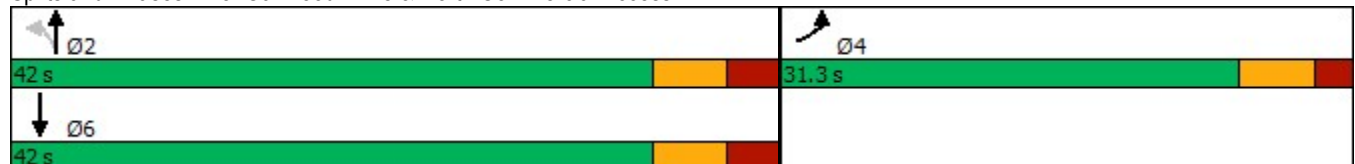


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	25.3			39.1	39.1	
Actuated g/C Ratio	0.36			0.56	0.56	
v/c Ratio	0.72			0.27	0.43	
Control Delay	26.6			9.1	5.2	
Queue Delay	0.0			0.0	0.0	
Total Delay	26.6			9.1	5.2	
LOS	C			A	A	
Approach Delay	26.6			9.1	5.2	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	69.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.72
Intersection Signal Delay:	11.7
Intersection LOS:	B
Intersection Capacity Utilization	55.3%
ICU Level of Service	B
Analysis Period (min)	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues

Future Total 2029

5: Oakwood Drive & North Commercial Access

PM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	440	476	809
v/c Ratio	0.72	0.27	0.43
Control Delay	26.6	9.1	5.2
Queue Delay	0.0	0.0	0.0
Total Delay	26.6	9.1	5.2
Queue Length 50th (m)	48.0	16.6	13.5
Queue Length 95th (m)	78.0	26.1	24.7
Internal Link Dist (m)	45.0	216.9	285.0
Turn Bay Length (m)			
Base Capacity (vph)	703	1731	1899
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.63	0.27	0.43
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Total 2029
PM Peak



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	396	9	1	437	365	379
Future Volume (vph)	396	9	1	437	365	379
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.92	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1682			3233	3060	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1682			3084	3060	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	430	10	1	475	397	412
RTOR Reduction (vph)	1	0	0	0	181	0
Lane Group Flow (vph)	439	0	0	476	628	0
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	21.2			35.1	35.1	
Effective Green, g (s)	25.2			39.1	39.1	
Actuated g/C Ratio	0.36			0.56	0.56	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	609			1732	1719	
v/s Ratio Prot	c0.26				c0.21	
v/s Ratio Perm				0.15		
v/c Ratio	0.72			0.27	0.37	
Uniform Delay, d1	19.2			7.9	8.4	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	4.2			0.4	0.6	
Delay (s)	23.3			8.3	9.0	
Level of Service	C			A	A	
Approach Delay (s)	23.3			8.3	9.0	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	69.6	Sum of lost time (s)	5.3
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

Future Total 2029

6: Site Access 1/South Commercial Access & Oakwood Drive

PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	158	0	43	160	34	0	0	53	182	0	89
Future Volume (vph)	53	158	0	43	160	34	0	0	53	182	0	89
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Ped Bike Factor	1.00					0.98						
Fr _t						0.850		0.850				0.850
Fl _t Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1681	1718	0	1648	1718	1504	1735	1475	0	1586	1735	1504
Fl _t Permitted	0.599			0.649						0.950		
Satd. Flow (perm)	1058	1718	0	1126	1718	1471	1735	1475	0	1586	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		597				819
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			122.6			120.6				82.8
Travel Time (s)		19.6			8.8			9.0				6.2
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Adj. Flow (vph)	58	172	0	47	174	37	0	0	58	198	0	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	172	0	47	174	37	0	58	0	198	0	97
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2029
PM Peak

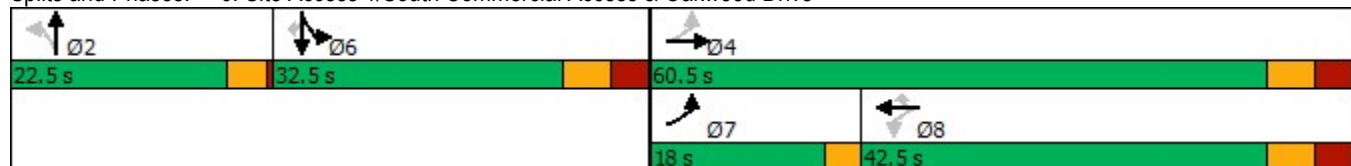


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	Min	Min		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.5	57.0		39.0	39.0	39.0		8.7		35.0		35.0
Actuated g/C Ratio	0.57	0.53		0.36	0.36	0.36		0.08		0.32		0.32
v/c Ratio	0.08	0.19		0.12	0.28	0.06		0.09		0.38		0.09
Control Delay	10.6	14.0		24.0	25.9	0.2		0.3		30.8		0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0		0.0
Total Delay	10.6	14.0		24.0	25.9	0.2		0.3		30.8		0.2
LOS	B	B		C	C	A		A		C		A
Approach Delay		13.1			21.9			0.3				20.7
Approach LOS		B			C			A				C

Intersection Summary

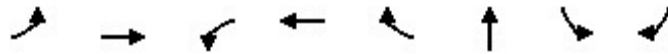
Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 107.7
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.38
 Intersection Signal Delay: 17.6
 Intersection LOS: B
 Intersection Capacity Utilization 56.8%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive



6: Site Access 1/South Commercial Access & Oakwood Drive

PM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBR
Lane Group Flow (vph)	58	172	47	174	37	58	198	97
v/c Ratio	0.08	0.19	0.12	0.28	0.06	0.09	0.38	0.09
Control Delay	10.6	14.0	24.0	25.9	0.2	0.3	30.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	14.0	24.0	25.9	0.2	0.3	30.8	0.2
Queue Length 50th (m)	5.1	18.0	6.5	25.6	0.0	0.0	31.9	0.0
Queue Length 95th (m)	10.7	29.8	14.7	42.2	0.0	0.0	51.9	0.0
Internal Link Dist (m)		248.4		98.6		96.6		
Turn Bay Length (m)			85.0					
Base Capacity (vph)	714	909	407	622	602	780	515	1041
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	0.08	0.19	0.12	0.28	0.06	0.07	0.38	0.09

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive










Future Total 2029
 PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	158	0	43	160	34	0	0	53	182	0	89
Future Volume (vph)	53	158	0	43	160	34	0	0	53	182	0	89
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5		3.5	3.5	3.5		0.0		3.5		3.5
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00		1.00		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frt	1.00	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)	1680	1718		1648	1718	1471		1475		1586		1504
Flt Permitted	0.60	1.00		0.65	1.00	1.00		1.00		0.95		1.00
Satd. Flow (perm)	1059	1718		1125	1718	1471		1475		1586		1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	172	0	47	174	37	0	0	58	198	0	97
RTOR Reduction (vph)	0	0	0	0	0	24	0	53	0	0	0	65
Lane Group Flow (vph)	58	172	0	47	174	13	0	5	0	198	0	32
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	53.0	53.0		35.0	35.0	35.0		4.7		31.0		31.0
Effective Green, g (s)	57.0	57.0		39.0	39.0	39.0		8.7		35.0		35.0
Actuated g/C Ratio	0.53	0.53		0.36	0.36	0.36		0.08		0.32		0.32
Clearance Time (s)	3.0	7.5		7.5	7.5	7.5		4.0		7.5		7.5
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2		2.2		2.2		2.2
Lane Grp Cap (vph)	670	909		407	622	532		119		515		488
v/s Ratio Prot	0.02	c0.10			c0.10			c0.00		c0.12		
v/s Ratio Perm	0.03			0.04		0.01						0.02
v/c Ratio	0.09	0.19		0.12	0.28	0.03		0.04		0.38		0.06
Uniform Delay, d1	12.4	13.3		22.9	24.4	22.1		45.6		28.0		25.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Incremental Delay, d2	0.3	0.5		0.6	1.1	0.1		0.1		2.2		0.3
Delay (s)	12.7	13.7		23.4	25.5	22.2		45.7		30.2		25.3
Level of Service	B	B		C	C	C		D		C		C
Approach Delay (s)		13.5			24.7			45.7			28.6	
Approach LOS		B			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			24.4									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.27									
Actuated Cycle Length (s)			107.7									Sum of lost time (s) 7.0
Intersection Capacity Utilization			56.8%									ICU Level of Service B
Analysis Period (min)			15									

c Critical Lane Group










Lanes, Volumes, Timings
7: Oakwood Drive & Site Access 2

Future Total 2029
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	7	4	207	4	3	247
Future Volume (vph)	7	4	207	4	3	247
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.955		0.998			
Flt Protected	0.968					0.999
Satd. Flow (prot)	1604	0	1731	0	0	1733
Flt Permitted	0.968					0.999
Satd. Flow (perm)	1604	0	1731	0	0	1733
Link Speed (k/h)	48		50			60
Link Distance (m)	39.5		2126.3			272.4
Travel Time (s)	3.0		153.1			16.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	4	225	4	3	268
Shared Lane Traffic (%)						
Lane Group Flow (vph)	12	0	229	0	0	271
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	26.7%			ICU Level of Service A		
Analysis Period (min)	15					












HCM Unsignalized Intersection Capacity Analysis
7: Oakwood Drive & Site Access 2

Future Total 2029
PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	7	4	207	4	3	247
Future Volume (Veh/h)	7	4	207	4	3	247
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	4	225	4	3	268
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						272
pX, platoon unblocked	0.95					
vC, conflicting volume	501	227			229	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	452	227			229	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	538	812			1339	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	12	229	271			
Volume Left	8	0	3			
Volume Right	4	4	0			
cSH	606	1700	1339			
Volume to Capacity	0.02	0.13	0.00			
Queue Length 95th (m)	0.5	0.0	0.1			
Control Delay (s)	11.1	0.0	0.1			
Lane LOS	B		A			
Approach Delay (s)	11.1	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			26.7%	ICU Level of Service	A	
Analysis Period (min)			15			














Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Total 2029
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	115	8	232	124	11	245
Future Volume (vph)	115	8	232	124	11	245
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.948			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1504	3146	0	1681	3233
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1504	3146	0	1681	3233
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	4%
Adj. Flow (vph)	125	9	252	135	12	266
Shared Lane Traffic (%)						
Lane Group Flow (vph)	125	9	387	0	12	266
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	24.9%			ICU Level of Service A		
Analysis Period (min)	15					

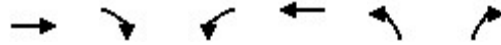
HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive

Future Total 2029
PM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	115	8	232	124	11	245	
Future Volume (Veh/h)	115	8	232	124	11	245	
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	125	9	252	135	12	266	
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	476	194			387		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	476	194			387		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	76	99			99		
cM capacity (veh/h)	517	822			1183		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	125	9	168	219	12	133	133
Volume Left	125	0	0	0	12	0	0
Volume Right	0	9	0	135	0	0	0
cSH	517	822	1700	1700	1183	1700	1700
Volume to Capacity	0.24	0.01	0.10	0.13	0.01	0.08	0.08
Queue Length 95th (m)	7.1	0.3	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	14.2	9.4	0.0	0.0	8.1	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	13.8	0.0		0.3			
Approach LOS	B						
Intersection Summary							
Average Delay			2.4				
Intersection Capacity Utilization			24.9%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive

Future Total 2029
 PM Peak



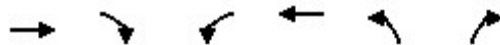
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (vph)	392	1	0	237	0	7
Future Volume (vph)	392	1	0	237	0	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Flt						0.865
Flt Protected						
Satd. Flow (prot)	3296	0	0	3296	0	1501
Flt Permitted						
Satd. Flow (perm)	3296	0	0	3296	0	1501
Link Speed (k/h)	50			50	48	
Link Distance (m)	122.6			240.9	86.6	
Travel Time (s)	8.8			17.3	6.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	426	1	0	258	0	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	427	0	0	258	0	8
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Yield	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	21.8%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive
























Future Total 2029
 PM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	392	1	0	237	0	7
Future Volume (Veh/h)	392	1	0	237	0	7
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	426	1	0	258	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	123			241		
pX, platoon unblocked						
vC, conflicting volume				426	556	214
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol				426	556	214
tC, single (s)				4.1	6.8	6.9
tC, 2 stage (s)						
tF (s)				2.2	3.5	3.3
p0 queue free %				100	100	99
cM capacity (veh/h)				1130	461	792
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	284	143	129	129	8	
Volume Left	0	0	0	0	0	
Volume Right	0	1	0	0	8	
cSH	1700	1700	1700	1700	792	
Volume to Capacity	0.17	0.08	0.08	0.08	0.01	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.2	
Control Delay (s)	0.0	0.0	0.0	0.0	9.6	
Lane LOS						A
Approach Delay (s)	0.0		0.0		9.6	
Approach LOS						A
Intersection Summary						
Average Delay				0.1		
Intersection Capacity Utilization				21.8%	ICU Level of Service	A
Analysis Period (min)				15		

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Background 2034
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	963	6	25	781	262	21	86	115	174	52	99
Future Volume (vph)	109	963	6	25	781	262	21	86	115	174	52	99
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98						
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1437	4595	0	1227	3264	1419	1681	1594	1319	1556	1475	1308
Flt Permitted	0.172			0.210			0.720			0.697		
Satd. Flow (perm)	260	4595	0	271	3264	1385	1274	1594	1319	1142	1475	1308
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				285			125			108
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	2						2					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%
Adj. Flow (vph)	118	1047	7	27	849	285	23	93	125	189	57	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	118	1054	0	27	849	285	23	93	125	189	57	108
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

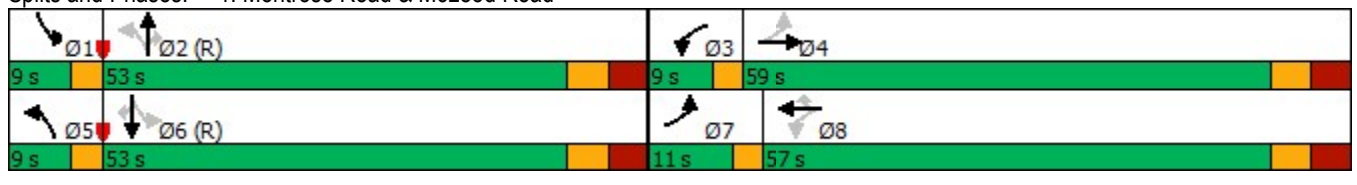
Future Background 2034
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.1	46.1
Total Split (s)	11.0	59.0		9.0	57.0	57.0	9.0	53.0	53.0	9.0	53.0	53.0
Total Split (%)	8.5%	45.4%		6.9%	43.8%	43.8%	6.9%	40.8%	40.8%	6.9%	40.8%	40.8%
Maximum Green (s)	8.0	51.0		6.0	49.0	49.0	6.0	45.0	45.0	6.0	45.0	45.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	66.0	54.8		61.9	46.1	46.1	59.0	43.6	43.6	66.0	55.2	55.2
Actuated g/C Ratio	0.51	0.42		0.48	0.35	0.35	0.45	0.34	0.34	0.51	0.42	0.42
v/c Ratio	0.43	0.54		0.13	0.73	0.42	0.04	0.17	0.24	0.30	0.09	0.18
Control Delay	20.5	29.0		14.8	40.2	4.7	20.4	37.2	8.4	21.6	28.5	6.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	29.0		14.8	40.2	4.7	20.4	37.2	8.4	21.6	28.5	6.6
LOS	C	C		B	D	A	C	D	A	C	C	A
Approach Delay		28.2			30.9			20.6			18.1	
Approach LOS		C			C			C			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 27.4 Intersection LOS: C
 Intersection Capacity Utilization 57.3% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Background 2034

1: Montrose Road & McLeod Road

AM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	118	1054	27	849	285	23	93	125	189	57	108
v/c Ratio	0.43	0.54	0.13	0.73	0.42	0.04	0.17	0.24	0.30	0.09	0.18
Control Delay	20.5	29.0	14.8	40.2	4.7	20.4	37.2	8.4	21.6	28.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	29.0	14.8	40.2	4.7	20.4	37.2	8.4	21.6	28.5	6.6
Queue Length 50th (m)	15.8	76.9	3.4	99.3	0.0	2.9	16.6	0.0	26.2	9.0	0.0
Queue Length 95th (m)	21.2	77.5	6.6	109.4	16.3	9.1	37.1	16.9	50.1	21.6	13.4
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	275	2014	208	1339	736	610	640	604	638	657	643
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.52	0.13	0.63	0.39	0.04	0.15	0.21	0.30	0.09	0.17
























Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Background 2034

1: Montrose Road & McLeod Road

AM Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	109	963	6	25	781	262	21	86	115	174	52	99	
Future Volume (vph)	109	963	6	25	781	262	21	86	115	174	52	99	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1437	4595		1227	3264	1385	1681	1594	1319	1556	1475	1308	
Flt Permitted	0.17	1.00		0.21	1.00	1.00	0.72	1.00	1.00	0.70	1.00	1.00	
Satd. Flow (perm)	261	4595		271	3264	1385	1274	1594	1319	1142	1475	1308	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	118	1047	7	27	849	285	23	93	125	189	57	108	
RTOR Reduction (vph)	0	1	0	0	0	181	0	0	84	0	0	64	
Lane Group Flow (vph)	118	1053	0	27	849	104	23	93	41	189	57	44	
Confl. Peds. (#/hr)	2					2							
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	58.2	50.8		47.7	43.3	43.3	42.4	38.4	38.4	55.8	48.8	48.8	
Effective Green, g (s)	62.2	54.8		55.7	47.3	47.3	50.4	42.4	42.4	59.8	52.8	52.8	
Actuated g/C Ratio	0.48	0.42		0.43	0.36	0.36	0.39	0.33	0.33	0.46	0.41	0.41	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	268	1936		177	1187	503	518	519	430	583	599	531	
v/s Ratio Prot	c0.05	0.23		0.01	c0.26		0.00	0.06		c0.05	0.04		
v/s Ratio Perm	0.16			0.06		0.07	0.01		0.03	0.10		0.03	
v/c Ratio	0.44	0.54		0.15	0.72	0.21	0.04	0.18	0.09	0.32	0.10	0.08	
Uniform Delay, d1	21.8	28.2		22.1	35.6	28.4	24.7	31.3	30.5	21.6	23.8	23.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	0.2		0.3	1.9	0.1	0.0	0.8	0.4	0.2	0.3	0.3	
Delay (s)	22.6	28.5		22.3	37.5	28.6	24.7	32.1	30.9	21.8	24.2	24.0	
Level of Service	C	C		C	D	C	C	C	C	C	C	C	
Approach Delay (s)		27.9			35.0			30.8			22.9		
Approach LOS		C			C			C			C		
Intersection Summary													
HCM 2000 Control Delay			30.3		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.44										
Actuated Cycle Length (s)			130.0		Sum of lost time (s)					6.0			
Intersection Capacity Utilization			57.3%		ICU Level of Service					B			
Analysis Period (min)			15										

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑↑					↑↑	↑	↑
Traffic Volume (vph)	0	1046	0	109	660	127	0	0	0	418	148	339
Future Volume (vph)	0	1046	0	109	660	127	0	0	0	418	148	339
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00								
Frt					0.976						0.938	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4473	1769	1586	4351	0	0	0	0	3048	1467	1374
Flt Permitted				0.180						0.950		
Satd. Flow (perm)	0	4473	1769	300	4351	0	0	0	0	3048	1467	1374
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					55						52	123
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Adj. Flow (vph)	0	1137	0	118	717	138	0	0	0	454	161	368
Shared Lane Traffic (%)												31%
Lane Group Flow (vph)	0	1137	0	118	855	0	0	0	0	454	275	254
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

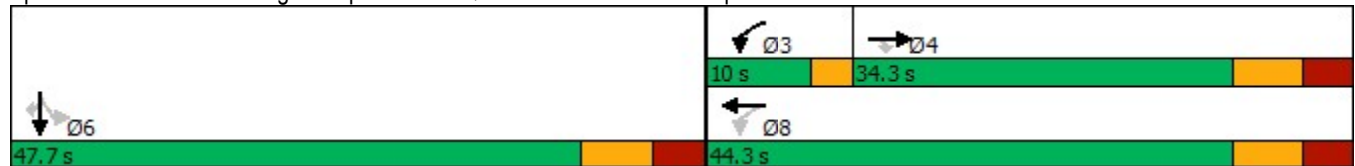


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	-4.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	4.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		28.5		41.4	35.9					22.7	22.7	22.7
Actuated g/C Ratio		0.42		0.61	0.53					0.33	0.33	0.33
v/c Ratio		0.60		0.30	0.37					0.45	0.52	0.47
Control Delay		18.7		9.1	9.9					19.6	19.1	12.8
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		18.7		9.1	9.9					19.6	19.1	12.8
LOS		B		A	A					B	B	B
Approach Delay		18.7			9.8						17.7	
Approach LOS		B			A						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 67.9
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 15.6
 Intersection LOS: B
 Intersection Capacity Utilization 55.3%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road





Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1137	118	855	454	275	254
v/c Ratio	0.60	0.30	0.37	0.45	0.52	0.47
Control Delay	18.7	9.1	9.9	19.6	19.1	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	9.1	9.9	19.6	19.1	12.8
Queue Length 50th (m)	41.6	5.4	19.1	25.0	25.3	13.8
Queue Length 95th (m)	69.9	16.2	37.1	36.2	46.5	32.4
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2050	398	2680	2002	981	944
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.30	0.32	0.23	0.28	0.27

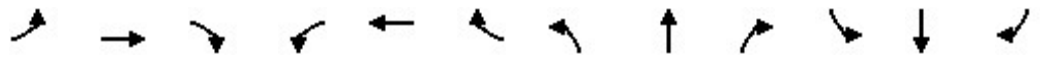
Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Background 2034

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘	↑↑↑					↖	↘	↗
Traffic Volume (vph)	0	1046	0	109	660	127	0	0	0	418	148	339
Future Volume (vph)	0	1046	0	109	660	127	0	0	0	418	148	339
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.98					1.00	0.94	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4473		1586	4350					3048	1466	1374
Flt Permitted		1.00		0.18	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4473		301	4350					3048	1466	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1137	0	118	717	138	0	0	0	454	161	368
RTOR Reduction (vph)	0	0	0	0	26	0	0	0	0	0	35	82
Lane Group Flow (vph)	0	1137	0	118	829	0	0	0	0	454	240	172
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		24.4		32.5	32.5					18.6	18.6	18.6
Effective Green, g (s)		28.4		36.5	36.5					22.6	22.6	22.6
Actuated g/C Ratio		0.42		0.54	0.54					0.33	0.33	0.33
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1865		333	2331					1011	486	455
v/s Ratio Prot		c0.25		0.05	c0.19						c0.16	
v/s Ratio Perm				0.14						0.15		0.13
v/c Ratio		0.61		0.35	0.36					0.45	0.49	0.38
Uniform Delay, d1		15.5		8.4	9.1					17.9	18.2	17.4
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.5		0.5	0.1					0.2	0.6	0.4
Delay (s)		16.0		8.9	9.1					18.1	18.8	17.8
Level of Service		B		A	A					B	B	B
Approach Delay (s)		16.0			9.1			0.0			18.2	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			14.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			68.1			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			55.3%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

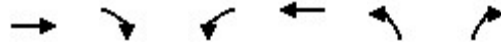
Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2034
AM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1014	451	0	709	107	200
Future Volume (vph)	1014	451	0	709	107	200
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Frt	0.954					0.850
Flt Protected					0.950	
Satd. Flow (prot)	4227	0	0	4473	3166	1446
Flt Permitted					0.950	
Satd. Flow (perm)	4227	0	0	4473	3166	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	236					85
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Adj. Flow (vph)	1102	490	0	771	116	217
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1592	0	0	771	116	217
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2034
 AM Peak

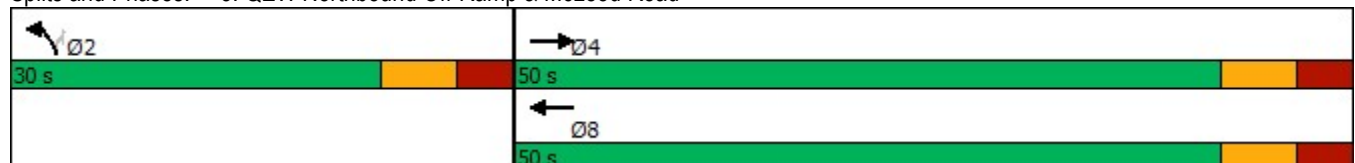


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	50.0			50.0	30.0	30.0
Total Split (%)	62.5%			62.5%	37.5%	37.5%
Maximum Green (s)	42.0			42.0	22.0	22.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	35.6			35.6	15.9	15.9
Actuated g/C Ratio	0.60			0.60	0.27	0.27
v/c Ratio	0.61			0.29	0.14	0.49
Control Delay	7.7			6.5	18.7	16.6
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	7.7			6.5	18.7	16.6
LOS	A			A	B	B
Approach Delay	7.7			6.5	17.3	
Approach LOS	A			A	B	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 59.8
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.61
 Intersection Signal Delay: 8.5
 Intersection Capacity Utilization 52.4%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2034
AM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1592	771	116	217
v/c Ratio	0.61	0.29	0.14	0.49
Control Delay	7.7	6.5	18.7	16.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.7	6.5	18.7	16.6
Queue Length 50th (m)	26.5	12.1	4.7	11.1
Queue Length 95th (m)	53.2	24.3	11.9	33.0
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3417	3565	1426	698
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	0.47	0.22	0.08	0.31
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

3: QEW Northbound Off-Ramp & McLeod Road

























Future Background 2034
AM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↔↔	↔
Traffic Volume (vph)	1014	451	0	709	107	200
Future Volume (vph)	1014	451	0	709	107	200
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.95			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4226			4473	3166	1446
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4226			4473	3166	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1102	490	0	771	116	217
RTOR Reduction (vph)	94	0	0	0	0	62
Lane Group Flow (vph)	1498	0	0	771	116	155
Confl. Peds. (#/hr)		1	1			
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	31.5			31.5	11.7	11.7
Effective Green, g (s)	35.5			35.5	15.7	15.7
Actuated g/C Ratio	0.60			0.60	0.27	0.27
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2534			2682	839	383
v/s Ratio Prot	c0.35			0.17	0.04	
v/s Ratio Perm						c0.11
v/c Ratio	0.59			0.29	0.14	0.40
Uniform Delay, d1	7.3			5.7	16.6	17.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			0.0	0.1	0.5
Delay (s)	7.7			5.8	16.6	18.4
Level of Service	A			A	B	B
Approach Delay (s)	7.7			5.8	17.8	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			8.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			59.2		Sum of lost time (s)	8.0
Intersection Capacity Utilization			52.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Background 2034
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	681	362	218	905	28	220	21	189	9	2	44
Future Volume (vph)	91	681	362	218	905	28	220	21	189	9	2	44
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00	1.00	0.98	1.00	0.98	
Fr _t			0.850			0.850			0.850		0.856	
Fl _t Protected	0.950			0.950			0.950	0.960		0.950		
Satd. Flow (prot)	1616	3233	1419	3197	3296	1475	1566	1582	1475	1648	1462	0
Fl _t Permitted	0.207			0.950			0.950	0.960		0.950		
Satd. Flow (perm)	352	3233	1398	3192	3296	1439	1560	1577	1451	1643	1462	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			393			139			205			48
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	99	740	393	237	984	30	239	23	205	10	2	48
Shared Lane Traffic (%)							45%					
Lane Group Flow (vph)	99	740	393	237	984	30	131	131	205	10	50	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

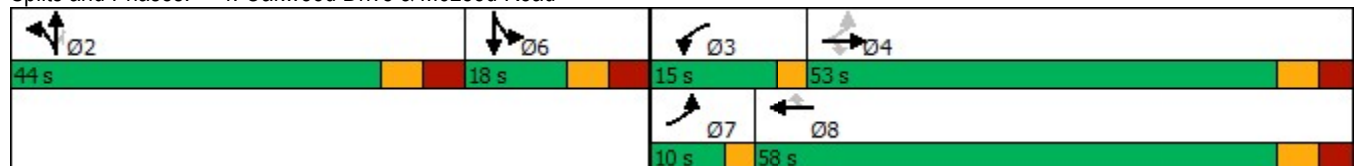
Future Background 2034
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	53.0	53.0	15.0	58.0	58.0	44.0	44.0	44.0	18.0	18.0	
Total Split (%)	7.7%	40.8%	40.8%	11.5%	44.6%	44.6%	33.8%	33.8%	33.8%	13.8%	13.8%	
Maximum Green (s)	7.0	45.4	45.4	12.0	50.4	50.4	35.7	35.7	35.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	49.6	33.1	33.1	15.4	40.0	40.0	17.9	17.9	17.9	13.1	13.1	
Actuated g/C Ratio	0.58	0.39	0.39	0.18	0.47	0.47	0.21	0.21	0.21	0.15	0.15	
v/c Ratio	0.27	0.59	0.50	0.42	0.64	0.04	0.40	0.40	0.44	0.04	0.19	
Control Delay	10.9	24.5	4.6	38.6	22.2	0.1	38.2	38.0	8.6	41.2	15.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	10.9	24.5	4.7	38.6	22.2	0.1	38.2	38.0	8.6	41.2	15.5	
LOS	B	C	A	D	C	A	D	D	A	D	B	
Approach Delay		17.1			24.8			25.1			19.8	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 85.9
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 21.6
 Intersection LOS: C
 Intersection Capacity Utilization 57.9%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Background 2034

4: Oakwood Drive & McLeod Road

AM Peak



























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	99	740	393	237	984	30	131	131	205	10	50
v/c Ratio	0.27	0.59	0.50	0.42	0.64	0.04	0.40	0.40	0.44	0.04	0.19
Control Delay	10.9	24.5	4.6	38.6	22.2	0.1	38.2	38.0	8.6	41.2	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.9	24.5	4.7	38.6	22.2	0.1	38.2	38.0	8.6	41.2	15.5
Queue Length 50th (m)	6.8	53.4	0.0	18.3	70.3	0.0	20.6	20.6	0.0	1.5	0.3
Queue Length 95th (m)	15.9	80.7	17.2	37.8	105.3	0.0	45.0	45.0	18.5	7.1	11.6
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	378	2007	1017	643	2192	1003	781	789	826	283	291
Starvation Cap Reductn	0	84	17	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.26	0.38	0.39	0.37	0.45	0.03	0.17	0.17	0.25	0.04	0.17

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Oakwood Drive & McLeod Road

Future Background 2034
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	681	362	218	905	28	220	21	189	9	2	44
Future Volume (vph)	91	681	362	218	905	28	220	21	189	9	2	44
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3233	1400	3197	3296	1441	1566	1583	1453	1648	1464	
Flt Permitted	0.21	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	352	3233	1400	3197	3296	1441	1566	1583	1453	1648	1464	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	740	393	237	984	30	239	23	205	10	2	48
RTOR Reduction (vph)	0	0	242	0	0	16	0	0	164	0	43	0
Lane Group Flow (vph)	99	740	151	237	984	14	131	131	41	10	7	0
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	34.8	29.7	29.7	11.1	35.7	35.7	13.6	13.6	13.6	6.0	6.0	
Effective Green, g (s)	42.8	33.7	33.7	15.1	39.7	39.7	17.6	17.6	17.6	10.0	10.0	
Actuated g/C Ratio	0.49	0.38	0.38	0.17	0.45	0.45	0.20	0.20	0.20	0.11	0.11	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	303	1243	538	551	1493	653	314	318	291	188	167	
v/s Ratio Prot	0.03	0.23		c0.07	c0.30		c0.08	0.08		c0.01	0.01	
v/s Ratio Perm	0.13		0.11			0.01			0.03			
v/c Ratio	0.33	0.60	0.28	0.43	0.66	0.02	0.42	0.41	0.14	0.05	0.04	
Uniform Delay, d1	12.9	21.5	18.6	32.4	18.7	13.2	30.5	30.5	28.8	34.6	34.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.6	0.2	0.4	0.9	0.0	0.7	0.6	0.2	0.1	0.1	
Delay (s)	13.3	22.2	18.8	32.8	19.6	13.2	31.2	31.1	28.9	34.7	34.6	
Level of Service	B	C	B	C	B	B	C	C	C	C	C	
Approach Delay (s)		20.4			22.0			30.2			34.6	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			22.8				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			87.6				Sum of lost time (s)				11.2	
Intersection Capacity Utilization			57.9%				ICU Level of Service				B	
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2034
AM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	200	4	2	223	262	262
Future Volume (vph)	200	4	2	223	262	262
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Fr _t	0.998				0.925	
Fl _t Protected	0.953					
Satd. Flow (prot)	1650	0	0	3059	2962	0
Fl _t Permitted	0.953			0.952		
Satd. Flow (perm)	1650	0	0	2912	2962	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1				285	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			239.7	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Adj. Flow (vph)	217	4	2	242	285	285
Shared Lane Traffic (%)						
Lane Group Flow (vph)	221	0	0	244	570	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2034
AM Peak

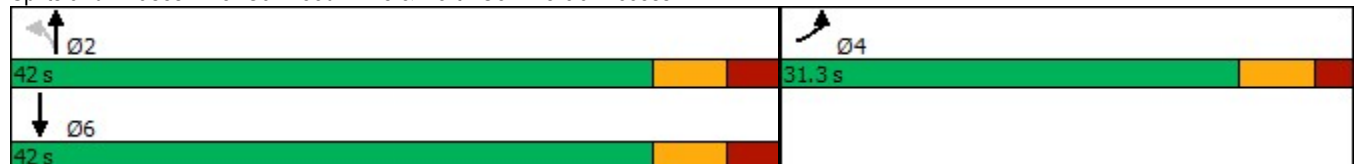


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	17.7			41.3	41.3	
Actuated g/C Ratio	0.28			0.64	0.64	
v/c Ratio	0.49			0.13	0.28	
Control Delay	22.5			5.4	3.2	
Queue Delay	0.0			0.0	0.0	
Total Delay	22.5			5.4	3.2	
LOS	C			A	A	
Approach Delay	22.5			5.4	3.2	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	64.3
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.49
Intersection Signal Delay:	7.8
Intersection LOS:	A
Intersection Capacity Utilization	36.0%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues
5: Oakwood Drive & North Commercial Access

Future Background 2034
AM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	221	244	570
v/c Ratio	0.49	0.13	0.28
Control Delay	22.5	5.4	3.2
Queue Delay	0.0	0.0	0.0
Total Delay	22.5	5.4	3.2
Queue Length 50th (m)	20.6	4.9	5.7
Queue Length 95th (m)	37.0	11.3	14.6
Internal Link Dist (m)	45.0	215.7	285.0
Turn Bay Length (m)			
Base Capacity (vph)	747	1871	2004
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.30	0.13	0.28
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Background 2034
AM Peak



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	200	4	2	223	262	262
Future Volume (vph)	200	4	2	223	262	262
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.93	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1650			3057	2962	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1650			2912	2962	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	4	2	242	285	285
RTOR Reduction (vph)	1	0	0	0	102	0
Lane Group Flow (vph)	220	0	0	244	468	0
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	13.6			37.3	37.3	
Effective Green, g (s)	17.6			41.3	41.3	
Actuated g/C Ratio	0.27			0.64	0.64	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	452			1873	1905	
v/s Ratio Prot	c0.13				c0.16	
v/s Ratio Perm				0.08		
v/c Ratio	0.49			0.13	0.25	
Uniform Delay, d1	19.5			4.5	4.9	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.8			0.1	0.3	
Delay (s)	20.4			4.6	5.2	
Level of Service	C			A	A	
Approach Delay (s)	20.4			4.6	5.2	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	64.2	Sum of lost time (s)	5.3
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	170	0	0	177	9	0	0	0	48	0	26
Future Volume (vph)	32	170	0	0	177	9	0	0	0	48	0	26
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Frt						0.850						0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1616	1638	0	1735	1669	1367	1735	1735	0	1528	1735	1504
Flt Permitted	0.592									0.950		
Satd. Flow (perm)	1007	1638	0	1735	1669	1367	1735	1735	0	1528	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109						802
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			119.4			97.6				82.8
Travel Time (s)		19.6			8.6			7.3				6.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%
Adj. Flow (vph)	35	185	0	0	192	10	0	0	0	52	0	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	185	0	0	192	10	0	0	0	52	0	28
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm			Split		Perm
Protected Phases	7	4			8			2		6		6

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

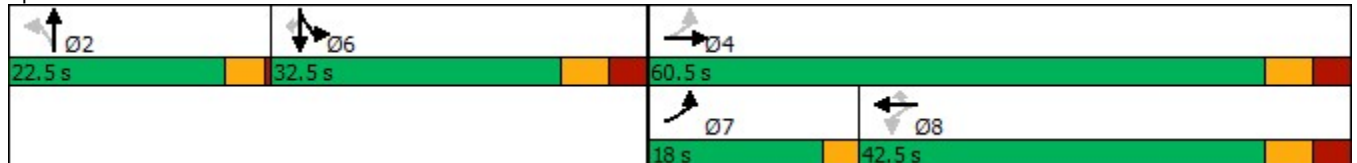
Future Background 2034
 AM Peak

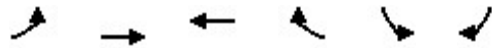
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	None	None		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.5	57.0		39.0	39.0	39.0				35.0		35.0
Actuated g/C Ratio	0.62	0.58		0.39	0.39	0.39				0.35		0.35
v/c Ratio	0.05	0.20		0.29	0.02	0.02				0.10		0.03
Control Delay	7.5	10.7		22.1	0.0	0.0				22.2		0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0				0.0		0.0
Total Delay	7.5	10.7		22.1	0.0	0.0				22.2		0.0
LOS	A	B		C	A	A				C		A
Approach Delay		10.2		21.0							14.4	
Approach LOS		B		C							B	

Intersection Summary

Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 99
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.29
 Intersection Signal Delay: 15.2
 Intersection LOS: B
 Intersection Capacity Utilization 43.9%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	35	185	192	10	52	28
v/c Ratio	0.05	0.20	0.29	0.02	0.10	0.03
Control Delay	7.5	10.7	22.1	0.0	22.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	10.7	22.1	0.0	22.2	0.0
Queue Length 50th (m)	2.4	15.9	24.7	0.0	6.6	0.0
Queue Length 95th (m)	6.0	26.6	41.0	0.0	14.8	0.0
Internal Link Dist (m)		248.4	95.4			
Turn Bay Length (m)						
Base Capacity (vph)	742	943	657	604	540	1050
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.20	0.29	0.02	0.10	0.03
Intersection Summary						












HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2034
 AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	170	0	0	177	9	0	0	0	48	0	26
Future Volume (vph)	32	170	0	0	177	9	0	0	0	48	0	26
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5			3.5	3.5				3.5		3.5
Lane Util. Factor	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	1.00			1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1616	1638			1669	1367				1528		1504
Flt Permitted	0.59	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1007	1638			1669	1367				1528		1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	185	0	0	192	10	0	0	0	52	0	28
RTOR Reduction (vph)	0	0	0	0	0	6	0	0	0	0	0	18
Lane Group Flow (vph)	35	185	0	0	192	4	0	0	0	52	0	10
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm			Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	53.0	53.0			35.0	35.0				31.0		31.0
Effective Green, g (s)	57.0	57.0			39.0	39.0				35.0		35.0
Actuated g/C Ratio	0.58	0.58			0.39	0.39				0.35		0.35
Clearance Time (s)	3.0	7.5			7.5	7.5				7.5		7.5
Vehicle Extension (s)	2.4	2.2			2.2	2.2				2.2		2.2
Lane Grp Cap (vph)	696	943			657	538				540		531
v/s Ratio Prot	0.01	c0.11			c0.12					c0.03		
v/s Ratio Perm	0.02					0.00						0.01
v/c Ratio	0.05	0.20			0.29	0.01				0.10		0.02
Uniform Delay, d1	9.1	10.0			20.5	18.2				21.4		20.8
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	0.1	0.5			1.1	0.0				0.4		0.1
Delay (s)	9.3	10.5			21.7	18.3				21.8		20.9
Level of Service	A	B			C	B				C		C
Approach Delay (s)		10.3			21.5			0.0			21.5	
Approach LOS		B			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			16.6		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.19									
Actuated Cycle Length (s)			99.0		Sum of lost time (s)				7.0			
Intersection Capacity Utilization			43.9%		ICU Level of Service				A			
Analysis Period (min)			15									
c Critical Lane Group												












Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Background 2034
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	50	7	156	77	12	175
Future Volume (vph)	50	7	156	77	12	175
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.950			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1432	2975	0	1601	3264
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1432	2975	0	1601	3264
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	8%	6%	5%	3%
Adj. Flow (vph)	54	8	170	84	13	190
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	8	254	0	13	190
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	20.8%		ICU Level of Service A			
Analysis Period (min)	15					



























HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive

Future Background 2034
AM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	50	7	156	77	12	175	
Future Volume (Veh/h)	50	7	156	77	12	175	
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	54	8	170	84	13	190	
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	333	127			254		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	333	127			254		
tC, single (s)	6.8	7.0			4.2		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	92	99			99		
cM capacity (veh/h)	635	890			1287		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	54	8	113	141	13	95	95
Volume Left	54	0	0	0	13	0	0
Volume Right	0	8	0	84	0	0	0
cSH	635	890	1700	1700	1287	1700	1700
Volume to Capacity	0.08	0.01	0.07	0.08	0.01	0.06	0.06
Queue Length 95th (m)	2.1	0.2	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	11.2	9.1	0.0	0.0	7.8	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	10.9		0.0		0.5		
Approach LOS	B						
Intersection Summary							
Average Delay			1.5				
Intersection Capacity Utilization			20.8%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Background 2034
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			 							
Traffic Volume (vph)	107	893	37	106	1029	327	33	130	262	409	161	107
Future Volume (vph)	107	893	37	106	1029	327	33	130	262	409	161	107
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						0.97						
Frt		0.994				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1514	4617	0	1542	3296	1460	1681	1685	1475	1664	1669	1446
Flt Permitted	0.085			0.188			0.647			0.629		
Satd. Flow (perm)	135	4617	0	305	3296	1411	1145	1685	1475	1102	1669	1446
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				307			117			116
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	7					7						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%
Adj. Flow (vph)	116	971	40	115	1118	355	36	141	285	445	175	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	1011	0	115	1118	355	36	141	285	445	175	116
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

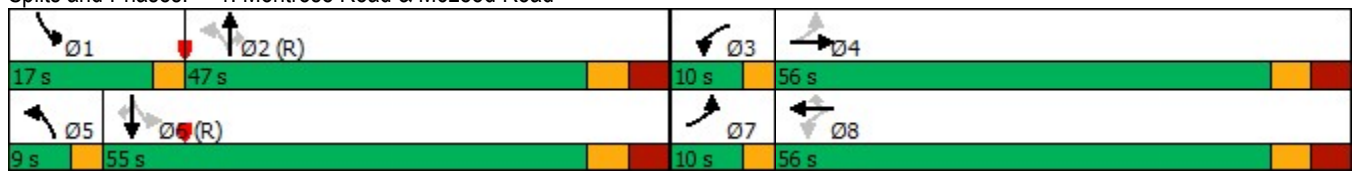
Future Background 2034
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.0	46.0
Total Split (s)	10.0	56.0		10.0	56.0	56.0	9.0	47.0	47.0	17.0	55.0	55.0
Total Split (%)	7.7%	43.1%		7.7%	43.1%	43.1%	6.9%	36.2%	36.2%	13.1%	42.3%	42.3%
Maximum Green (s)	7.0	48.0		7.0	48.0	48.0	6.0	39.0	39.0	14.0	47.0	47.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	66.1	51.1		66.1	51.1	51.1	58.0	43.0	43.0	65.9	55.5	55.5
Actuated g/C Ratio	0.51	0.39		0.51	0.39	0.39	0.45	0.33	0.33	0.51	0.43	0.43
v/c Ratio	0.63	0.56		0.44	0.86	0.48	0.07	0.25	0.50	0.70	0.25	0.17
Control Delay	36.8	31.7		22.4	44.3	7.1	17.2	33.3	23.4	29.4	26.4	5.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.8	31.7		22.4	44.3	7.1	17.2	33.3	23.4	29.4	26.4	5.0
LOS	D	C		C	D	A	B	C	C	C	C	A
Approach Delay		32.2			34.4			26.0			24.8	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 31.0 Intersection LOS: C
 Intersection Capacity Utilization 82.7% ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Background 2034

1: Montrose Road & McLeod Road

PM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	116	1011	115	1118	355	36	141	285	445	175	116
v/c Ratio	0.63	0.56	0.44	0.86	0.48	0.07	0.25	0.50	0.70	0.25	0.17
Control Delay	36.8	31.7	22.4	44.3	7.1	17.2	33.3	23.4	29.4	26.4	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.8	31.7	22.4	44.3	7.1	17.2	33.3	23.4	29.4	26.4	5.0
Queue Length 50th (m)	15.1	71.6	14.9	135.4	7.6	4.6	26.3	33.8	75.7	30.1	0.0
Queue Length 95th (m)	#33.6	85.4	25.6	164.5	30.4	10.3	43.3	60.9	106.6	47.7	11.7
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	185	1850	259	1318	748	552	557	566	640	712	683
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.55	0.44	0.85	0.47	0.07	0.25	0.50	0.70	0.25	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

Future Background 2034

1: Montrose Road & McLeod Road

PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	107	893	37	106	1029	327	33	130	262	409	161	107	
Future Volume (vph)	107	893	37	106	1029	327	33	130	262	409	161	107	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1514	4617		1542	3296	1411	1681	1685	1475	1664	1669	1446	
Flt Permitted	0.09	1.00		0.19	1.00	1.00	0.65	1.00	1.00	0.63	1.00	1.00	
Satd. Flow (perm)	136	4617		305	3296	1411	1144	1685	1475	1102	1669	1446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	116	971	40	115	1118	355	36	141	285	445	175	116	
RTOR Reduction (vph)	0	4	0	0	0	186	0	0	78	0	0	68	
Lane Group Flow (vph)	116	1007	0	115	1118	169	36	141	207	445	175	48	
Confl. Peds. (#/hr)	7					7							
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	54.1	47.1		54.1	47.1	47.1	42.6	39.0	39.0	56.9	50.3	50.3	
Effective Green, g (s)	61.1	51.1		61.1	51.1	51.1	50.6	43.0	43.0	60.9	54.3	54.3	
Actuated g/C Ratio	0.47	0.39		0.47	0.39	0.39	0.39	0.33	0.33	0.47	0.42	0.42	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	180	1814		248	1295	554	476	557	487	597	697	603	
v/s Ratio Prot	c0.05	0.22		0.04	c0.34		0.00	0.08		c0.11	0.10		
v/s Ratio Perm	0.25			0.18		0.12	0.02		0.14	0.24		0.03	
v/c Ratio	0.64	0.56		0.46	0.86	0.30	0.08	0.25	0.42	0.75	0.25	0.08	
Uniform Delay, d1	25.7	30.6		21.0	36.2	27.2	24.8	31.8	33.9	25.9	24.6	22.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.8	0.3		1.0	6.1	0.2	0.0	1.1	2.7	4.8	0.9	0.3	
Delay (s)	32.6	30.9		22.0	42.4	27.4	24.8	32.9	36.6	30.7	25.5	23.1	
Level of Service	C	C		C	D	C	C	C	D	C	C	C	
Approach Delay (s)		31.1			37.6			34.5			28.2		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			33.6									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.67										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			82.7%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	1306	0	167	852	175	0	0	0	605	140	352
Future Volume (vph)	0	1306	0	167	852	175	0	0	0	605	140	352
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00	1.00							
Frt					0.974						0.932	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4736	1769	1616	4533	0	0	0	0	3136	1528	1401
Flt Permitted				0.139						0.950		
Satd. Flow (perm)	0	4736	1769	236	4533	0	0	0	0	3136	1528	1401
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					60						61	98
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)	3		3	3		3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Adj. Flow (vph)	0	1420	0	182	926	190	0	0	0	658	152	383
Shared Lane Traffic (%)												33%
Lane Group Flow (vph)	0	1420	0	182	1116	0	0	0	0	658	278	257
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

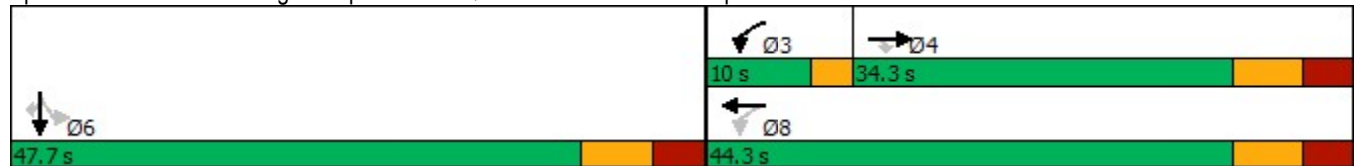


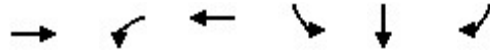
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	0.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	8.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		29.9		45.1	39.8					28.1	28.1	28.1
Actuated g/C Ratio		0.39		0.59	0.52					0.36	0.36	0.36
v/c Ratio		0.77		0.54	0.47					0.57	0.47	0.45
Control Delay		25.5		17.2	12.9					21.4	16.7	13.3
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		25.5		17.2	12.9					21.4	16.7	13.3
LOS		C		B	B					C	B	B
Approach Delay		25.5			13.5						18.6	
Approach LOS		C			B						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 77
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 19.4
 Intersection LOS: B
 Intersection Capacity Utilization 67.0%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road





Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1420	182	1116	658	278	257
v/c Ratio	0.77	0.54	0.47	0.57	0.47	0.45
Control Delay	25.5	17.2	12.9	21.4	16.7	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.5	17.2	12.9	21.4	16.7	13.3
Queue Length 50th (m)	63.8	11.0	32.9	39.0	24.4	17.1
Queue Length 95th (m)	#102.6	32.6	57.5	53.1	44.1	35.7
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	1863	337	2407	1769	888	833
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.54	0.46	0.37	0.31	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

Future Background 2034

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

PM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘	↑↑↑					↖	↘	↗
Traffic Volume (vph)	0	1306	0	167	852	175	0	0	0	605	140	352
Future Volume (vph)	0	1306	0	167	852	175	0	0	0	605	140	352
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.97					1.00	0.93	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4736		1616	4536					3136	1528	1401
Flt Permitted		1.00		0.14	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4736		236	4536					3136	1528	1401
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1420	0	182	926	190	0	0	0	658	152	383
RTOR Reduction (vph)	0	0	0	0	29	0	0	0	0	0	39	62
Lane Group Flow (vph)	0	1420	0	182	1087	0	0	0	0	658	239	195
Confl. Peds. (#/hr)	3		3	3		3						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		25.8		35.7	35.7					24.1	24.1	24.1
Effective Green, g (s)		29.8		39.7	39.7					28.1	28.1	28.1
Actuated g/C Ratio		0.39		0.52	0.52					0.37	0.37	0.37
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1837		317	2344					1147	559	512
v/s Ratio Prot		c0.30		c0.08	0.24						0.16	
v/s Ratio Perm				0.21						c0.21		0.14
v/c Ratio		0.77		0.57	0.46					0.57	0.43	0.38
Uniform Delay, d1		20.5		12.2	11.8					19.5	18.3	17.9
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		2.0		2.1	0.1					0.6	0.4	0.3
Delay (s)		22.5		14.2	11.9					20.1	18.7	18.3
Level of Service		C		B	B					C	B	B
Approach Delay (s)		22.5			12.2			0.0			19.4	
Approach LOS		C			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			18.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			76.8			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			67.0%			ICU Level of Service				C		
Analysis Period (min)			15									

c Critical Lane Group

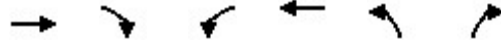
Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2034
PM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1394	465	0	1065	144	203
Future Volume (vph)	1394	465	0	1065	144	203
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Fr _t	0.962					0.850
Fl _t Protected					0.950	
Satd. Flow (prot)	4462	0	0	4690	3197	1489
Fl _t Permitted					0.950	
Satd. Flow (perm)	4462	0	0	4690	3197	1489
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	188					36
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Adj. Flow (vph)	1515	505	0	1158	157	221
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2020	0	0	1158	157	221
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2034
 PM Peak

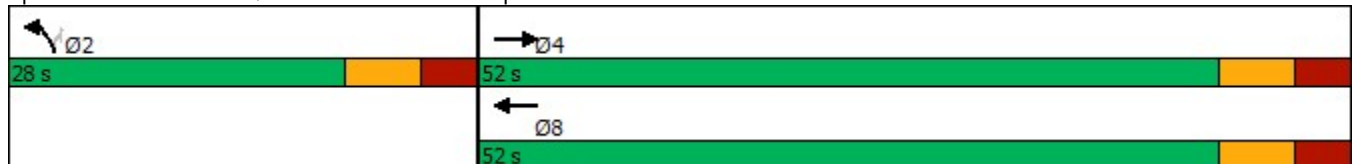


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	52.0			52.0	28.0	28.0
Total Split (%)	65.0%			65.0%	35.0%	35.0%
Maximum Green (s)	44.0			44.0	20.0	20.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	44.2			44.2	17.9	17.9
Actuated g/C Ratio	0.63			0.63	0.25	0.25
v/c Ratio	0.70			0.39	0.19	0.55
Control Delay	9.8			7.2	21.8	25.1
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	9.8			7.2	21.8	25.1
LOS	A			A	C	C
Approach Delay	9.8			7.2	23.7	
Approach LOS	A			A	C	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 70.2
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 10.4
 Intersection LOS: B
 Intersection Capacity Utilization 60.9%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2034
PM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2020	1158	157	221
v/c Ratio	0.70	0.39	0.19	0.55
Control Delay	9.8	7.2	21.8	25.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.8	7.2	21.8	25.1
Queue Length 50th (m)	50.4	23.8	8.9	22.4
Queue Length 95th (m)	83.1	39.3	15.7	42.2
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3172	3275	1116	543
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	0.64	0.35	0.14	0.41
Intersection Summary				

























HCM Signalized Intersection Capacity Analysis
3: QEW Northbound Off-Ramp & McLeod Road

Future Background 2034
PM Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↖↗	↗
Traffic Volume (vph)	1394	465	0	1065	144	203
Future Volume (vph)	1394	465	0	1065	144	203
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.96			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4465			4690	3197	1489
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4465			4690	3197	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1515	505	0	1158	157	221
RTOR Reduction (vph)	69	0	0	0	0	27
Lane Group Flow (vph)	1951	0	0	1158	157	194
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	40.1			40.1	13.8	13.8
Effective Green, g (s)	44.1			44.1	17.8	17.8
Actuated g/C Ratio	0.63			0.63	0.25	0.25
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2816			2958	814	379
v/s Ratio Prot	c0.44			0.25	0.05	
v/s Ratio Perm						c0.13
v/c Ratio	0.69			0.39	0.19	0.51
Uniform Delay, d1	8.5			6.3	20.4	22.3
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.7			0.1	0.1	0.9
Delay (s)	9.1			6.4	20.5	23.2
Level of Service	A			A	C	C
Approach Delay (s)	9.1			6.4	22.1	
Approach LOS	A			A	C	
Intersection Summary						
HCM 2000 Control Delay			9.6		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.64			
Actuated Cycle Length (s)			69.9		Sum of lost time (s)	8.0
Intersection Capacity Utilization			60.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Background 2034
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	1041	527	344	1236	34	541	14	427	28	22	99
Future Volume (vph)	72	1041	527	344	1236	34	541	14	427	28	22	99
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98	1.00		0.98	0.98	0.98	0.99	1.00	0.97	
Frt			0.850			0.850			0.850		0.877	
Flt Protected	0.950			0.950			0.950	0.955		0.950		
Satd. Flow (prot)	1616	3264	1475	3166	3296	1446	1566	1575	1460	1681	1447	0
Flt Permitted	0.084			0.950			0.950	0.955		0.950		
Satd. Flow (perm)	143	3264	1452	3162	3296	1414	1534	1545	1441	1680	1447	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			573			139			314			108
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Adj. Flow (vph)	78	1132	573	374	1343	37	588	15	464	30	24	108
Shared Lane Traffic (%)							49%					
Lane Group Flow (vph)	78	1132	573	374	1343	37	300	303	464	30	132	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

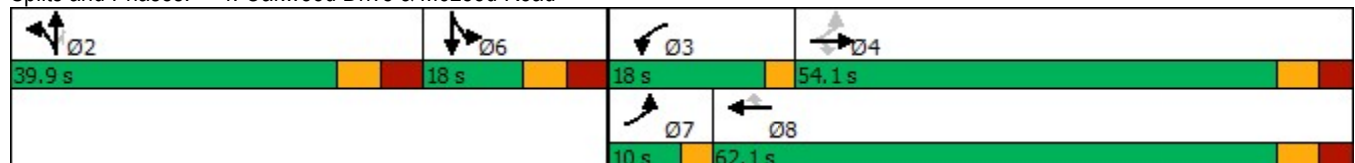
Future Background 2034
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	54.1	54.1	18.0	62.1	62.1	39.9	39.9	39.9	18.0	18.0	
Total Split (%)	7.7%	41.6%	41.6%	13.8%	47.8%	47.8%	30.7%	30.7%	30.7%	13.8%	13.8%	
Maximum Green (s)	7.0	46.5	46.5	15.0	54.5	54.5	31.6	31.6	31.6	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	64.6	49.2	49.2	18.9	59.4	59.4	32.0	32.0	32.0	12.7	12.7	
Actuated g/C Ratio	0.52	0.40	0.40	0.15	0.48	0.48	0.26	0.26	0.26	0.10	0.10	
v/c Ratio	0.39	0.87	0.62	0.78	0.85	0.05	0.74	0.75	0.77	0.17	0.54	
Control Delay	20.4	44.0	5.4	63.7	36.4	0.1	54.8	54.9	22.8	55.8	23.7	
Queue Delay	0.0	23.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	20.4	67.3	5.8	63.7	36.4	0.1	54.8	54.9	22.8	55.8	23.7	
LOS	C	E	A	E	D	A	D	D	C	E	C	
Approach Delay		45.5			41.4			40.9			29.6	
Approach LOS		D			D			D			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 124.1
 Natural Cycle: 120
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 42.4
 Intersection LOS: D
 Intersection Capacity Utilization 81.3%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Background 2034

4: Oakwood Drive & McLeod Road

PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	78	1132	573	374	1343	37	300	303	464	30	132
v/c Ratio	0.39	0.87	0.62	0.78	0.85	0.05	0.74	0.75	0.77	0.17	0.54
Control Delay	20.4	44.0	5.4	63.7	36.4	0.1	54.8	54.9	22.8	55.8	23.7
Queue Delay	0.0	23.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	67.3	5.8	63.7	36.4	0.1	54.8	54.9	22.8	55.8	23.7
Queue Length 50th (m)	8.5	138.4	0.0	47.6	160.6	0.0	71.4	72.3	34.7	7.1	5.7
Queue Length 95th (m)	17.9	#175.2	24.9	#70.1	#201.5	0.0	107.3	108.5	78.4	16.7	25.6
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	206	1334	932	486	1578	749	451	454	638	186	256
Starvation Cap Reductn	0	242	69	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.38	1.04	0.66	0.77	0.85	0.05	0.67	0.67	0.73	0.16	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

4: Oakwood Drive & McLeod Road

Future Background 2034
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	1041	527	344	1236	34	541	14	427	28	22	99
Future Volume (vph)	72	1041	527	344	1236	34	541	14	427	28	22	99
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3264	1452	3166	3296	1414	1566	1575	1441	1681	1449	
Flt Permitted	0.08	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	144	3264	1452	3166	3296	1414	1566	1575	1441	1681	1449	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	1132	573	374	1343	37	588	15	464	30	24	108
RTOR Reduction (vph)	0	0	343	0	0	19	0	0	233	0	97	0
Lane Group Flow (vph)	78	1132	230	374	1343	18	300	303	231	30	35	0
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	51.4	46.0	46.0	14.8	55.4	55.4	28.0	28.0	28.0	8.7	8.7	
Effective Green, g (s)	59.4	50.0	50.0	18.8	59.4	59.4	32.0	32.0	32.0	12.7	12.7	
Actuated g/C Ratio	0.48	0.40	0.40	0.15	0.48	0.48	0.26	0.26	0.26	0.10	0.10	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	179	1308	582	477	1570	673	401	404	369	171	147	
v/s Ratio Prot	0.03	0.35		c0.12	c0.41		0.19	c0.19		0.02	c0.02	
v/s Ratio Perm	0.17		0.16			0.01			0.16			
v/c Ratio	0.44	0.87	0.39	0.78	0.86	0.03	0.75	0.75	0.62	0.18	0.24	
Uniform Delay, d1	22.4	34.3	26.6	51.0	28.9	17.3	42.6	42.7	41.0	51.2	51.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	6.2	0.3	8.0	4.7	0.0	7.1	7.3	2.8	0.4	0.6	
Delay (s)	23.6	40.4	26.9	58.9	33.6	17.3	49.7	49.9	43.9	51.6	52.2	
Level of Service	C	D	C	E	C	B	D	D	D	D	D	
Approach Delay (s)		35.3			38.7			47.2			52.0	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			39.8	HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			124.7	Sum of lost time (s)				11.2				
Intersection Capacity Utilization			81.3%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

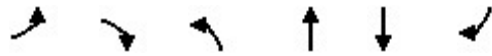
Future Background 2034
PM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	437	10	1	413	354	418
Future Volume (vph)	437	10	1	413	354	418
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.997				0.919	
Flt Protected	0.953					
Satd. Flow (prot)	1681	0	0	3233	3048	0
Flt Permitted	0.953			0.954		
Satd. Flow (perm)	1681	0	0	3084	3048	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2				454	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			240.9	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Adj. Flow (vph)	475	11	1	449	385	454
Shared Lane Traffic (%)						
Lane Group Flow (vph)	486	0	0	450	839	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Background 2034
PM Peak

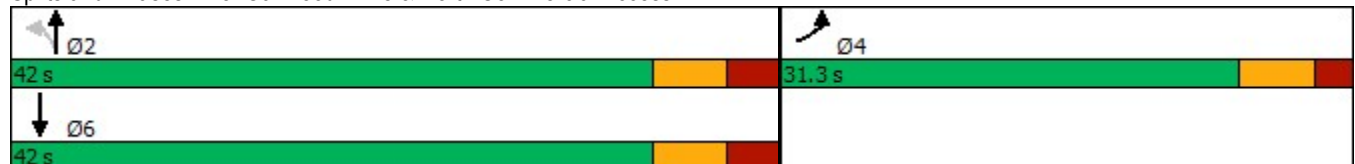


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	26.5			39.1	39.1	
Actuated g/C Ratio	0.37			0.55	0.55	
v/c Ratio	0.77			0.26	0.45	
Control Delay	29.1			9.3	5.1	
Queue Delay	0.0			0.0	0.0	
Total Delay	29.1			9.3	5.1	
LOS	C			A	A	
Approach Delay	29.1			9.3	5.1	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	70.9
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.77
Intersection Signal Delay:	12.7
Intersection LOS:	B
Intersection Capacity Utilization	58.8%
ICU Level of Service	B
Analysis Period (min)	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



5: Oakwood Drive & North Commercial Access

PM Peak

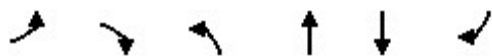


Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	486	450	839
v/c Ratio	0.77	0.26	0.45
Control Delay	29.1	9.3	5.1
Queue Delay	0.0	0.0	0.0
Total Delay	29.1	9.3	5.1
Queue Length 50th (m)	55.1	16.5	13.8
Queue Length 95th (m)	88.9	24.7	24.4
Internal Link Dist (m)	45.0	216.9	285.0
Turn Bay Length (m)			
Base Capacity (vph)	690	1700	1885
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.70	0.26	0.45
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

5: Oakwood Drive & North Commercial Access

Future Background 2034
PM Peak



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	437	10	1	413	354	418
Future Volume (vph)	437	10	1	413	354	418
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.92	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1682			3233	3047	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1682			3084	3047	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	475	11	1	449	385	454
RTOR Reduction (vph)	1	0	0	0	204	0
Lane Group Flow (vph)	485	0	0	450	635	0
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	22.5			35.1	35.1	
Effective Green, g (s)	26.5			39.1	39.1	
Actuated g/C Ratio	0.37			0.55	0.55	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	628			1700	1680	
v/s Ratio Prot	c0.29				c0.21	
v/s Ratio Perm				0.15		
v/c Ratio	0.77			0.26	0.38	
Uniform Delay, d1	19.5			8.4	9.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	5.9			0.4	0.7	
Delay (s)	25.4			8.7	9.7	
Level of Service	C			A	A	
Approach Delay (s)	25.4			8.7	9.7	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	70.9	Sum of lost time (s)	5.3
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	170	0	0	174	38	0	0	0	201	0	98
Future Volume (vph)	59	170	0	0	174	38	0	0	0	201	0	98
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Ped Bike Factor	1.00					0.98						
Fr _t						0.850						0.850
Fl _t Protected	0.950									0.950		
Satd. Flow (prot)	1681	1718	0	1735	1718	1504	1735	1735	0	1586	1735	1504
Fl _t Permitted	0.579									0.950		
Satd. Flow (perm)	1023	1718	0	1735	1718	1471	1735	1735	0	1586	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109						803
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			122.6			120.6				82.8
Travel Time (s)		19.6			8.8			9.0				6.2
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Adj. Flow (vph)	64	185	0	0	189	41	0	0	0	218	0	107
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	185	0	0	189	41	0	0	0	218	0	107
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Background 2034
 PM Peak

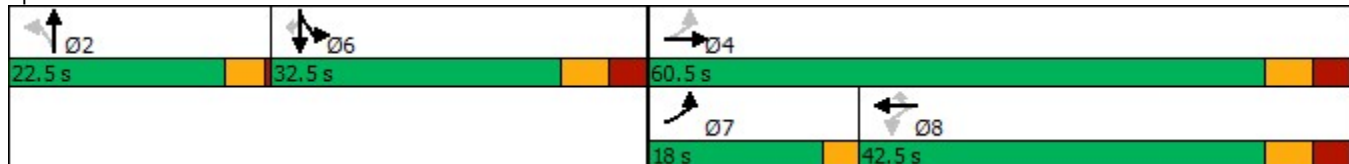


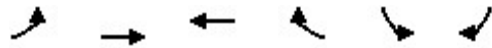
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm			Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	Min	Min		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.5	57.0			39.0	39.0				35.0		35.0
Actuated g/C Ratio	0.57	0.53			0.36	0.36				0.32		0.32
v/c Ratio	0.09	0.20			0.30	0.07				0.42		0.10
Control Delay	10.7	14.1			26.3	0.2				31.6		0.2
Queue Delay	0.0	0.0			0.0	0.0				0.0		0.0
Total Delay	10.7	14.1			26.3	0.2				31.6		0.2
LOS	B	B			C	A				C		A
Approach Delay		13.3			21.7							21.3
Approach LOS		B			C							C

Intersection Summary

Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 107.7
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.42
 Intersection Signal Delay: 18.9
 Intersection LOS: B
 Intersection Capacity Utilization 51.3%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	64	185	189	41	218	107
v/c Ratio	0.09	0.20	0.30	0.07	0.42	0.10
Control Delay	10.7	14.1	26.3	0.2	31.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	14.1	26.3	0.2	31.6	0.2
Queue Length 50th (m)	5.7	19.6	28.1	0.0	35.6	0.0
Queue Length 95th (m)	11.6	31.9	45.8	0.0	56.9	0.0
Internal Link Dist (m)		248.4	98.6			
Turn Bay Length (m)						
Base Capacity (vph)	700	909	622	602	515	1030
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.20	0.30	0.07	0.42	0.10
Intersection Summary						

HCM Signalized Intersection Capacity Analysis
6: Site Access 1/South Commercial Access & Oakwood Drive












Future Background 2034
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	170	0	0	174	38	0	0	0	201	0	98
Future Volume (vph)	59	170	0	0	174	38	0	0	0	201	0	98
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5			3.5	3.5				3.5		3.5
Lane Util. Factor	1.00	1.00			1.00	1.00				1.00		1.00
Frbp, ped/bikes	1.00	1.00			1.00	0.98				1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	1.00			1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1680	1718			1718	1471				1586		1504
Flt Permitted	0.58	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1023	1718			1718	1471				1586		1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	185	0	0	189	41	0	0	0	218	0	107
RTOR Reduction (vph)	0	0	0	0	0	26	0	0	0	0	0	72
Lane Group Flow (vph)	64	185	0	0	189	15	0	0	0	218	0	35
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm			Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	53.0	53.0			35.0	35.0				31.0		31.0
Effective Green, g (s)	57.0	57.0			39.0	39.0				35.0		35.0
Actuated g/C Ratio	0.53	0.53			0.36	0.36				0.32		0.32
Clearance Time (s)	3.0	7.5			7.5	7.5				7.5		7.5
Vehicle Extension (s)	2.4	2.2			2.2	2.2				2.2		2.2
Lane Grp Cap (vph)	657	909			622	532				515		488
v/s Ratio Prot	0.02	c0.11			c0.11					c0.14		
v/s Ratio Perm	0.03					0.01						0.02
v/c Ratio	0.10	0.20			0.30	0.03				0.42		0.07
Uniform Delay, d1	12.5	13.4			24.6	22.1				28.5		25.1
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	0.3	0.5			1.3	0.1				2.5		0.3
Delay (s)	12.8	13.9			25.9	22.2				31.0		25.4
Level of Service	B	B			C	C				C		C
Approach Delay (s)		13.6			25.2			0.0			29.2	
Approach LOS		B			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			23.2									C
HCM 2000 Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			107.7							7.0		
Intersection Capacity Utilization			51.3%									A
Analysis Period (min)			15									

c Critical Lane Group














Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Background 2034
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	119	9	257	132	12	271
Future Volume (vph)	119	9	257	132	12	271
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.949			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1504	3149	0	1681	3233
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1504	3149	0	1681	3233
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	4%
Adj. Flow (vph)	129	10	279	143	13	295
Shared Lane Traffic (%)						
Lane Group Flow (vph)	129	10	422	0	13	295
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	26.1%			ICU Level of Service A		
Analysis Period (min)	15					
























HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive

Future Background 2034
PM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	119	9	257	132	12	271	
Future Volume (Veh/h)	119	9	257	132	12	271	
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	129	10	279	143	13	295	
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	524	211			422		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	524	211			422		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	73	99			99		
cM capacity (veh/h)	482	801			1148		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	129	10	186	236	13	148	148
Volume Left	129	0	0	0	13	0	0
Volume Right	0	10	0	143	0	0	0
cSH	482	801	1700	1700	1148	1700	1700
Volume to Capacity	0.27	0.01	0.11	0.14	0.01	0.09	0.09
Queue Length 95th (m)	8.1	0.3	0.0	0.0	0.3	0.0	0.0
Control Delay (s)	15.2	9.6	0.0	0.0	8.2	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	14.8	0.0		0.3			
Approach LOS	B						
Intersection Summary							
Average Delay			2.5				
Intersection Capacity Utilization			26.1%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Total 2034
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	975	6	25	807	262	21	86	115	174	52	99
Future Volume (vph)	109	975	6	25	807	262	21	86	115	174	52	99
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.98						
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1437	4595	0	1227	3264	1419	1681	1594	1319	1556	1475	1308
Flt Permitted	0.166			0.209			0.720			0.697		
Satd. Flow (perm)	251	4595	0	270	3264	1385	1274	1594	1319	1142	1475	1308
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				285			125			108
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	2					2						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%
Adj. Flow (vph)	118	1060	7	27	877	285	23	93	125	189	57	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	118	1067	0	27	877	285	23	93	125	189	57	108
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

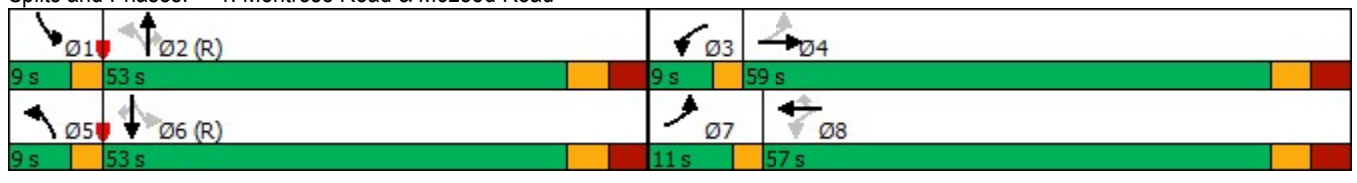
Future Total 2034
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.1	46.1
Total Split (s)	11.0	59.0		9.0	57.0	57.0	9.0	53.0	53.0	9.0	53.0	53.0
Total Split (%)	8.5%	45.4%		6.9%	43.8%	43.8%	6.9%	40.8%	40.8%	6.9%	40.8%	40.8%
Maximum Green (s)	8.0	51.0		6.0	49.0	49.0	6.0	45.0	45.0	6.0	45.0	45.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	67.2	56.1		63.0	47.3	47.3	57.6	42.2	42.2	64.8	54.0	54.0
Actuated g/C Ratio	0.52	0.43		0.48	0.36	0.36	0.44	0.32	0.32	0.50	0.42	0.42
v/c Ratio	0.43	0.54		0.13	0.74	0.42	0.04	0.18	0.24	0.30	0.09	0.18
Control Delay	19.9	28.1		14.2	39.6	4.6	21.0	38.3	8.6	22.4	29.3	6.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	28.1		14.2	39.6	4.6	21.0	38.3	8.6	22.4	29.3	6.7
LOS	B	C		B	D	A	C	D	A	C	C	A
Approach Delay		27.3			30.6			21.2			18.7	
Approach LOS		C			C			C			B	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 27.1 Intersection LOS: C
 Intersection Capacity Utilization 58.1% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Total 2034

1: Montrose Road & McLeod Road

AM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	118	1067	27	877	285	23	93	125	189	57	108
v/c Ratio	0.43	0.54	0.13	0.74	0.42	0.04	0.18	0.24	0.30	0.09	0.18
Control Delay	19.9	28.1	14.2	39.6	4.6	21.0	38.3	8.6	22.4	29.3	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	28.1	14.2	39.6	4.6	21.0	38.3	8.6	22.4	29.3	6.7
Queue Length 50th (m)	15.4	76.3	3.3	101.6	0.0	2.9	17.0	0.0	27.0	9.2	0.0
Queue Length 95th (m)	20.8	77.3	6.5	112.8	16.1	9.2	37.5	17.1	50.7	21.8	13.6
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	274	2040	209	1343	737	597	633	599	628	648	635
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.52	0.13	0.65	0.39	0.04	0.15	0.21	0.30	0.09	0.17

Intersection Summary

HCM Signalized Intersection Capacity Analysis

Future Total 2034

1: Montrose Road & McLeod Road

AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	109	975	6	25	807	262	21	86	115	174	52	99	
Future Volume (vph)	109	975	6	25	807	262	21	86	115	174	52	99	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1437	4595		1227	3264	1385	1681	1594	1319	1556	1475	1308	
Flt Permitted	0.17	1.00		0.21	1.00	1.00	0.72	1.00	1.00	0.70	1.00	1.00	
Satd. Flow (perm)	251	4595		270	3264	1385	1274	1594	1319	1142	1475	1308	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	118	1060	7	27	877	285	23	93	125	189	57	108	
RTOR Reduction (vph)	0	1	0	0	0	179	0	0	86	0	0	65	
Lane Group Flow (vph)	118	1066	0	27	877	106	23	93	39	189	57	43	
Confl. Peds. (#/hr)	2					2							
Heavy Vehicles (%)	17%	5%	10%	37%	3%	6%	0%	11%	14%	8%	20%	15%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	59.4	52.1		48.8	44.5	44.5	41.0	37.0	37.0	54.6	47.6	47.6	
Effective Green, g (s)	63.4	56.1		56.8	48.5	48.5	49.0	41.0	41.0	58.6	51.6	51.6	
Actuated g/C Ratio	0.49	0.43		0.44	0.37	0.37	0.38	0.32	0.32	0.45	0.40	0.40	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	267	1982		179	1217	516	505	502	415	574	585	519	
v/s Ratio Prot	c0.05	0.23		0.01	c0.27		0.00	0.06		c0.05	0.04		
v/s Ratio Perm	0.16			0.06		0.08	0.01		0.03	0.10		0.03	
v/c Ratio	0.44	0.54		0.15	0.72	0.21	0.05	0.19	0.09	0.33	0.10	0.08	
Uniform Delay, d1	21.3	27.4		21.4	34.9	27.7	25.6	32.4	31.4	22.3	24.6	24.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.2		0.3	2.0	0.1	0.0	0.8	0.5	0.2	0.3	0.3	
Delay (s)	22.1	27.6		21.7	36.9	27.8	25.6	33.2	31.9	22.6	24.9	24.8	
Level of Service	C	C		C	D	C	C	C	C	C	C	C	
Approach Delay (s)		27.0			34.4			31.8			23.6		
Approach LOS		C			C			C			C		
Intersection Summary													
HCM 2000 Control Delay			30.0									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.45										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			58.1%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

AM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖↗	↗	↖
Traffic Volume (vph)	0	1058	0	109	686	127	0	0	0	432	148	339
Future Volume (vph)	0	1058	0	109	686	127	0	0	0	432	148	339
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00								
Frt					0.977						0.938	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4473	1769	1586	4355	0	0	0	0	3048	1467	1374
Flt Permitted				0.176						0.950		
Satd. Flow (perm)	0	4473	1769	294	4355	0	0	0	0	3048	1467	1374
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					51						52	113
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)			1	1								
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Adj. Flow (vph)	0	1150	0	118	746	138	0	0	0	470	161	368
Shared Lane Traffic (%)												31%
Lane Group Flow (vph)	0	1150	0	118	884	0	0	0	0	470	275	254
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

Lanes, Volumes, Timings
 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Future Total 2034
 AM Peak

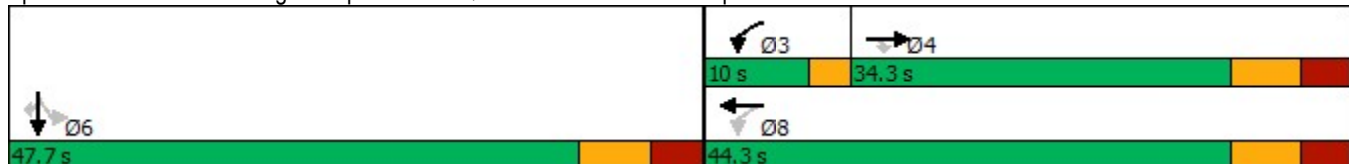


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	-4.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	4.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		28.6		41.4	35.9					22.9	22.9	22.9
Actuated g/C Ratio		0.42		0.61	0.53					0.34	0.34	0.34
v/c Ratio		0.61		0.31	0.38					0.46	0.52	0.47
Control Delay		18.9		9.2	10.1					19.7	19.0	13.5
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		18.9		9.2	10.1					19.7	19.0	13.5
LOS		B		A	B					B	B	B
Approach Delay		18.9			10.0						18.0	
Approach LOS		B			B						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 68.1
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.61
 Intersection Signal Delay: 15.8
 Intersection LOS: B
 Intersection Capacity Utilization 55.5%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

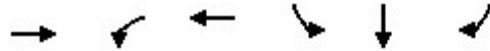


Queues

Future Total 2034

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

AM Peak

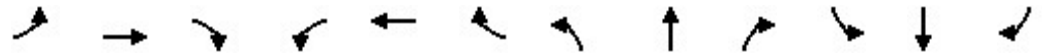


Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1150	118	884	470	275	254
v/c Ratio	0.61	0.31	0.38	0.46	0.52	0.47
Control Delay	18.9	9.2	10.1	19.7	19.0	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	9.2	10.1	19.7	19.0	13.5
Queue Length 50th (m)	42.2	5.4	20.1	26.0	25.3	15.0
Queue Length 95th (m)	70.9	16.2	38.6	37.5	46.5	33.8
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	2042	395	2670	1994	977	938
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.30	0.33	0.24	0.28	0.27

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Future Total 2034
 AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖	↗	↖
Traffic Volume (vph)	0	1058	0	109	686	127	0	0	0	432	148	339
Future Volume (vph)	0	1058	0	109	686	127	0	0	0	432	148	339
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.98					1.00	0.94	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4473		1586	4353					3048	1466	1374
Flt Permitted		1.00		0.18	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4473		294	4353					3048	1466	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1150	0	118	746	138	0	0	0	470	161	368
RTOR Reduction (vph)	0	0	0	0	24	0	0	0	0	0	35	75
Lane Group Flow (vph)	0	1150	0	118	860	0	0	0	0	470	240	179
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	8%	0%	6%	9%	5%	0%	0%	0%	7%	10%	4%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		24.4		32.5	32.5					18.7	18.7	18.7
Effective Green, g (s)		28.4		36.5	36.5					22.7	22.7	22.7
Actuated g/C Ratio		0.42		0.54	0.54					0.33	0.33	0.33
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1862		329	2329					1014	487	457
v/s Ratio Prot		c0.26		0.05	c0.20						c0.16	
v/s Ratio Perm				0.14						0.15		0.13
v/c Ratio		0.62		0.36	0.37					0.46	0.49	0.39
Uniform Delay, d1		15.6		8.5	9.2					17.9	18.2	17.4
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.5		0.5	0.1					0.2	0.6	0.4
Delay (s)		16.2		8.9	9.3					18.2	18.7	17.9
Level of Service		B		A	A					B	B	B
Approach Delay (s)		16.2			9.2			0.0			18.3	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			14.6			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			68.2			Sum of lost time (s)				9.0		
Intersection Capacity Utilization			55.5%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

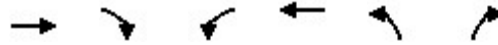
Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2034
AM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1039	451	0	735	107	200
Future Volume (vph)	1039	451	0	735	107	200
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Fr _t	0.955					0.850
Fl _t Protected					0.950	
Satd. Flow (prot)	4232	0	0	4473	3166	1446
Fl _t Permitted					0.950	
Satd. Flow (perm)	4232	0	0	4473	3166	1446
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	231					79
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Adj. Flow (vph)	1129	490	0	799	116	217
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1619	0	0	799	116	217
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2034
 AM Peak

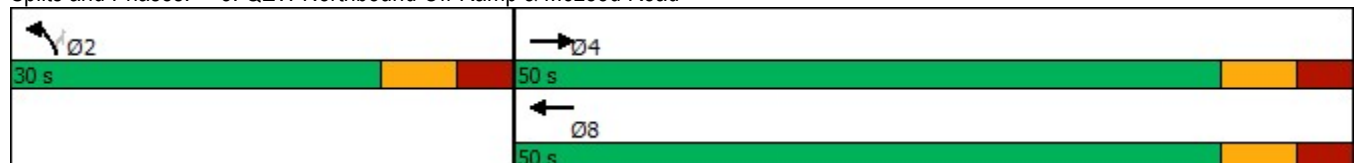


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		NA		Prot	Perm
Protected Phases	4		8		2	
Permitted Phases						2
Detector Phase	4		8		2	2
Switch Phase						
Minimum Initial (s)	10.0		10.0		8.0	8.0
Minimum Split (s)	34.0		34.0		24.0	24.0
Total Split (s)	50.0		50.0		30.0	30.0
Total Split (%)	62.5%		62.5%		37.5%	37.5%
Maximum Green (s)	42.0		42.0		22.0	22.0
Yellow Time (s)	4.5		4.5		4.5	4.5
All-Red Time (s)	3.5		3.5		3.5	3.5
Lost Time Adjust (s)	-4.0		-4.0		-4.0	-4.0
Total Lost Time (s)	4.0		4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5		2.5		2.5	2.5
Recall Mode	Min		Min		None	None
Walk Time (s)	10.0		10.0		0.0	0.0
Flash Dont Walk (s)	16.0		16.0		0.0	0.0
Pedestrian Calls (#/hr)	0		0		0	0
Act Effct Green (s)	36.1		36.1		16.1	16.1
Actuated g/C Ratio	0.60		0.60		0.27	0.27
v/c Ratio	0.62		0.30		0.14	0.49
Control Delay	8.0		6.6		18.8	17.2
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	8.0		6.6		18.8	17.2
LOS	A		A		B	B
Approach Delay	8.0		6.6		17.8	
Approach LOS	A		A		B	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 60.5
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.62
 Intersection Signal Delay: 8.7
 Intersection LOS: A
 Intersection Capacity Utilization 52.9%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2034
 AM Peak



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1619	799	116	217
v/c Ratio	0.62	0.30	0.14	0.49
Control Delay	8.0	6.6	18.8	17.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.0	6.6	18.8	17.2
Queue Length 50th (m)	27.9	12.8	4.8	11.9
Queue Length 95th (m)	55.6	25.5	11.9	33.9
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3382	3522	1409	687
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	0.23	0.08	0.32
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2034
AM Peak



























Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↔↔	↔
Traffic Volume (vph)	1039	451	0	735	107	200
Future Volume (vph)	1039	451	0	735	107	200
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.95			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4231			4473	3166	1446
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4231			4473	3166	1446
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1129	490	0	799	116	217
RTOR Reduction (vph)	93	0	0	0	0	58
Lane Group Flow (vph)	1526	0	0	799	116	159
Confl. Peds. (#/hr)		1	1			
Heavy Vehicles (%)	8%	9%	0%	8%	3%	4%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	31.9			31.9	12.0	12.0
Effective Green, g (s)	35.9			35.9	16.0	16.0
Actuated g/C Ratio	0.60			0.60	0.27	0.27
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2535			2680	845	386
v/s Ratio Prot	c0.36			0.18	0.04	
v/s Ratio Perm						c0.11
v/c Ratio	0.60			0.30	0.14	0.41
Uniform Delay, d1	7.5			5.9	16.7	18.1
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			0.0	0.1	0.5
Delay (s)	7.9			5.9	16.8	18.6
Level of Service	A			A	B	B
Approach Delay (s)	7.9			5.9	18.0	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			8.5		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.54			
Actuated Cycle Length (s)			59.9		Sum of lost time (s)	8.0
Intersection Capacity Utilization			52.9%		ICU Level of Service	A
Analysis Period (min)			15			

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Total 2034
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	681	387	229	905	28	294	21	210	9	2	44
Future Volume (vph)	91	681	387	229	905	28	294	21	210	9	2	44
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00	1.00	0.98	1.00	0.98	
Frt			0.850			0.850			0.850		0.856	
Flt Protected	0.950			0.950			0.950	0.958		0.950		
Satd. Flow (prot)	1616	3233	1419	3197	3296	1475	1566	1579	1475	1648	1462	0
Flt Permitted	0.203			0.950			0.950	0.958		0.950		
Satd. Flow (perm)	345	3233	1398	3192	3296	1439	1560	1574	1451	1643	1462	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			421			139			228			48
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	99	740	421	249	984	30	320	23	228	10	2	48
Shared Lane Traffic (%)							47%					
Lane Group Flow (vph)	99	740	421	249	984	30	170	173	228	10	50	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

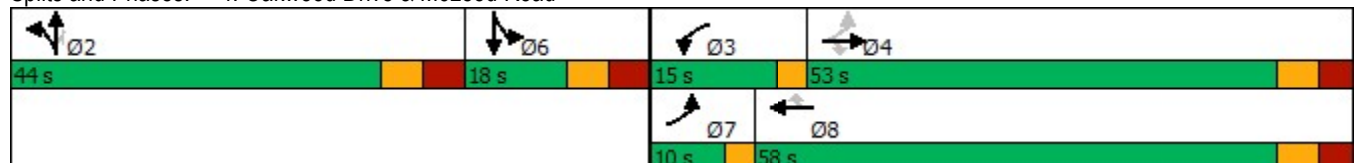
Future Total 2034
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	53.0	53.0	15.0	58.0	58.0	44.0	44.0	44.0	18.0	18.0	
Total Split (%)	7.7%	40.8%	40.8%	11.5%	44.6%	44.6%	33.8%	33.8%	33.8%	13.8%	13.8%	
Maximum Green (s)	7.0	45.4	45.4	12.0	50.4	50.4	35.7	35.7	35.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	51.0	34.4	34.4	15.6	41.6	41.6	20.8	20.8	20.8	13.2	13.2	
Actuated g/C Ratio	0.56	0.38	0.38	0.17	0.46	0.46	0.23	0.23	0.23	0.15	0.15	
v/c Ratio	0.28	0.60	0.53	0.45	0.65	0.04	0.47	0.48	0.45	0.04	0.20	
Control Delay	12.4	26.2	4.9	41.8	24.0	0.1	38.9	38.9	7.8	44.2	16.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	12.4	26.2	5.0	41.8	24.0	0.1	38.9	38.9	7.8	44.2	16.3	
LOS	B	C	A	D	C	A	D	D	A	D	B	
Approach Delay		18.0			26.9			26.5			21.0	
Approach LOS		B			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 90.4
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 23.2
 Intersection LOS: C
 Intersection Capacity Utilization 59.9%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Total 2034

4: Oakwood Drive & McLeod Road

AM Peak






























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	99	740	421	249	984	30	170	173	228	10	50
v/c Ratio	0.28	0.60	0.53	0.45	0.65	0.04	0.47	0.48	0.45	0.04	0.20
Control Delay	12.4	26.2	4.9	41.8	24.0	0.1	38.9	38.9	7.8	44.2	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.4	26.2	5.0	41.8	24.0	0.1	38.9	38.9	7.8	44.2	16.3
Queue Length 50th (m)	7.7	57.4	0.0	21.1	76.2	0.0	28.5	29.0	0.0	1.6	0.3
Queue Length 95th (m)	18.0	87.6	19.0	42.1	115.2	0.0	57.6	58.7	19.1	7.6	12.2
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	364	1924	1002	616	2112	971	749	755	812	272	281
Starvation Cap Reductn	0	88	19	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.27	0.40	0.43	0.40	0.47	0.03	0.23	0.23	0.28	0.04	0.18

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Oakwood Drive & McLeod Road

Future Total 2034
AM Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 		 	 								
Traffic Volume (vph)	91	681	387	229	905	28	294	21	210	9	2	44	
Future Volume (vph)	91	681	387	229	905	28	294	21	210	9	2	44	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00		
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00		
Satd. Flow (prot)	1616	3233	1399	3197	3296	1441	1566	1580	1453	1648	1464		
Flt Permitted	0.20	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00		
Satd. Flow (perm)	345	3233	1399	3197	3296	1441	1566	1580	1453	1648	1464		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	99	740	421	249	984	30	320	23	228	10	2	48	
RTOR Reduction (vph)	0	0	260	0	0	17	0	0	177	0	43	0	
Lane Group Flow (vph)	99	740	161	249	984	13	170	173	51	10	7	0	
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1	
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA		
Protected Phases	7	4		3	8		2	2		6	6		
Permitted Phases	4		4			8			2				
Actuated Green, G (s)	36.2	31.1	31.1	11.3	37.3	37.3	16.4	16.4	16.4	6.0	6.0		
Effective Green, g (s)	44.2	35.1	35.1	15.3	41.3	41.3	20.4	20.4	20.4	10.0	10.0		
Actuated g/C Ratio	0.48	0.38	0.38	0.17	0.45	0.45	0.22	0.22	0.22	0.11	0.11		
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3		
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
Lane Grp Cap (vph)	291	1233	533	531	1479	646	347	350	322	179	159		
v/s Ratio Prot	0.03	0.23		c0.08	c0.30		0.11	c0.11		c0.01	0.00		
v/s Ratio Perm	0.13		0.11			0.01			0.03				
v/c Ratio	0.34	0.60	0.30	0.47	0.67	0.02	0.49	0.49	0.16	0.06	0.05		
Uniform Delay, d1	14.0	22.8	19.9	34.7	19.9	14.1	31.3	31.3	28.9	36.8	36.7		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.5	0.7	0.2	0.5	1.0	0.0	0.8	0.8	0.2	0.1	0.1		
Delay (s)	14.5	23.5	20.1	35.2	20.9	14.1	32.1	32.1	29.0	36.9	36.8		
Level of Service	B	C	C	D	C	B	C	C	C	D	D		
Approach Delay (s)		21.7			23.6			30.9			36.8		
Approach LOS		C			C			C			D		
Intersection Summary													
HCM 2000 Control Delay			24.4	HCM 2000 Level of Service						C			
HCM 2000 Volume to Capacity ratio			0.51										
Actuated Cycle Length (s)			92.0	Sum of lost time (s)						11.2			
Intersection Capacity Utilization			59.9%	ICU Level of Service						B			
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2034
AM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	200	4	2	318	299	262
Future Volume (vph)	200	4	2	318	299	262
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Flt	0.998				0.930	
Flt Protected	0.953					
Satd. Flow (prot)	1650	0	0	3058	2968	0
Flt Permitted	0.953			0.953		
Satd. Flow (perm)	1650	0	0	2914	2968	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1				285	
Link Speed (k/h)	48			50	50	
Link Distance (m)	69.0			239.7	309.0	
Travel Time (s)	5.2			17.3	22.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Adj. Flow (vph)	217	4	2	346	325	285
Shared Lane Traffic (%)						
Lane Group Flow (vph)	221	0	0	348	610	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2034
AM Peak

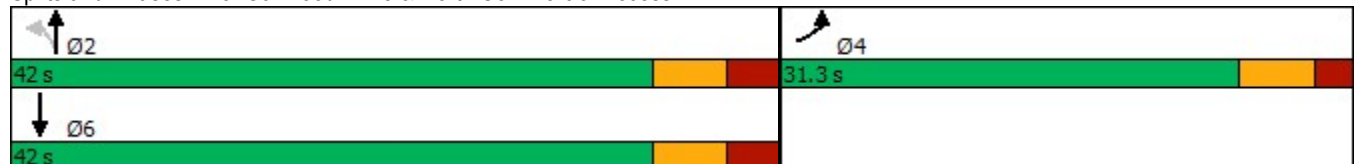


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	17.7			41.3	41.3	
Actuated g/C Ratio	0.28			0.64	0.64	
v/c Ratio	0.49			0.19	0.30	
Control Delay	22.5			5.6	3.4	
Queue Delay	0.0			0.0	0.0	
Total Delay	22.5			5.6	3.4	
LOS	C			A	A	
Approach Delay	22.5			5.6	3.4	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	64.3
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.49
Intersection Signal Delay:	7.6
Intersection LOS:	A
Intersection Capacity Utilization	37.1%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues

Future Total 2034

5: Oakwood Drive & North Commercial Access

AM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	221	348	610
v/c Ratio	0.49	0.19	0.30
Control Delay	22.5	5.6	3.4
Queue Delay	0.0	0.0	0.0
Total Delay	22.5	5.6	3.4
Queue Length 50th (m)	20.6	7.3	6.7
Queue Length 95th (m)	37.0	15.7	16.2
Internal Link Dist (m)	45.0	215.7	285.0
Turn Bay Length (m)			
Base Capacity (vph)	747	1872	2008
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.30	0.19	0.30
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Total 2034
AM Peak

























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	200	4	2	318	299	262
Future Volume (vph)	200	4	2	318	299	262
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.93	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1650			3057	2968	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1650			2913	2968	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	4	2	346	325	285
RTOR Reduction (vph)	1	0	0	0	102	0
Lane Group Flow (vph)	220	0	0	348	508	0
Heavy Vehicles (%)	2%	0%	0%	10%	10%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	13.6			37.3	37.3	
Effective Green, g (s)	17.6			41.3	41.3	
Actuated g/C Ratio	0.27			0.64	0.64	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	452			1873	1909	
v/s Ratio Prot	c0.13				c0.17	
v/s Ratio Perm				0.12		
v/c Ratio	0.49			0.19	0.27	
Uniform Delay, d1	19.5			4.6	4.9	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.8			0.2	0.3	
Delay (s)	20.4			4.9	5.3	
Level of Service	C			A	A	
Approach Delay (s)	20.4			4.9	5.3	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	64.2	Sum of lost time (s)	5.3
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2034
 AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	175	0	35	179	9	0	0	79	48	0	26
Future Volume (vph)	32	175	0	35	179	9	0	0	79	48	0	26
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Frt						0.850		0.850				0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1616	1638	0	1648	1669	1367	1735	1475	0	1528	1735	1504
Flt Permitted	0.573			0.638						0.950		
Satd. Flow (perm)	975	1638	0	1107	1669	1367	1735	1475	0	1528	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		724				799
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			119.4			97.6				82.8
Travel Time (s)		19.6			8.6			7.3				6.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%
Adj. Flow (vph)	35	190	0	38	195	10	0	0	86	52	0	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	190	0	38	195	10	0	86	0	52	0	28
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6		6

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2034
 AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	None	None		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.6	57.1		39.1	39.1	39.1		8.7		35.1		35.1
Actuated g/C Ratio	0.58	0.54		0.37	0.37	0.37		0.08		0.33		0.33
v/c Ratio	0.05	0.22		0.09	0.32	0.02		0.11		0.10		0.03
Control Delay	10.4	14.0		23.7	26.3	0.1		0.3		26.2		0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0		0.0
Total Delay	10.4	14.0		23.7	26.3	0.1		0.3		26.2		0.0
LOS	B	B		C	C	A		A		C		A
Approach Delay		13.5			24.8			0.3				17.1
Approach LOS		B			C			A				B

Intersection Summary

Area Type: Other

Cycle Length: 115.5

Actuated Cycle Length: 106

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.32

Intersection Signal Delay: 16.5

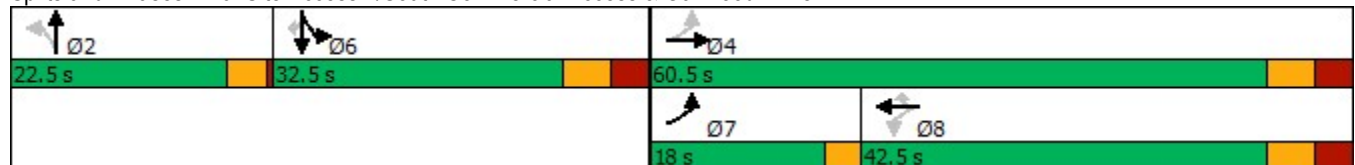
Intersection LOS: B

Intersection Capacity Utilization 45.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive

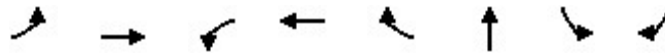


Queues

Future Total 2034

6: Site Access 1/South Commercial Access & Oakwood Drive

AM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBR
Lane Group Flow (vph)	35	190	38	195	10	86	52	28
v/c Ratio	0.05	0.22	0.09	0.32	0.02	0.11	0.10	0.03
Control Delay	10.4	14.0	23.7	26.3	0.1	0.3	26.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	14.0	23.7	26.3	0.1	0.3	26.2	0.0
Queue Length 50th (m)	3.0	20.3	5.2	29.2	0.0	0.0	7.6	0.0
Queue Length 95th (m)	7.3	33.1	12.5	47.4	0.0	0.0	16.5	0.0
Internal Link Dist (m)		248.4		95.4		73.6		
Turn Bay Length (m)			85.0					
Base Capacity (vph)	681	881	407	615	572	883	505	1032
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	0.22	0.09	0.32	0.02	0.10	0.10	0.03

Intersection Summary










HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2034
 AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	32	175	0	35	179	9	0	0	79	48	0	26	
Future Volume (vph)	32	175	0	35	179	9	0	0	79	48	0	26	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	3.5		3.5	3.5	3.5		0.0		3.5		3.5	
Lane Util. Factor	1.00	1.00		1.00	1.00	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)	1616	1638		1648	1669	1367		1475		1528		1504	
Flt Permitted	0.57	1.00		0.64	1.00	1.00		1.00		0.95		1.00	
Satd. Flow (perm)	975	1638		1107	1669	1367		1475		1528		1504	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	35	190	0	38	195	10	0	0	86	52	0	28	
RTOR Reduction (vph)	0	0	0	0	0	6	0	80	0	0	0	19	
Lane Group Flow (vph)	35	190	0	38	195	4	0	6	0	52	0	9	
Heavy Vehicles (%)	4%	8%	2%	2%	6%	10%	2%	2%	2%	10%	2%	0%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm	
Protected Phases	7	4			8			2		6	6		
Permitted Phases	4			8		8	2					6	
Actuated Green, G (s)	53.1	53.1		35.1	35.1	35.1		3.7		31.0		31.0	
Effective Green, g (s)	57.1	57.1		39.1	39.1	39.1		7.7		35.0		35.0	
Actuated g/C Ratio	0.53	0.53		0.37	0.37	0.37		0.07		0.33		0.33	
Clearance Time (s)	3.0	7.5		7.5	7.5	7.5		4.0		7.5		7.5	
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2		2.2		2.2		2.2	
Lane Grp Cap (vph)	635	875		405	611	500		106		500		492	
v/s Ratio Prot	0.01	c0.12			c0.12			c0.00		c0.03			
v/s Ratio Perm	0.02			0.03		0.00						0.01	
v/c Ratio	0.06	0.22		0.09	0.32	0.01		0.06		0.10		0.02	
Uniform Delay, d1	11.9	13.1		22.2	24.3	21.5		46.2		25.0		24.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2	0.2	0.6		0.5	1.4	0.0		0.1		0.4		0.1	
Delay (s)	12.1	13.7		22.7	25.7	21.5		46.3		25.4		24.4	
Level of Service	B	B		C	C	C		D		C		C	
Approach Delay (s)		13.4			25.0			46.3			25.0		
Approach LOS		B			C			D			C		
Intersection Summary													
HCM 2000 Control Delay			23.8		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.20										
Actuated Cycle Length (s)			106.8		Sum of lost time (s)						7.0		
Intersection Capacity Utilization			45.4%		ICU Level of Service						A		
Analysis Period (min)			15										
c Critical Lane Group													










Lanes, Volumes, Timings
7: Oakwood Drive & Site Access 2

Future Total 2034
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	5	203	2	2	203
Future Volume (vph)	11	5	203	2	2	203
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.960		0.999			
Flt Protected	0.966					
Satd. Flow (prot)	1609	0	1733	0	0	1735
Flt Permitted	0.966					
Satd. Flow (perm)	1609	0	1733	0	0	1735
Link Speed (k/h)	48		50			60
Link Distance (m)	39.5		2126.3			272.4
Travel Time (s)	3.0		153.1			16.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	5	221	2	2	221
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	0	223	0	0	223
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	23.3%			ICU Level of Service A		
Analysis Period (min)	15					












HCM Unsignalized Intersection Capacity Analysis
7: Oakwood Drive & Site Access 2

Future Total 2034
AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	11	5	203	2	2	203
Future Volume (Veh/h)	11	5	203	2	2	203
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	5	221	2	2	221
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						272
pX, platoon unblocked	0.94					
vC, conflicting volume	447	222			223	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	382	222			223	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	584	818			1346	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	17	223	223			
Volume Left	12	0	2			
Volume Right	5	2	0			
cSH	637	1700	1346			
Volume to Capacity	0.03	0.13	0.00			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	10.8	0.0	0.1			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			23.3%		ICU Level of Service	A
Analysis Period (min)			15			














Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Total 2034
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	61	7	156	80	12	175
Future Volume (vph)	61	7	156	80	12	175
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.949			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1432	2973	0	1601	3264
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1432	2973	0	1601	3264
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	5%	8%	6%	5%	3%
Adj. Flow (vph)	66	8	170	87	13	190
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	8	257	0	13	190
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	21.2%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 8: Montrose Road & Oakwood Drive

Future Total 2034
 AM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	61	7	156	80	12	175	
Future Volume (Veh/h)	61	7	156	80	12	175	
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	66	8	170	87	13	190	
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	334	128			257		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	334	128			257		
tC, single (s)	6.8	7.0			4.2		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	90	99			99		
cM capacity (veh/h)	634	888			1283		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	66	8	113	144	13	95	95
Volume Left	66	0	0	0	13	0	0
Volume Right	0	8	0	87	0	0	0
cSH	634	888	1700	1700	1283	1700	1700
Volume to Capacity	0.10	0.01	0.07	0.08	0.01	0.06	0.06
Queue Length 95th (m)	2.6	0.2	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	11.3	9.1	0.0	0.0	7.8	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	11.1	0.0		0.5			
Approach LOS	B						
Intersection Summary							
Average Delay			1.7				
Intersection Capacity Utilization			21.2%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive

Future Total 2034
 AM Peak



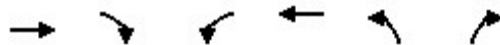
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (vph)	302	1	0	223	0	11
Future Volume (vph)	302	1	0	223	0	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t						0.865
Fl _t Protected						
Satd. Flow (prot)	3296	0	0	3296	0	1501
Fl _t Permitted						
Satd. Flow (perm)	3296	0	0	3296	0	1501
Link Speed (k/h)	50			50	48	
Link Distance (m)	119.4			239.7	74.2	
Travel Time (s)	8.6			17.3	5.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	328	1	0	242	0	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	329	0	0	242	0	12
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Yield	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.1%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive
























Future Total 2034
 AM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	302	1	0	223	0	11
Future Volume (Veh/h)	302	1	0	223	0	11
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	328	1	0	242	0	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	119			240		
pX, platoon unblocked						
vC, conflicting volume			328	450	164	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			328	450	164	
tC, single (s)			4.1	6.8	6.9	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			100	100	99	
cM capacity (veh/h)			1228	538	851	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	219	110	121	121	12	
Volume Left	0	0	0	0	0	
Volume Right	0	1	0	0	12	
cSH	1700	1700	1700	1700	851	
Volume to Capacity	0.13	0.06	0.07	0.07	0.01	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.3	
Control Delay (s)	0.0	0.0	0.0	0.0	9.3	
Lane LOS						A
Approach Delay (s)	0.0		0.0		9.3	
Approach LOS						A
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			19.1%	ICU Level of Service	A	
Analysis Period (min)			15			

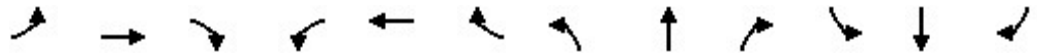
Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Total 2034
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	903	37	106	1047	327	33	130	262	409	161	107
Future Volume (vph)	107	903	37	106	1047	327	33	130	262	409	161	107
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	45.0		45.0	145.0		0.0	85.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						0.97						
Frt		0.994				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1514	4617	0	1542	3296	1460	1681	1685	1475	1664	1669	1446
Flt Permitted	0.080			0.185			0.647			0.629		
Satd. Flow (perm)	128	4617	0	300	3296	1411	1145	1685	1475	1102	1669	1446
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				301			117			116
Link Speed (k/h)		50			50			50				50
Link Distance (m)		245.6			256.6			302.8				340.0
Travel Time (s)		17.7			18.5			21.8				24.5
Confl. Peds. (#/hr)	7					7						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%
Adj. Flow (vph)	116	982	40	115	1138	355	36	141	285	445	175	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	1022	0	115	1138	355	36	141	285	445	175	116
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
1: Montrose Road & McLeod Road

Future Total 2034
PM Peak

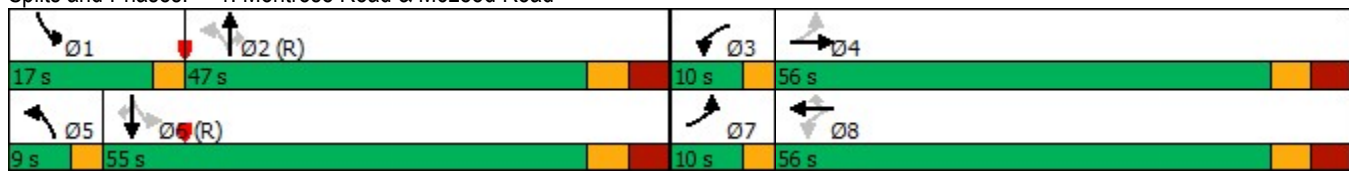


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	4.0	4.0	6.0	8.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	40.0		9.0	40.0	40.0	9.0	46.0	46.0	9.0	46.0	46.0
Total Split (s)	10.0	56.0		10.0	56.0	56.0	9.0	47.0	47.0	17.0	55.0	55.0
Total Split (%)	7.7%	43.1%		7.7%	43.1%	43.1%	6.9%	36.2%	36.2%	13.1%	42.3%	42.3%
Maximum Green (s)	7.0	48.0		7.0	48.0	48.0	6.0	39.0	39.0	14.0	47.0	47.0
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	4.0		0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Recall Mode	None	Min		None	Min	Min	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)		12.0			12.0	12.0		14.0	14.0		14.0	14.0
Flash Dont Walk (s)		20.0			20.0	20.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	66.4	51.4		66.4	51.4	51.4	58.0	43.0	43.0	65.6	55.2	55.2
Actuated g/C Ratio	0.51	0.40		0.51	0.40	0.40	0.45	0.33	0.33	0.50	0.42	0.42
v/c Ratio	0.64	0.56		0.45	0.87	0.48	0.07	0.25	0.50	0.70	0.25	0.17
Control Delay	38.5	31.7		22.4	45.0	7.4	17.2	33.3	23.4	29.6	26.5	5.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.5	31.7		22.4	45.0	7.4	17.2	33.3	23.4	29.6	26.5	5.0
LOS	D	C		C	D	A	B	C	C	C	C	A
Approach Delay		32.3			35.1			26.0			25.0	
Approach LOS		C			D			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 31.3 Intersection LOS: C
 Intersection Capacity Utilization 83.2% ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: Montrose Road & McLeod Road



Queues

Future Total 2034

1: Montrose Road & McLeod Road

PM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	116	1022	115	1138	355	36	141	285	445	175	116
v/c Ratio	0.64	0.56	0.45	0.87	0.48	0.07	0.25	0.50	0.70	0.25	0.17
Control Delay	38.5	31.7	22.4	45.0	7.4	17.2	33.3	23.4	29.6	26.5	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.5	31.7	22.4	45.0	7.4	17.2	33.3	23.4	29.6	26.5	5.0
Queue Length 50th (m)	15.1	72.6	14.9	139.0	8.5	4.6	26.3	33.8	75.7	30.1	0.0
Queue Length 95th (m)	#36.2	86.7	25.6	168.9	31.9	10.3	43.3	60.9	106.6	47.7	11.7
Internal Link Dist (m)		221.6		232.6			278.8			316.0	
Turn Bay Length (m)	45.0		145.0			85.0			115.0		
Base Capacity (vph)	182	1850	258	1318	745	552	557	566	636	709	680
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.55	0.45	0.86	0.48	0.07	0.25	0.50	0.70	0.25	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

Future Total 2034

1: Montrose Road & McLeod Road

PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	107	903	37	106	1047	327	33	130	262	409	161	107	
Future Volume (vph)	107	903	37	106	1047	327	33	130	262	409	161	107	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Total Lost time (s)	-1.0	4.0		-1.0	4.0	4.0	-1.0	4.0	4.0	-1.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1514	4618		1542	3296	1411	1681	1685	1475	1664	1669	1446	
Flt Permitted	0.08	1.00		0.18	1.00	1.00	0.65	1.00	1.00	0.63	1.00	1.00	
Satd. Flow (perm)	128	4618		300	3296	1411	1144	1685	1475	1102	1669	1446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	116	982	40	115	1138	355	36	141	285	445	175	116	
RTOR Reduction (vph)	0	4	0	0	0	182	0	0	78	0	0	68	
Lane Group Flow (vph)	116	1018	0	115	1138	173	36	141	207	445	175	48	
Confl. Peds. (#/hr)	7					7							
Heavy Vehicles (%)	11%	4%	4%	9%	2%	3%	0%	5%	2%	1%	6%	4%	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)	54.4	47.4		54.4	47.4	47.4	42.6	39.0	39.0	56.6	50.0	50.0	
Effective Green, g (s)	61.4	51.4		61.4	51.4	51.4	50.6	43.0	43.0	60.6	54.0	54.0	
Actuated g/C Ratio	0.47	0.40		0.47	0.40	0.40	0.39	0.33	0.33	0.47	0.42	0.42	
Clearance Time (s)	3.0	8.0		3.0	8.0	8.0	3.0	8.0	8.0	3.0	8.0	8.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	177	1825		246	1303	557	476	557	487	594	693	600	
v/s Ratio Prot	c0.06	0.22		0.04	c0.35		0.00	0.08		c0.11	0.10		
v/s Ratio Perm	0.25			0.18		0.12	0.02		0.14	0.24		0.03	
v/c Ratio	0.66	0.56		0.47	0.87	0.31	0.08	0.25	0.42	0.75	0.25	0.08	
Uniform Delay, d1	25.9	30.5		20.8	36.3	27.1	24.8	31.8	33.9	26.2	24.8	23.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.6	0.3		1.0	6.7	0.2	0.0	1.1	2.7	4.9	0.9	0.3	
Delay (s)	33.5	30.8		21.9	43.0	27.3	24.8	32.9	36.6	31.1	25.7	23.2	
Level of Service	C	C		C	D	C	C	C	D	C	C	C	
Approach Delay (s)		31.1			38.0			34.5			28.6		
Approach LOS		C			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			33.8									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.68										
Actuated Cycle Length (s)			130.0									Sum of lost time (s)	6.0
Intersection Capacity Utilization			83.2%									ICU Level of Service	E
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings

Future Total 2034

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑↑					↖↗	↗	↖
Traffic Volume (vph)	0	1316	0	167	870	175	0	0	0	630	140	352
Future Volume (vph)	0	1316	0	167	870	175	0	0	0	630	140	352
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		85.0	40.0		0.0	0.0		0.0	80.0		30.0
Storage Lanes	0		1	1		0	0		0	2		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	1.00	1.00	1.00	0.97	0.95	0.95
Ped Bike Factor				1.00	1.00							
Frt					0.975						0.932	0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	4736	1769	1616	4539	0	0	0	0	3136	1528	1401
Flt Permitted				0.138						0.950		
Satd. Flow (perm)	0	4736	1769	235	4539	0	0	0	0	3136	1528	1401
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					58						58	98
Link Speed (k/h)		50			50			50			60	
Link Distance (m)		256.6			310.0			216.3			250.6	
Travel Time (s)		18.5			22.3			15.6			15.0	
Confl. Peds. (#/hr)	3		3	3		3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Adj. Flow (vph)	0	1430	0	182	946	190	0	0	0	685	152	383
Shared Lane Traffic (%)												33%
Lane Group Flow (vph)	0	1430	0	182	1136	0	0	0	0	685	278	257
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2	1	1	2					1	2	1
Detector Template		Thru	Right	Left	Thru					Left	Thru	Right
Leading Detector (m)		30.5	6.1	6.1	30.5					6.1	30.5	6.1
Trailing Detector (m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Position(m)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Size(m)		1.8	6.1	6.1	1.8					6.1	1.8	6.1
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7						28.7	
Detector 2 Size(m)		1.8			1.8						1.8	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	

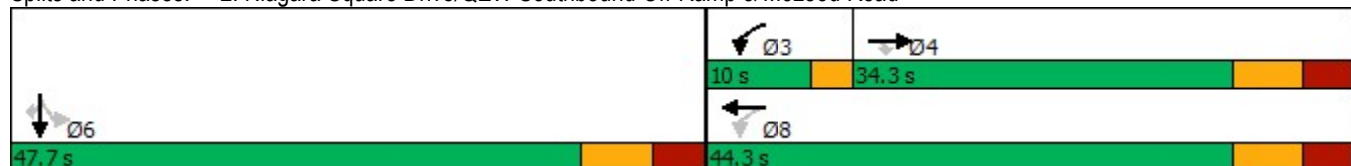


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Detector Phase		4	4	3	8					6	6	6
Switch Phase												
Minimum Initial (s)		20.0	20.0	6.0	20.0					10.0	10.0	10.0
Minimum Split (s)		34.3	34.3	10.0	34.3					47.7	47.7	47.7
Total Split (s)		34.3	34.3	10.0	44.3					47.7	47.7	47.7
Total Split (%)		37.3%	37.3%	10.9%	48.2%					51.8%	51.8%	51.8%
Maximum Green (s)		26.0	26.0	7.0	36.0					39.0	39.0	39.0
Yellow Time (s)		4.8	4.8	3.0	4.8					5.0	5.0	5.0
All-Red Time (s)		3.5	3.5	0.0	3.5					3.7	3.7	3.7
Lost Time Adjust (s)		-4.0	0.0	-4.0	-4.0					-4.0	-4.0	-4.0
Total Lost Time (s)		4.3	8.3	-1.0	4.3					4.7	4.7	4.7
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		2.5	2.5	2.5	2.5					2.5	2.5	2.5
Recall Mode		Min	Min	None	Min					None	None	None
Walk Time (s)		10.0	10.0		10.0					14.0	14.0	14.0
Flash Dont Walk (s)		16.0	16.0		16.0					25.0	25.0	25.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		29.9		45.2	39.9					28.9	28.9	28.9
Actuated g/C Ratio		0.38		0.58	0.51					0.37	0.37	0.37
v/c Ratio		0.78		0.55	0.48					0.59	0.46	0.44
Control Delay		26.3		17.8	13.5					21.6	16.7	13.1
Queue Delay		0.0		0.0	0.0					0.0	0.0	0.0
Total Delay		26.3		17.8	13.5					21.6	16.7	13.1
LOS		C		B	B					C	B	B
Approach Delay		26.3			14.1						18.7	
Approach LOS		C			B						B	

Intersection Summary

Area Type: Other
 Cycle Length: 92
 Actuated Cycle Length: 77.8
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 19.9
 Intersection LOS: B
 Intersection Capacity Utilization 68.0%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

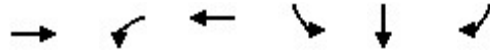


Queues

Future Total 2034

2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

PM Peak



Lane Group	EBT	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1430	182	1136	685	278	257
v/c Ratio	0.78	0.55	0.48	0.59	0.46	0.44
Control Delay	26.3	17.8	13.5	21.6	16.7	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	17.8	13.5	21.6	16.7	13.1
Queue Length 50th (m)	65.7	11.4	34.6	41.0	24.8	17.1
Queue Length 95th (m)	#111.3	#33.5	60.1	55.8	44.4	35.7
Internal Link Dist (m)	232.6		286.0		226.6	
Turn Bay Length (m)		40.0		80.0		30.0
Base Capacity (vph)	1842	333	2382	1748	877	824
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.55	0.48	0.39	0.32	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
 2: Niagara Square Drive/QEW Southbound Off-Ramp & McLeod Road

Future Total 2034
 PM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↘	↑↑↑					↖	↘	↗
Traffic Volume (vph)	0	1316	0	167	870	175	0	0	0	630	140	352
Future Volume (vph)	0	1316	0	167	870	175	0	0	0	630	140	352
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.3		-1.0	4.3					4.7	4.7	4.7
Lane Util. Factor		0.91		1.00	0.91					0.97	0.95	0.95
Frbp, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00					1.00	1.00	1.00
Frt		1.00		1.00	0.97					1.00	0.93	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		4736		1616	4539					3136	1528	1401
Flt Permitted		1.00		0.14	1.00					0.95	1.00	1.00
Satd. Flow (perm)		4736		235	4539					3136	1528	1401
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1430	0	182	946	190	0	0	0	685	152	383
RTOR Reduction (vph)	0	0	0	0	28	0	0	0	0	0	36	62
Lane Group Flow (vph)	0	1430	0	182	1108	0	0	0	0	685	242	195
Confl. Peds. (#/hr)	3		3	3		3						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	5%	0%	0%	0%	4%	3%	2%
Turn Type		NA	Perm	pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		25.9		35.8	35.8					24.8	24.8	24.8
Effective Green, g (s)		29.9		39.8	39.8					28.8	28.8	28.8
Actuated g/C Ratio		0.39		0.51	0.51					0.37	0.37	0.37
Clearance Time (s)		8.3		3.0	8.3					8.7	8.7	8.7
Vehicle Extension (s)		2.5		2.5	2.5					2.5	2.5	2.5
Lane Grp Cap (vph)		1824		314	2327					1163	567	519
v/s Ratio Prot		c0.30		c0.08	0.24						0.16	
v/s Ratio Perm				0.22						c0.22		0.14
v/c Ratio		0.78		0.58	0.48					0.59	0.43	0.38
Uniform Delay, d1		21.0		12.5	12.2					19.6	18.2	17.8
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		2.2		2.1	0.1					0.6	0.4	0.3
Delay (s)		23.2		14.7	12.3					20.3	18.6	18.2
Level of Service		C		B	B					C	B	B
Approach Delay (s)		23.2			12.6			0.0			19.4	
Approach LOS		C			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			18.5		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			77.6		Sum of lost time (s)					9.0		
Intersection Capacity Utilization			68.0%		ICU Level of Service					C		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2034
PM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1429	465	0	1083	144	203
Future Volume (vph)	1429	465	0	1083	144	203
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		0	0		2	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.91	0.91	1.00	0.91	0.97	1.00
Ped Bike Factor	0.99					
Frt	0.963					0.850
Flt Protected					0.950	
Satd. Flow (prot)	4467	0	0	4690	3197	1489
Flt Permitted					0.950	
Satd. Flow (perm)	4467	0	0	4690	3197	1489
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	183					33
Link Speed (k/h)	50			50	60	
Link Distance (m)	310.0			148.8	229.3	
Travel Time (s)	22.3			10.7	13.8	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Adj. Flow (vph)	1553	505	0	1177	157	221
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2058	0	0	1177	157	221
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	7.4	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2			2	1	1
Detector Template	Thru			Thru	Left	Right
Leading Detector (m)	30.5			30.5	6.1	6.1
Trailing Detector (m)	0.0			0.0	0.0	0.0
Detector 1 Position(m)	0.0			0.0	0.0	0.0
Detector 1 Size(m)	1.8			1.8	6.1	6.1
Detector 1 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0	0.0	0.0
Detector 1 Queue (s)	0.0			0.0	0.0	0.0
Detector 1 Delay (s)	0.0			0.0	0.0	0.0
Detector 2 Position(m)	28.7			28.7		
Detector 2 Size(m)	1.8			1.8		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2034
 PM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Detector Phase	4			8	2	2
Switch Phase						
Minimum Initial (s)	10.0			10.0	8.0	8.0
Minimum Split (s)	34.0			34.0	24.0	24.0
Total Split (s)	52.0			52.0	28.0	28.0
Total Split (%)	65.0%			65.0%	35.0%	35.0%
Maximum Green (s)	44.0			44.0	20.0	20.0
Yellow Time (s)	4.5			4.5	4.5	4.5
All-Red Time (s)	3.5			3.5	3.5	3.5
Lost Time Adjust (s)	-4.0			-4.0	-4.0	-4.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Recall Mode	Min			Min	None	None
Walk Time (s)	10.0			10.0	0.0	0.0
Flash Dont Walk (s)	16.0			16.0	0.0	0.0
Pedestrian Calls (#/hr)	0			0	0	0
Act Effct Green (s)	44.7			44.7	18.0	18.0
Actuated g/C Ratio	0.63			0.63	0.25	0.25
v/c Ratio	0.71			0.40	0.19	0.55
Control Delay	10.0			7.3	21.9	25.7
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	10.0			7.3	21.9	25.7
LOS	B			A	C	C
Approach Delay	10.0			7.3	24.1	
Approach LOS	B			A	C	

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 70.8
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 10.6
 Intersection LOS: B
 Intersection Capacity Utilization 61.6%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 3: QEW Northbound Off-Ramp & McLeod Road



Queues
 3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2034
 PM Peak

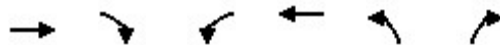


Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2058	1177	157	221
v/c Ratio	0.71	0.40	0.19	0.55
Control Delay	10.0	7.3	21.9	25.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.0	7.3	21.9	25.7
Queue Length 50th (m)	52.8	24.5	8.9	22.9
Queue Length 95th (m)	86.2	40.2	15.7	42.7
Internal Link Dist (m)	286.0	124.8	205.3	
Turn Bay Length (m)				60.0
Base Capacity (vph)	3147	3245	1106	536
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	0.65	0.36	0.14	0.41
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

3: QEW Northbound Off-Ramp & McLeod Road

Future Total 2034
PM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↘↘	↗
Traffic Volume (vph)	1429	465	0	1083	144	203
Future Volume (vph)	1429	465	0	1083	144	203
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	0.97	1.00
Frbp, ped/bikes	0.99			1.00	1.00	1.00
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.96			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4469			4690	3197	1489
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4469			4690	3197	1489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1553	505	0	1177	157	221
RTOR Reduction (vph)	67	0	0	0	0	25
Lane Group Flow (vph)	1991	0	0	1177	157	196
Confl. Peds. (#/hr)		3	3			
Heavy Vehicles (%)	4%	2%	0%	3%	2%	1%
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	40.6			40.6	13.9	13.9
Effective Green, g (s)	44.6			44.6	17.9	17.9
Actuated g/C Ratio	0.63			0.63	0.25	0.25
Clearance Time (s)	8.0			8.0	8.0	8.0
Vehicle Extension (s)	2.5			2.5	2.5	2.5
Lane Grp Cap (vph)	2827			2967	811	378
v/s Ratio Prot	c0.45			0.25	0.05	
v/s Ratio Perm						c0.13
v/c Ratio	0.70			0.40	0.19	0.52
Uniform Delay, d1	8.6			6.4	20.6	22.6
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.8			0.1	0.1	0.9
Delay (s)	9.3			6.4	20.7	23.5
Level of Service	A			A	C	C
Approach Delay (s)	9.3			6.4	22.3	
Approach LOS	A			A	C	

























Intersection Summary

HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	70.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Total 2034
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	1041	562	354	1236	34	587	14	445	28	22	99
Future Volume (vph)	72	1041	562	354	1236	34	587	14	445	28	22	99
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98	1.00		0.98	0.98	0.98	0.99	1.00	0.97	
Fr _t			0.850			0.850			0.850		0.877	
Fl _t Protected	0.950			0.950			0.950	0.954		0.950		
Satd. Flow (prot)	1616	3264	1475	3166	3296	1446	1566	1574	1460	1681	1447	0
Fl _t Permitted	0.083			0.950			0.950	0.954		0.950		
Satd. Flow (perm)	141	3264	1452	3162	3296	1414	1534	1543	1441	1680	1447	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			611			139			314			108
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Adj. Flow (vph)	78	1132	611	385	1343	37	638	15	484	30	24	108
Shared Lane Traffic (%)							49%					
Lane Group Flow (vph)	78	1132	611	385	1343	37	325	328	484	30	132	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

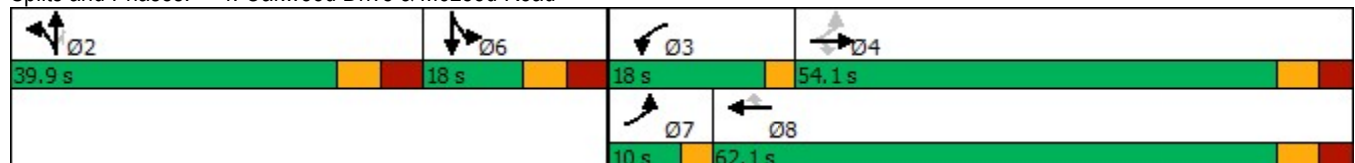
Future Total 2034
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.6	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	54.1	54.1	18.0	62.1	62.1	39.9	39.9	39.9	18.0	18.0	
Total Split (%)	7.7%	41.6%	41.6%	13.8%	47.8%	47.8%	30.7%	30.7%	30.7%	13.8%	13.8%	
Maximum Green (s)	7.0	46.5	46.5	15.0	54.5	54.5	31.6	31.6	31.6	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	3.5	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	12.0		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	20.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	65.0	49.6	49.6	19.0	59.9	59.9	33.3	33.3	33.3	12.7	12.7	
Actuated g/C Ratio	0.52	0.39	0.39	0.15	0.48	0.48	0.26	0.26	0.26	0.10	0.10	
v/c Ratio	0.39	0.88	0.65	0.81	0.86	0.05	0.79	0.79	0.79	0.18	0.54	
Control Delay	21.0	44.9	5.7	66.2	37.1	0.1	57.8	57.9	25.1	55.9	23.9	
Queue Delay	0.0	30.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	21.0	75.7	6.0	66.2	37.1	0.1	57.8	57.9	25.1	55.9	23.9	
LOS	C	E	A	E	D	A	E	E	C	E	C	
Approach Delay		50.0			42.7			43.9			29.8	
Approach LOS		D			D			D			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 125.8
 Natural Cycle: 120
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 45.3
 Intersection LOS: D
 Intersection Capacity Utilization 82.7%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues
4: Oakwood Drive & McLeod Road

Future Total 2034
PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	78	1132	611	385	1343	37	325	328	484	30	132
v/c Ratio	0.39	0.88	0.65	0.81	0.86	0.05	0.79	0.79	0.79	0.18	0.54
Control Delay	21.0	44.9	5.7	66.2	37.1	0.1	57.8	57.9	25.1	55.9	23.9
Queue Delay	0.0	30.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	75.7	6.0	66.2	37.1	0.1	57.8	57.9	25.1	55.9	23.9
Queue Length 50th (m)	8.5	138.4	0.0	49.2	160.6	0.0	78.9	79.8	40.9	7.1	5.7
Queue Length 95th (m)	18.1	#175.2	26.3	#73.7	#201.5	0.0	#119.1	#121.1	87.7	16.7	25.6
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	202	1312	949	478	1568	745	444	446	633	183	254
Starvation Cap Reductn	0	242	66	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.39	1.06	0.69	0.81	0.86	0.05	0.73	0.74	0.76	0.16	0.52




























Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

4: Oakwood Drive & McLeod Road

Future Total 2034
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 		 	 							
Traffic Volume (vph)	72	1041	562	354	1236	34	587	14	445	28	22	99
Future Volume (vph)	72	1041	562	354	1236	34	587	14	445	28	22	99
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	3.6	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3264	1452	3166	3296	1414	1566	1574	1441	1681	1449	
Flt Permitted	0.08	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	141	3264	1452	3166	3296	1414	1566	1574	1441	1681	1449	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	1132	611	385	1343	37	638	15	484	30	24	108
RTOR Reduction (vph)	0	0	368	0	0	19	0	0	232	0	97	0
Lane Group Flow (vph)	78	1132	243	385	1343	18	325	328	252	30	35	0
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	51.7	46.3	46.3	15.0	55.9	55.9	29.2	29.2	29.2	8.7	8.7	
Effective Green, g (s)	59.7	50.3	50.3	19.0	59.9	59.9	33.2	33.2	33.2	12.7	12.7	
Actuated g/C Ratio	0.47	0.40	0.40	0.15	0.47	0.47	0.26	0.26	0.26	0.10	0.10	
Clearance Time (s)	3.0	7.6	7.6	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	176	1298	577	475	1561	670	411	413	378	168	145	
v/s Ratio Prot	0.03	0.35		c0.12	c0.41		0.21	c0.21		0.02	c0.02	
v/s Ratio Perm	0.18		0.17			0.01			0.18			
v/c Ratio	0.44	0.87	0.42	0.81	0.86	0.03	0.79	0.79	0.67	0.18	0.24	
Uniform Delay, d1	23.0	35.1	27.5	52.0	29.5	17.7	43.4	43.4	41.7	52.1	52.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	6.7	0.4	9.9	5.0	0.0	9.7	9.8	4.0	0.4	0.6	
Delay (s)	24.3	41.7	27.9	61.8	34.6	17.7	53.0	53.2	45.7	52.4	53.0	
Level of Service	C	D	C	E	C	B	D	D	D	D	D	
Approach Delay (s)		36.3			40.2			49.9			52.9	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.4		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			126.4		Sum of lost time (s)					11.2		
Intersection Capacity Utilization			82.7%		ICU Level of Service					E		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2034
PM Peak



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	437	10	1	476	399	418
Future Volume (vph)	437	10	1	476	399	418
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.997			0.923		
Flt Protected	0.953					
Satd. Flow (prot)	1681	0	0	3233	3058	0
Flt Permitted	0.953			0.954		
Satd. Flow (perm)	1681	0	0	3084	3058	0
Right Turn on Red	Yes			Yes		
Satd. Flow (RTOR)	2			454		
Link Speed (k/h)	48			50		50
Link Distance (m)	69.0			240.9		309.0
Travel Time (s)	5.2			17.3		22.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Adj. Flow (vph)	475	11	1	517	434	454
Shared Lane Traffic (%)						
Lane Group Flow (vph)	486	0	0	518	888	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7		3.7
Link Offset(m)	0.0			0.0		0.0
Crosswalk Width(m)	1.6			1.6		1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (m)	6.1		6.1	30.5	30.5	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	6.1		6.1	1.8	1.8	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)				28.7	28.7	
Detector 2 Size(m)				1.8	1.8	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						

Lanes, Volumes, Timings
5: Oakwood Drive & North Commercial Access

Future Total 2034
PM Peak

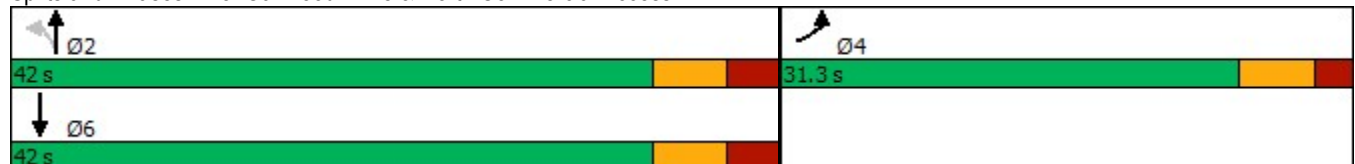


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Initial (s)	8.0		10.0	10.0	10.0	
Minimum Split (s)	22.3		34.0	34.0	34.0	
Total Split (s)	31.3		42.0	42.0	42.0	
Total Split (%)	42.7%		57.3%	57.3%	57.3%	
Maximum Green (s)	25.0		35.0	35.0	35.0	
Yellow Time (s)	4.1		4.1	4.1	4.1	
All-Red Time (s)	2.2		2.9	2.9	2.9	
Lost Time Adjust (s)	-4.0			-4.0	-4.0	
Total Lost Time (s)	2.3			3.0	3.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Max	Max	Max	
Walk Time (s)			10.0	10.0	10.0	
Flash Dont Walk (s)			17.0	17.0	17.0	
Pedestrian Calls (#/hr)			0	0	0	
Act Effect Green (s)	26.5			39.1	39.1	
Actuated g/C Ratio	0.37			0.55	0.55	
v/c Ratio	0.77			0.30	0.47	
Control Delay	29.1			9.7	5.5	
Queue Delay	0.0			0.0	0.0	
Total Delay	29.1			9.7	5.5	
LOS	C			A	A	
Approach Delay	29.1			9.7	5.5	
Approach LOS	C			A	A	

Intersection Summary

Area Type:	Other
Cycle Length:	73.3
Actuated Cycle Length:	70.9
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.77
Intersection Signal Delay:	12.7
Intersection LOS:	B
Intersection Capacity Utilization:	60.2%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 5: Oakwood Drive & North Commercial Access



Queues
 5: Oakwood Drive & North Commercial Access

Future Total 2034
 PM Peak



Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	486	518	888
v/c Ratio	0.77	0.30	0.47
Control Delay	29.1	9.7	5.5
Queue Delay	0.0	0.0	0.0
Total Delay	29.1	9.7	5.5
Queue Length 50th (m)	55.1	19.5	15.9
Queue Length 95th (m)	88.9	28.6	27.6
Internal Link Dist (m)	45.0	216.9	285.0
Turn Bay Length (m)			
Base Capacity (vph)	690	1700	1890
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.70	0.30	0.47
Intersection Summary			

HCM Signalized Intersection Capacity Analysis
5: Oakwood Drive & North Commercial Access

Future Total 2034
PM Peak

























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	437	10	1	476	399	418
Future Volume (vph)	437	10	1	476	399	418
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	2.3			3.0	3.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.92	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1682			3233	3059	
Flt Permitted	0.95			0.95	1.00	
Satd. Flow (perm)	1682			3084	3059	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	475	11	1	517	434	454
RTOR Reduction (vph)	1	0	0	0	204	0
Lane Group Flow (vph)	485	0	0	518	684	0
Heavy Vehicles (%)	0%	0%	0%	4%	3%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	22.5			35.1	35.1	
Effective Green, g (s)	26.5			39.1	39.1	
Actuated g/C Ratio	0.37			0.55	0.55	
Clearance Time (s)	6.3			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	628			1700	1686	
v/s Ratio Prot	c0.29				c0.22	
v/s Ratio Perm				0.17		
v/c Ratio	0.77			0.30	0.41	
Uniform Delay, d1	19.5			8.6	9.2	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	5.9			0.5	0.7	
Delay (s)	25.4			9.0	9.9	
Level of Service	C			A	A	
Approach Delay (s)	25.4			9.0	9.9	
Approach LOS	C			A	A	

Intersection Summary

HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	70.9	Sum of lost time (s)	5.3
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2034
 PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	174	0	43	177	38	0	0	53	201	0	98
Future Volume (vph)	59	174	0	43	177	38	0	0	53	201	0	98
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	85.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. 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
Ped Bike Factor	1.00					0.98						
Fr _t						0.850		0.850				0.850
Fl _t Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1681	1718	0	1648	1718	1504	1735	1475	0	1586	1735	1504
Fl _t Permitted	0.575			0.639						0.950		
Satd. Flow (perm)	1016	1718	0	1109	1718	1471	1735	1475	0	1586	1735	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		564				800
Link Speed (k/h)		50			50			48				48
Link Distance (m)		272.4			122.6			120.6				82.8
Travel Time (s)		19.6			8.8			9.0				6.2
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Adj. Flow (vph)	64	189	0	47	192	41	0	0	58	218	0	107
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	189	0	47	192	41	0	58	0	218	0	107
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5	6.1	6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	6.1	1.8		6.1	1.8	6.1	6.1	1.8		6.1	1.8	6.1
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
 6: Site Access 1/South Commercial Access & Oakwood Drive

Future Total 2034
 PM Peak

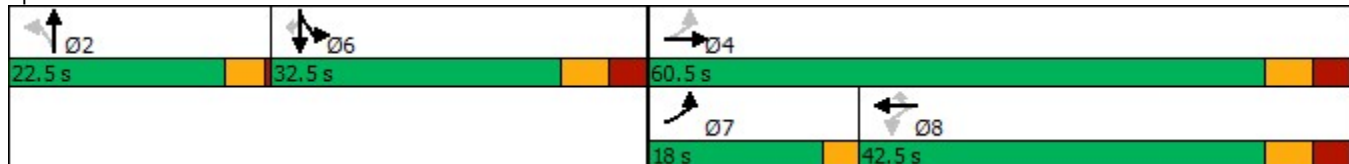


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Detector Phase	7	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	21.0		10.0	10.0	10.0	4.0	4.0		10.0	10.0	10.0
Minimum Split (s)	11.0	34.5		34.5	34.5	34.5	20.0	20.0		38.5	38.5	38.5
Total Split (s)	18.0	60.5		42.5	42.5	42.5	22.5	22.5		32.5	32.5	32.5
Total Split (%)	15.6%	52.4%		36.8%	36.8%	36.8%	19.5%	19.5%		28.1%	28.1%	28.1%
Maximum Green (s)	15.0	53.0		35.0	35.0	35.0	18.5	18.5		25.0	25.0	25.0
Yellow Time (s)	3.0	4.1		4.1	4.1	4.1	3.5	3.5		4.1	4.1	4.1
All-Red Time (s)	0.0	3.4		3.4	3.4	3.4	0.5	0.5		3.4	3.4	3.4
Lost Time Adjust (s)	-4.0	-4.0		-4.0	-4.0	-4.0	-4.0	-4.0		-4.0	-4.0	-4.0
Total Lost Time (s)	-1.0	3.5		3.5	3.5	3.5	0.0	0.0		3.5	3.5	3.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2	2.2	2.2		2.2	2.2	2.2
Recall Mode	Max	Max		Max	Max	Max	Min	Min		Max	Max	Max
Walk Time (s)		10.0		10.0	10.0	10.0	5.0	5.0		11.0	11.0	11.0
Flash Dont Walk (s)		17.0		17.0	17.0	17.0	11.0	11.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0		0	0	0
Act Effct Green (s)	61.5	57.0		39.0	39.0	39.0		8.7		35.0		35.0
Actuated g/C Ratio	0.57	0.53		0.36	0.36	0.36		0.08		0.32		0.32
v/c Ratio	0.09	0.21		0.12	0.31	0.07		0.09		0.42		0.10
Control Delay	10.7	14.2		24.0	26.4	0.2		0.3		31.6		0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0		0.0
Total Delay	10.7	14.2		24.0	26.4	0.2		0.3		31.6		0.2
LOS	B	B		C	C	A		A		C		A
Approach Delay		13.3			22.2			0.3				21.3
Approach LOS		B			C			A				C

Intersection Summary

Area Type: Other
 Cycle Length: 115.5
 Actuated Cycle Length: 107.7
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.42
 Intersection Signal Delay: 18.0
 Intersection LOS: B
 Intersection Capacity Utilization 57.9%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 6: Site Access 1/South Commercial Access & Oakwood Drive

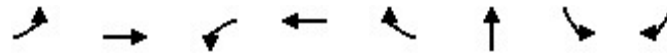


Queues

Future Total 2034

6: Site Access 1/South Commercial Access & Oakwood Drive

PM Peak



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBR
Lane Group Flow (vph)	64	189	47	192	41	58	218	107
v/c Ratio	0.09	0.21	0.12	0.31	0.07	0.09	0.42	0.10
Control Delay	10.7	14.2	24.0	26.4	0.2	0.3	31.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	14.2	24.0	26.4	0.2	0.3	31.6	0.2
Queue Length 50th (m)	5.7	20.1	6.5	28.6	0.0	0.0	35.6	0.0
Queue Length 95th (m)	11.6	32.7	14.7	46.6	0.0	0.0	56.9	0.0
Internal Link Dist (m)		248.4		98.6		96.6		
Turn Bay Length (m)			85.0					
Base Capacity (vph)	697	909	401	622	602	754	515	1028
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	0.09	0.21	0.12	0.31	0.07	0.08	0.42	0.10

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 6: Site Access 1/South Commercial Access & Oakwood Drive










Future Total 2034
 PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	174	0	43	177	38	0	0	53	201	0	98
Future Volume (vph)	59	174	0	43	177	38	0	0	53	201	0	98
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.5		3.5	3.5	3.5		0.0		3.5		3.5
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00		1.00		1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Frt	1.00	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)	1680	1718		1648	1718	1471		1475		1586		1504
Flt Permitted	0.57	1.00		0.64	1.00	1.00		1.00		0.95		1.00
Satd. Flow (perm)	1016	1718		1108	1718	1471		1475		1586		1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	189	0	47	192	41	0	0	58	218	0	107
RTOR Reduction (vph)	0	0	0	0	0	26	0	53	0	0	0	72
Lane Group Flow (vph)	64	189	0	47	192	15	0	5	0	218	0	35
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	0%	3%	2%	2%	3%	0%	2%	2%	2%	6%	2%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		Split		Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4			8		8	2					6
Actuated Green, G (s)	53.0	53.0		35.0	35.0	35.0		4.7		31.0		31.0
Effective Green, g (s)	57.0	57.0		39.0	39.0	39.0		8.7		35.0		35.0
Actuated g/C Ratio	0.53	0.53		0.36	0.36	0.36		0.08		0.32		0.32
Clearance Time (s)	3.0	7.5		7.5	7.5	7.5		4.0		7.5		7.5
Vehicle Extension (s)	2.4	2.2		2.2	2.2	2.2		2.2		2.2		2.2
Lane Grp Cap (vph)	654	909		401	622	532		119		515		488
v/s Ratio Prot	0.02	c0.11			c0.11			c0.00		c0.14		
v/s Ratio Perm	0.03			0.04		0.01						0.02
v/c Ratio	0.10	0.21		0.12	0.31	0.03		0.04		0.42		0.07
Uniform Delay, d1	12.5	13.4		22.9	24.7	22.1		45.6		28.5		25.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00		1.00
Incremental Delay, d2	0.3	0.5		0.6	1.3	0.1		0.1		2.5		0.3
Delay (s)	12.8	13.9		23.5	26.0	22.2		45.7		31.0		25.4
Level of Service	B	B		C	C	C		D		C		C
Approach Delay (s)		13.6			25.0			45.7			29.2	
Approach LOS		B			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			24.6				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			107.7				Sum of lost time (s)			7.0		
Intersection Capacity Utilization			57.9%				ICU Level of Service			B		
Analysis Period (min)			15									

c Critical Lane Group










Lanes, Volumes, Timings
7: Oakwood Drive & Site Access 2

Future Total 2034
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	7	4	229	4	3	273
Future Volume (vph)	7	4	229	4	3	273
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.955		0.998			
Flt Protected	0.968					
Satd. Flow (prot)	1604	0	1731	0	0	1735
Flt Permitted	0.968					
Satd. Flow (perm)	1604	0	1731	0	0	1735
Link Speed (k/h)	48		50			60
Link Distance (m)	39.5		2126.3			272.4
Travel Time (s)	3.0		153.1			16.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	4	249	4	3	297
Shared Lane Traffic (%)						
Lane Group Flow (vph)	12	0	253	0	0	300
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	28.2%			ICU Level of Service A		
Analysis Period (min)	15					














HCM Unsignalized Intersection Capacity Analysis
 7: Oakwood Drive & Site Access 2

Future Total 2034
 PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	7	4	229	4	3	273
Future Volume (Veh/h)	7	4	229	4	3	273
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	4	249	4	3	297
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	272					
pX, platoon unblocked	0.94					
vC, conflicting volume	554	251	253			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	496	251	253			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	100			
cM capacity (veh/h)	501	788	1312			
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	12	253	300			
Volume Left	8	0	3			
Volume Right	4	4	0			
cSH	570	1700	1312			
Volume to Capacity	0.02	0.15	0.00			
Queue Length 95th (m)	0.5	0.0	0.1			
Control Delay (s)	11.4	0.0	0.1			
Lane LOS	B		A			
Approach Delay (s)	11.4	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			28.2%		ICU Level of Service	A
Analysis Period (min)			15			













Lanes, Volumes, Timings
8: Montrose Road & Oakwood Drive

Future Total 2034
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	126	9	257	137	12	271
Future Volume (vph)	126	9	257	137	12	271
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	35.0	0.0		0.0	15.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850	0.948			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1681	1504	3146	0	1681	3233
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1681	1504	3146	0	1681	3233
Link Speed (k/h)	60		60			60
Link Distance (m)	2126.3		149.4			1982.8
Travel Time (s)	127.6		9.0			119.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	4%
Adj. Flow (vph)	137	10	279	149	13	295
Shared Lane Traffic (%)						
Lane Group Flow (vph)	137	10	428	0	13	295
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	26.7%			ICU Level of Service A		
Analysis Period (min)	15					

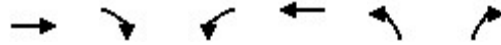
HCM Unsignalized Intersection Capacity Analysis
8: Montrose Road & Oakwood Drive

Future Total 2034
PM Peak

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	126	9	257	137	12	271	
Future Volume (Veh/h)	126	9	257	137	12	271	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	137	10	279	149	13	295	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type							
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	527	214			428		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	527	214			428		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	71	99			99		
cM capacity (veh/h)	480	797			1142		
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	137	10	186	242	13	148	148
Volume Left	137	0	0	0	13	0	0
Volume Right	0	10	0	149	0	0	0
cSH	480	797	1700	1700	1142	1700	1700
Volume to Capacity	0.29	0.01	0.11	0.14	0.01	0.09	0.09
Queue Length 95th (m)	8.9	0.3	0.0	0.0	0.3	0.0	0.0
Control Delay (s)	15.5	9.6	0.0	0.0	8.2	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	15.1		0.0		0.3		
Approach LOS	C						
Intersection Summary							
Average Delay			2.6				
Intersection Capacity Utilization			26.7%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive

Future Total 2034
 PM Peak



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↑
Traffic Volume (vph)	428	1	0	257	0	7
Future Volume (vph)	428	1	0	257	0	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Flt						0.865
Flt Protected						
Satd. Flow (prot)	3296	0	0	3296	0	1501
Flt Permitted						
Satd. Flow (perm)	3296	0	0	3296	0	1501
Link Speed (k/h)	50			50	48	
Link Distance (m)	122.6			240.9	86.6	
Travel Time (s)	8.8			17.3	6.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	465	1	0	279	0	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	466	0	0	279	0	8
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Yield	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	22.9%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
 9: Site Access 3 (Right-in/Right-out) & Oakwood Drive

























Future Total 2034
 PM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Traffic Volume (veh/h)	428	1	0	257	0	7
Future Volume (Veh/h)	428	1	0	257	0	7
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	465	1	0	279	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)	123			241		
pX, platoon unblocked						
vC, conflicting volume			465	605	233	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			465	605	233	
tC, single (s)			4.1	6.8	6.9	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			100	100	99	
cM capacity (veh/h)			1093	429	769	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	310	156	140	140	8	
Volume Left	0	0	0	0	0	
Volume Right	0	1	0	0	8	
cSH	1700	1700	1700	1700	769	
Volume to Capacity	0.18	0.09	0.08	0.08	0.01	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.2	
Control Delay (s)	0.0	0.0	0.0	0.0	9.7	
Lane LOS					A	
Approach Delay (s)	0.0		0.0		9.7	
Approach LOS					A	
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			22.9%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Total 2034 - Dual Right-Turn
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	681	387	229	905	28	294	21	210	9	2	44
Future Volume (vph)	91	681	387	229	905	28	294	21	210	9	2	44
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		2	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	1.00	1.00	0.98	1.00	0.98	
Fr _t			0.850			0.850			0.850		0.856	
Fl _t Protected	0.950			0.950			0.950	0.958		0.950		
Satd. Flow (prot)	1616	3233	2497	3197	3296	1475	1566	1579	1475	1648	1462	0
Fl _t Permitted	0.195			0.950			0.950	0.958		0.950		
Satd. Flow (perm)	332	3233	2437	3192	3296	1439	1560	1574	1451	1643	1462	0
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						139			228			48
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	99	740	421	249	984	30	320	23	228	10	2	48
Shared Lane Traffic (%)							47%					
Lane Group Flow (vph)	99	740	421	249	984	30	170	173	228	10	50	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

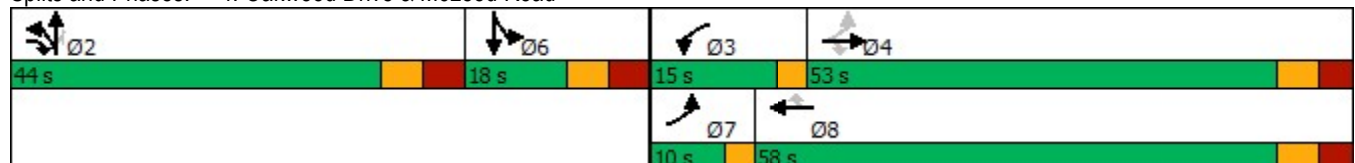
Future Total 2034 - Dual Right-Turn
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	pm+ov	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	2	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	8.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.0	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	53.0	44.0	15.0	58.0	58.0	44.0	44.0	44.0	18.0	18.0	
Total Split (%)	7.7%	40.8%	33.8%	11.5%	44.6%	44.6%	33.8%	33.8%	33.8%	13.8%	13.8%	
Maximum Green (s)	7.0	45.4	35.7	12.0	50.4	50.4	35.7	35.7	35.7	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	4.2	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	4.3	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	None	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	5.7		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	25.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	51.6	34.8	57.5	15.8	42.2	42.2	23.5	23.5	23.5	13.4	13.4	
Actuated g/C Ratio	0.55	0.37	0.61	0.17	0.45	0.45	0.25	0.25	0.25	0.14	0.14	
v/c Ratio	0.29	0.62	0.28	0.46	0.66	0.04	0.43	0.44	0.43	0.04	0.20	
Control Delay	13.9	28.1	7.6	44.1	25.9	0.1	37.1	37.2	7.2	46.7	16.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	13.9	28.1	7.6	44.1	25.9	0.1	37.1	37.2	7.2	46.7	16.9	
LOS	B	C	A	D	C	A	D	D	A	D	B	
Approach Delay		20.1			28.9			25.2			21.9	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 93.8
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 24.6
 Intersection LOS: C
 Intersection Capacity Utilization 59.9%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Total 2034 - Dual Right-Turn

4: Oakwood Drive & McLeod Road

AM Peak



























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	99	740	421	249	984	30	170	173	228	10	50
v/c Ratio	0.29	0.62	0.28	0.46	0.66	0.04	0.43	0.44	0.43	0.04	0.20
Control Delay	13.9	28.1	7.6	44.1	25.9	0.1	37.1	37.2	7.2	46.7	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	28.1	7.6	44.1	25.9	0.1	37.1	37.2	7.2	46.7	16.9
Queue Length 50th (m)	8.1	59.5	18.0	21.8	79.4	0.0	28.6	29.1	0.0	1.7	0.3
Queue Length 95th (m)	19.9	93.9	25.7	43.9	124.5	0.0	57.3	58.1	18.5	7.8	12.3
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	349	1871	1938	599	2057	950	728	734	797	264	275
Starvation Cap Reductn	0	84	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.28	0.41	0.22	0.42	0.48	0.03	0.23	0.24	0.29	0.04	0.18

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Oakwood Drive & McLeod Road

























Future Total 2034 - Dual Right-Turn
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	681	387	229	905	28	294	21	210	9	2	44
Future Volume (vph)	91	681	387	229	905	28	294	21	210	9	2	44
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	4.3	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3233	2462	3197	3296	1441	1566	1580	1453	1648	1464	
Flt Permitted	0.20	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	333	3233	2462	3197	3296	1441	1566	1580	1453	1648	1464	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	740	421	249	984	30	320	23	228	10	2	48
RTOR Reduction (vph)	0	0	0	0	0	17	0	0	173	0	43	0
Lane Group Flow (vph)	99	740	421	249	984	13	170	173	55	10	7	0
Confl. Peds. (#/hr)	2		2	2		2	1		3	3		1
Heavy Vehicles (%)	4%	4%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA	pm+ov	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	36.6	31.5	50.6	11.4	37.8	37.8	19.1	19.1	19.1	6.0	6.0	
Effective Green, g (s)	44.6	35.5	58.6	15.4	41.8	41.8	23.1	23.1	23.1	10.0	10.0	
Actuated g/C Ratio	0.47	0.37	0.62	0.16	0.44	0.44	0.24	0.24	0.24	0.11	0.11	
Clearance Time (s)	3.0	7.6	8.3	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	278	1205	1515	517	1447	632	379	383	352	173	153	
v/s Ratio Prot	0.03	0.23	0.07	c0.08	c0.30		0.11	c0.11		c0.01	0.00	
v/s Ratio Perm	0.13		0.10			0.01			0.04			
v/c Ratio	0.36	0.61	0.28	0.48	0.68	0.02	0.45	0.45	0.16	0.06	0.05	
Uniform Delay, d1	15.2	24.3	8.5	36.3	21.4	15.1	30.6	30.7	28.4	38.4	38.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.8	0.1	0.5	1.2	0.0	0.6	0.6	0.2	0.1	0.1	
Delay (s)	15.8	25.1	8.6	36.8	22.6	15.1	31.3	31.3	28.5	38.5	38.4	
Level of Service	B	C	A	D	C	B	C	C	C	D	D	
Approach Delay (s)		18.8			25.2			30.2			38.4	
Approach LOS		B			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			23.8			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			95.2	Sum of lost time (s)					11.2			
Intersection Capacity Utilization			59.9%	ICU Level of Service			B					
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

Future Total 2034 - Dual Right-Turn
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	1041	562	354	1236	34	587	14	445	28	22	99
Future Volume (vph)	72	1041	562	354	1236	34	587	14	445	28	22	99
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0		0.0
Storage Lanes	1		2	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor			0.97	1.00		0.98	0.98	0.98	0.99	1.00	0.97	
Frt			0.850			0.850			0.850		0.877	
Flt Protected	0.950			0.950			0.950	0.954		0.950		
Satd. Flow (prot)	1616	3264	2595	3166	3296	1446	1566	1574	1460	1681	1447	0
Flt Permitted	0.081			0.950			0.950	0.954		0.950		
Satd. Flow (perm)	138	3264	2527	3162	3296	1414	1534	1543	1441	1680	1447	0
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						139			314			108
Link Speed (k/h)		50			50			50				50
Link Distance (m)		148.8			245.9			309.0				281.5
Travel Time (s)		10.7			17.7			22.2				20.3
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Adj. Flow (vph)	78	1132	611	385	1343	37	638	15	484	30	24	108
Shared Lane Traffic (%)							49%					
Lane Group Flow (vph)	78	1132	611	385	1343	37	325	328	484	30	132	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		28.7			28.7			28.7				28.7
Detector 2 Size(m)		1.8			1.8			1.8				1.8
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
4: Oakwood Drive & McLeod Road

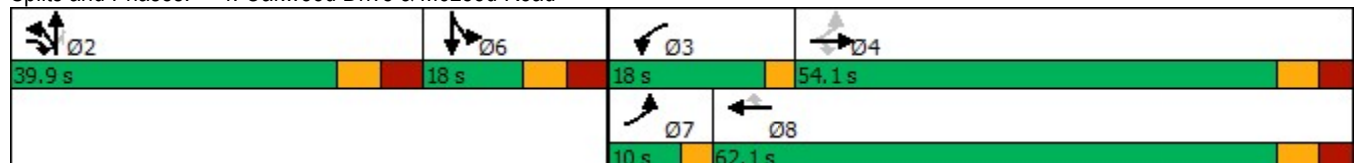
Future Total 2034 - Dual Right-Turn
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	pm+ov	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Detector Phase	7	4	2	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	10.0	8.0	6.0	10.0	10.0	8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	10.0	39.6	39.0	10.0	39.6	39.6	39.0	39.0	39.0	18.0	18.0	
Total Split (s)	10.0	54.1	39.9	18.0	62.1	62.1	39.9	39.9	39.9	18.0	18.0	
Total Split (%)	7.7%	41.6%	30.7%	13.8%	47.8%	47.8%	30.7%	30.7%	30.7%	13.8%	13.8%	
Maximum Green (s)	7.0	46.5	31.6	15.0	54.5	54.5	31.6	31.6	31.6	9.7	9.7	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	0.0	3.5	4.2	0.0	3.5	3.5	4.2	4.2	4.2	4.2	4.2	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	
Total Lost Time (s)	-1.0	3.6	4.3	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	Min	None	None	Min	Min	None	None	None	None	None	
Walk Time (s)		12.0	5.7		12.0	12.0	5.7	5.7	5.7	4.9	4.9	
Flash Dont Walk (s)		20.0	25.0		20.0	20.0	25.0	25.0	25.0	4.8	4.8	
Pedestrian Calls (#/hr)		0	0		0	0	0	0	0	0	0	
Act Effct Green (s)	64.4	49.0	82.5	19.0	59.2	59.2	34.2	34.2	34.2	12.7	12.7	
Actuated g/C Ratio	0.51	0.39	0.65	0.15	0.47	0.47	0.27	0.27	0.27	0.10	0.10	
v/c Ratio	0.40	0.89	0.37	0.81	0.87	0.05	0.77	0.77	0.78	0.18	0.54	
Control Delay	21.6	46.5	8.9	66.6	38.2	0.1	55.9	56.0	24.6	56.0	23.9	
Queue Delay	0.0	31.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	21.6	78.0	8.9	66.6	38.2	0.1	55.9	56.0	24.6	56.0	23.9	
LOS	C	E	A	E	D	A	E	E	C	E	C	
Approach Delay		52.4			43.6			42.6			29.8	
Approach LOS		D			D			D			C	

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	126.1
Natural Cycle:	120
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	46.2
Intersection LOS:	D
Intersection Capacity Utilization:	82.7%
ICU Level of Service:	E
Analysis Period (min):	15

Splits and Phases: 4: Oakwood Drive & McLeod Road



Queues

Future Total 2034 - Dual Right-Turn

4: Oakwood Drive & McLeod Road

PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	78	1132	611	385	1343	37	325	328	484	30	132
v/c Ratio	0.40	0.89	0.37	0.81	0.87	0.05	0.77	0.77	0.78	0.18	0.54
Control Delay	21.6	46.5	8.9	66.6	38.2	0.1	55.9	56.0	24.6	56.0	23.9
Queue Delay	0.0	31.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	78.0	8.9	66.6	38.2	0.1	55.9	56.0	24.6	56.0	23.9
Queue Length 50th (m)	8.5	138.4	31.2	49.2	160.6	0.0	78.9	79.8	40.9	7.1	5.7
Queue Length 95th (m)	18.7	#175.2	42.8	#73.7	#201.5	0.0	#119.1	#121.1	87.7	16.7	25.6
Internal Link Dist (m)		124.8			221.9			285.0			257.5
Turn Bay Length (m)	30.0		100.0	60.0		40.0	75.0		50.0	20.0	
Base Capacity (vph)	200	1310	1702	478	1548	737	443	445	632	183	253
Starvation Cap Reductn	0	242	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	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
Reduced v/c Ratio	0.39	1.06	0.36	0.81	0.87	0.05	0.73	0.74	0.77	0.16	0.52

























Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
4: Oakwood Drive & McLeod Road

Future Total 2034 - Dual Right-Turn
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	1041	562	354	1236	34	587	14	445	28	22	99
Future Volume (vph)	72	1041	562	354	1236	34	587	14	445	28	22	99
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	-1.0	3.6	4.3	-1.0	3.6	3.6	4.3	4.3	4.3	4.3	4.3	
Lane Util. Factor	1.00	0.95	0.88	0.97	0.95	1.00	0.95	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1616	3264	2555	3166	3296	1414	1566	1574	1441	1681	1449	
Flt Permitted	0.08	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	137	3264	2555	3166	3296	1414	1566	1574	1441	1681	1449	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	1132	611	385	1343	37	638	15	484	30	24	108
RTOR Reduction (vph)	0	0	0	0	0	20	0	0	229	0	97	0
Lane Group Flow (vph)	78	1132	611	385	1343	17	325	328	255	30	35	0
Confl. Peds. (#/hr)	1		3	3		1	6		1	1		6
Heavy Vehicles (%)	4%	3%	2%	3%	2%	4%	2%	0%	3%	0%	0%	5%
Turn Type	pm+pt	NA	pm+ov	Prot	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4		4			8			2			
Actuated Green, G (s)	51.0	45.6	75.8	15.0	55.2	55.2	30.2	30.2	30.2	8.7	8.7	
Effective Green, g (s)	59.0	49.6	83.8	19.0	59.2	59.2	34.2	34.2	34.2	12.7	12.7	
Actuated g/C Ratio	0.47	0.39	0.66	0.15	0.47	0.47	0.27	0.27	0.27	0.10	0.10	
Clearance Time (s)	3.0	7.6	8.3	3.0	7.6	7.6	8.3	8.3	8.3	8.3	8.3	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	173	1277	1689	474	1540	660	422	424	388	168	145	
v/s Ratio Prot	0.03	0.35	0.10	c0.12	c0.41		0.21	c0.21		0.02	c0.02	
v/s Ratio Perm	0.18		0.14			0.01			0.18			
v/c Ratio	0.45	0.89	0.36	0.81	0.87	0.03	0.77	0.77	0.66	0.18	0.24	
Uniform Delay, d1	23.7	35.9	9.5	52.1	30.3	18.2	42.6	42.7	41.0	52.2	52.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	7.7	0.1	10.0	5.7	0.0	8.1	8.2	3.6	0.4	0.6	
Delay (s)	25.1	43.6	9.6	62.1	36.0	18.2	50.7	50.9	44.6	52.6	53.2	
Level of Service	C	D	A	E	D	B	D	D	D	D	D	
Approach Delay (s)		31.4			41.4			48.2			53.1	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			39.6				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			126.7				Sum of lost time (s)			11.2		
Intersection Capacity Utilization			82.7%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

Appendix D

Transportation Tomorrow Survey 2016

AM Inbound
Wed Apr 27 2022 08:51:47 GMT-0400 (Eastern Daylight Time) - Run Time: 310Sec
Cross-Tabulation Query Form - Trip - 2016 v1.1
Row: Planning object of origin - pd_Orig
Column: 2006 QTA zone of destination - gnt06_Dest
Road:
COG:(0226,0230,0205)
TAG:
Filters:
Start time of trip - start_time in 600-900
and
Trip purpose - trip_purpose in 1,3,3
Trip 2016
Table:

	N	S	E	W	N Trips	S Trips	E Trips	W Trips
PD 1 of Toronto	1				0	0	0	0
PD 2 of Toronto	1				0	0	0	0
PD 13 of Toronto	7				7	0	0	0
Mississauga	1				0	0	0	0
Orillia	1				0	0	0	0
Burlington	15				15	0	0	0
Hamilton	43				43	0	0	0
Grimsby	1				0	0	0	0
Lindsay	1				0	0	0	0
Pelham	22	0.5		0.5	11	0	0	11
Napier-an-the-Br	32	1			32	0	0	0
St. Catharines	122	1			122	0	0	0
Thornhill	4	1			4	0	0	0
Napier Falls	3263	0.33333	0.33333	0.33333	1087.67	0	1087.67	1087.67
Welland	105	1			0	105	0	0
Port Colborne	70	1			0	70	0	0
Fort Erie	133	1			0	133	0	0
Wainfleet		1			0	0	0	0
Cambridge		1			0	0	0	0
Haldimand-North		0.33333	0.33333		0	0	0	0
Etterville		1			0	0	0	0
TOTAL	3816				1321.67	308	1087.67	1098.67
					35%	8%	29%	29%

AM Outbound
Wed Apr 27 2022 08:51:10 GMT-0400 (Eastern Daylight Time) - Run Time: 380Sec
Cross-Tabulation Query Form - Trip - 2016 v1.1
Row: Planning object of destination - pd_Dest
Column: 2006 QTA zone of origin - gnt06_Orig
Road:
COG:(0226,0230,0205)
TAG:
Filters:
Start time of trip - start_time in 600-900
and
Trip purpose - trip_purpose in 1,3,3
Trip 2016
Table:

	N	S	E	W	N Trips	S Trips	E Trips	W Trips
PD 1 of Toronto	5	1			5	0	0	0
PD 2 of Toronto	1				0	0	0	0
PD 13 of Toronto	1				0	0	0	0
Mississauga	23	1			23	0	0	0
Orillia	38	1			38	0	0	0
Burlington	107	1			107	0	0	0
Hamilton	79	1			79	0	0	0
Grimsby	87	1			87	0	0	0
Lindsay	105	1			105	0	0	0
Pelham	42	0.5		0.5	21	0	0	21
Napier-an-the-Br	195	1			195	0	0	0
St. Catharines	658	1			658	0	0	0
Thornhill	132	1			132	0	0	0
Napier Falls	4242	0.33333	0.33333	0.33333	1414	0	1414	1414
Welland	329	1			0	329	0	0
Port Colborne		1			0	0	0	0
Fort Erie	116	1			0	116	0	0
Wainfleet		1			0	0	0	0
Cambridge		1			0	0	0	0
Haldimand-North	107	0.33333	0.33333	0.33333	35.6667	35.6667	0	35.6667
Etterville	11	1			11	0	0	0
TOTAL	6276				2910.67	480.667	1414	1470.67
					46%	8%	23%	23%

TOTAL	North	South	East	West
AM Inbound	33%	8%	29%	29%
AM Outbound	46%	8%	23%	23%
PM Inbound	51%	9%	20%	20%
PM Outbound	41%	8%	25%	26%

PM Inbound
Wed Apr 27 2022 08:51:01 GMT-0400 (Eastern Daylight Time) - Run Time: 208Sec
Cross-Tabulation Query Form - Trip - 2016 v1.1
Row: Planning object of origin - pd_Orig
Column: 2006 QTA zone of destination - gnt06_Dest
Road:
COG:(0226,0230,0205)
TAG:
Filters:
Start time of trip - start_time in 1800-1900
and
Trip purpose - trip_purpose in 1,3,3
Trip 2016
Table:

	N	S	E	W	N Trips	S Trips	E Trips	W Trips
PD 1 of Toronto	10	1			10	0	0	0
PD 2 of Toronto	1				0	0	0	0
PD 13 of Toronto	1				0	0	0	0
Mississauga	23	1			23	0	0	0
Orillia	38	1			38	0	0	0
Burlington	107	1			107	0	0	0
Hamilton	79	1			79	0	0	0
Grimsby	87	1			87	0	0	0
Lindsay	115	1			115	0	0	0
Pelham		0.5		0.5	0	0	0	0
Napier-an-the-Br	448	1			448	0	0	0
St. Catharines	827	1			827	0	0	0
Thornhill	113	1			113	0	0	0
Napier Falls	3386	0.33333	0.33333	0.33333	1128.67	0	1128.67	1128.67
Welland	381	1			0	381	0	0
Port Colborne		1			0	16	0	0
Fort Erie	108	1			0	108	0	0
Wainfleet		1			0	5	0	0
Cambridge		1			0	0	0	0
Haldimand-North	13	0.33333	0.33333	0.33333	4.33333	4.33333	0	4.33333
Etterville	11	1			11	0	0	0
TOTAL	5615				2839	514.333	1128.67	1133
					51%	9%	20%	20%

TOTAL (rounded based on existing travel patterns)	North	South	East	West
AM Inbound	35%	8%	29%	29%
AM Outbound	45%	10%	20%	25%
PM Inbound	50%	10%	20%	20%
PM Outbound	40%	10%	25%	25%

PM Outbound
Wed Apr 27 2022 08:51:42 GMT-0400 (Eastern Daylight Time) - Run Time: 285Sec
Cross-Tabulation Query Form - Trip - 2016 v1.1
Row: Planning object of destination - pd_Dest
Column: 2006 QTA zone of origin - gnt06_Orig
Road:
COG:(0226,0230,0205)
TAG:
Filters:
Start time of trip - start_time in 1800-1900
and
Trip purpose - trip_purpose in 1,3,3
Trip 2016
Table:

	N	S	E	W	N Trips	S Trips	E Trips	W Trips
PD 1 of Toronto	1				0	0	0	0
PD 2 of Toronto	1				94	0	0	0
PD 13 of Toronto	1				0	0	0	0
Mississauga	1				0	0	0	0
Orillia	1				0	0	0	0
Burlington	15	1			15	0	0	0
Hamilton	81	1			81	0	0	0
Grimsby	1				0	0	0	0
Lindsay	1				0	0	0	0
Pelham	38	0.5		0.5	19	0	0	19
Napier-an-the-Br	39	1			39	0	0	0
St. Catharines	351	1			351	0	0	0
Thornhill	11	1			11	0	0	0
Napier Falls	3749	0.33333	0.33333	0.33333	1249.67	0	1249.67	1249.67
Welland	54	1			0	54	0	0
Port Colborne	43	1			0	43	0	0
Fort Erie	285	1			0	285	0	0
Wainfleet		1			0	0	0	0
Cambridge		1			0	0	0	0
Haldimand-North	26	0.33333	0.33333	0.33333	8.66667	8.66667	0	8.66667
Etterville	54	1			54	0	0	0
TOTAL	4936				2012.33	389.667	1249.67	1277.33
					41%	8%	25%	26%

4936



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