BROCCOLINI

Final Report

Traffic Impact Study (TIS) Proposed Warehousing, Logistics and Distribution Centre, 12304 Heart Lake Road, Town of Caledon

IBI

Prepared for Broccolini c/o Real Estate Development
by IBI Group
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ORIGINATOR:	Dumitru Liubeznii
REVIEWER:	Rao N. Marthi
AUTHORIZATION:	Peter Richards
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1 Introduction

Broccolini c/o Real Estate Development retained IBI Group (the 'proponent') retained IBI Group to prepare a Traffic Impact Study (TIS) report in support of the Zoning By-law Amendment and Site Plan Application for proposed warehousing, logistics, and distribution centre to be located at 12304 Heart Lake Road (the 'subject site') in the Town of Caledon (the 'Town') and Peel Region (the 'Region').

The subject site is currently occupied by agricultural fields. The proposed development plan adheres to the Mayfield West Secondary Plan, according to which the subject lands shall be converted into employment lands.

The subject site is located on the west side of Heart Lake Road, just north of Highway 410. The proposed development study area is presented in **Exhibit 2-1**. The latest site plan received on November 9, 2021, shows one warehouse building labelled as BLDG 1 on the south side of the proposed extension of Abbotside Way and Bonnieglen Farm Boulevard intersection. The proposed extension of Abbotside Way is planned to connect to Heart Lake Road. The proposed development is designed to connect to the proposed extension of Abbotside Way via Two full move accesses.

A total of 220 auto parking spaces, 211 regular spaces and 9 accessible spaces are provided on the conceptual site plan, whereas 339 auto parking spaces will be required as per the Town's Zoning By-law. According to the conceptual site plan, the proposed facility will have 87 trailer parking spaces. The conceptual plan and the statistics are presented in **Section 8**.

As per the Development Application Review Team (DART) meeting held on July 1, 2021, a Traffic Impact Study (including Road Network Review and Circulation, Transportation Demand Management Plan, Active Transportation Provisions and Network Connections) and a parking and loading review were requested by the Town.

1.1 Study Purpose

The purpose of this report is to analyze the impacts that the proposed development may have on the surrounding transportation network. This report takes into consideration future road configurations, background traffic growth, and other proposed developments in the area.

The purpose of this study is to provide traffic analysis, where IBI will:

- Assess the 2021 existing traffic operations of the study area intersections during the weekday AM and PM peak hours;
- Considering the proposed development will be fully built by 2023 (opening year), a 5-year after the opening year (i.e., the year 2028), and 10-year after the opening year (i.e., the year 2033) are considered as future horizon years;
- Assess the future background traffic operations during the weekday AM and PM peak hours, incorporating both traffic growth and the traffic generated from the background developments in the vicinity of the proposed development;
- Estimate site traffic based on information published in the *Trip Generation Manual, 10th Edition,* by the *Institute of Transportation Engineers (ITE)*;
- Assess the future total traffic operations during the weekday AM and PM peak hours, incorporating future background traffic and the traffic generated from the proposed development.

- Develop mitigation measures to address any deficiencies at each stage (existing, Future Background and Future Total traffic) for all key study area intersections;
- Review the maneuverability of design vehicles at the site access driveways and within site at parking spaces and loading docks;
- Review the site access geometry, width, clear throat length, and curb radius with respect to the Town's Development Standard Manual, and determine whether or not additional turning lanes are required;
- Review sightlines at the proposed site access driveways with respect to the requirements as outlined in the 2017 Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (June 2017) Manual; and
- Review the adequacy of the proposed parking supply with regard to the parking requirements per the City's Zoning By-law, as amended (the "Zoning By-law") for the site.

1.2 Summary of Consultation with Agencies

At the onset of the project, IBI circulated the terms of reference of the study to the Town, Region, and the Ministry of Transportation Ontario (the 'MTO'). The correspondence and confirmation of the scope of work are presented in **Appendix A**.

1.3 Report Structure

The scope of the current study is based on the Town's, Region's, and MTO's TIS guidelines. This TIS report examines the anticipated impact of the proposed development on the study area traffic operations and identifies potential improvements to operations if needed. Following is the report structure:

- **Section 2** examines the existing transportation facilities and discusses the traffic analysis details, such as signal timing plans, turning movement counts, analysis periods, and study intersections.
- **Section 3** examines the existing traffic operational conditions and identifies existing operational issues. Road improvements aimed at mitigating the identified operational issues are proposed, if necessary.
- **Section 4** through **Section 7** examines the future transportation improvements planned by the City and Region, the Future Background traffic operations under the full built-out year of 2023, 5-year horizon from full build-out (2028), and 10-year horizon from full build-out (2033) without the subject site. Road improvements aimed at mitigating the identified operational issues are proposed, if necessary.
- Site trip generation estimates from the proposed developments and trip assignment to the study area road network are discussed in **Section 8**.
- **Section 9** through **Section 13** examines Future Total traffic operations under the full built-out year of 2023, 5-year horizon from full build-out (2028), and 10-year horizon from full build-out (2033) with the subject site. Road improvements aimed at mitigating the identified operational issues are proposed, if necessary.
- **Section 14** examines the concept draft plan based on the location and configuration of the proposed site access, including available sight distance, vehicle swept path analysis, and parking required to support concept design.
- **Section 15** provides conclusions made based on the preceding sections.

- **Section 16** provides recommendations made based on the preceding sections.

2 Existing Transportation Context and Traffic Data

This section documents the transportation network in the study area observed in 2021, including existing roadways, traffic control measures, intersection performance, walking and cycling facilities, and transit operations. The section also evaluates the suitability of traffic data.

2.1 Study Area

The proposed development is located in the west quadrant of Heart Lake Road overpass at Highway 410, as illustrated in **Exhibit 2-1**.

The study area intersections were determined through the consultation with the Town, Region and MTO, and consist of the following locations (as presented in **Exhibit 2-1**):

1. Kennedy Road North and Abbotside Way (signalized);
2. Abbotside Way and Learmont Avenue (unsignalized);
3. Heart Lake Road and Mayfield Road (signalized);
4. Mayfield Road and Highway 410 Southbound Off-Ramp (signalized); and,
5. Mayfield Road and Highway 410 Northbound Off-Ramp (signalized).

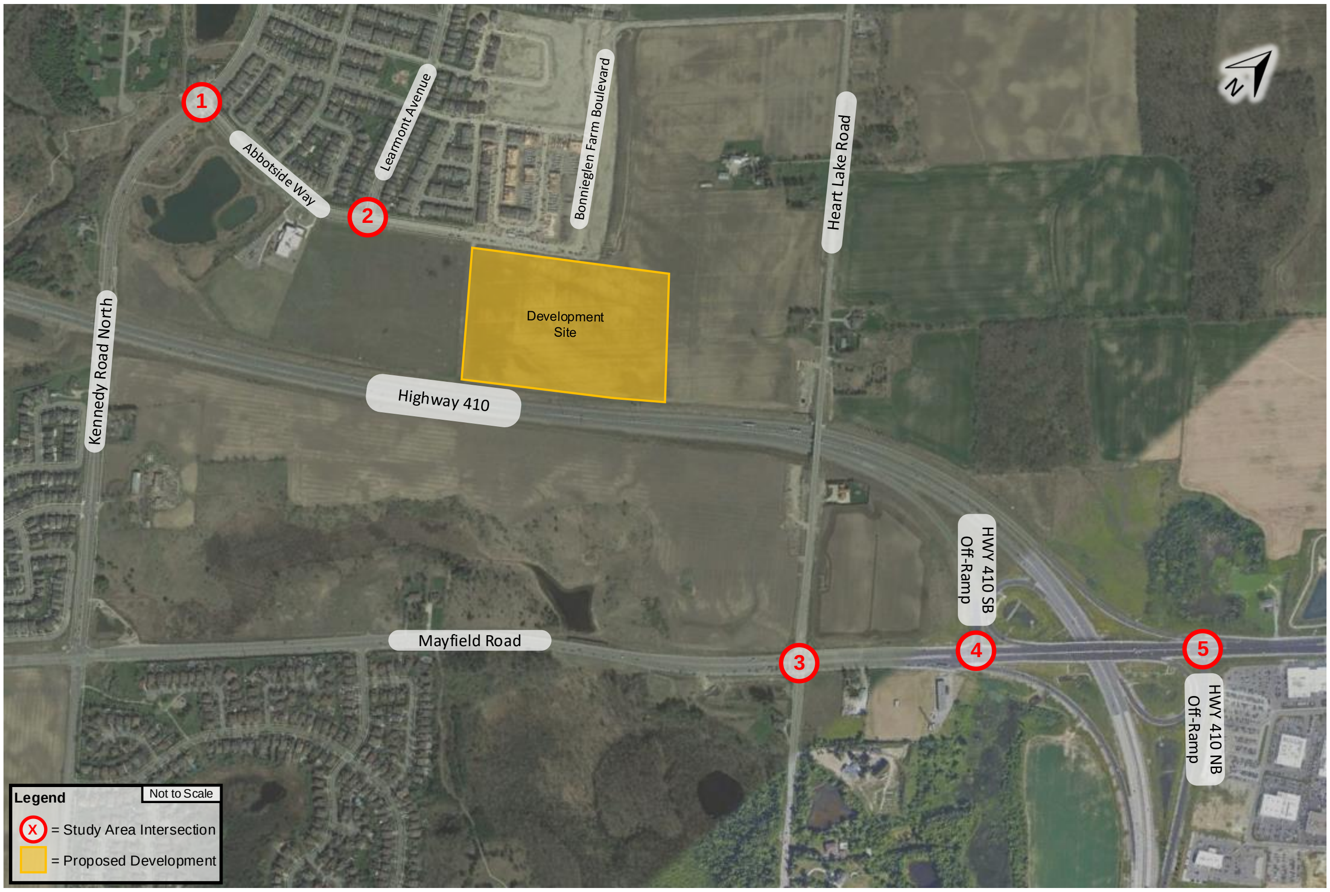
The area surrounding the proposed development is a mix of residential and agricultural land uses. The areas to the northwest of the development are low-density residential, the area to the north and east of the development contains agricultural lands, while the area facing the development site from the southeast is bound by Highway 410.

The surrounding lands are known to the Town, Region, and MTO as Mayfield West Community. The details of community development are referenced from *Mayfield West Community Traffic Management Plan*[1] shared by the Town. The community is encompassed by Highway 410 to the south, Hurontario Street to the west, Old School Road and West Humber River to the north, and Dixie Road to the east.

The Mayfield West Community features a Village Centre with a mix of residential, retail, commercial, and institutional uses adjacent to the east edge of the Etobicoke Creek valley. The planned road network provides direct connections between neighbourhoods and the Village Centre and employment lands located along the north side of Highway 410. The employment lands are served by collector roads running east-west

[1] *Mayfield West Community Traffic Management Plan by Monarch Corporation and Coscorp Inc., February 2008*

Exhibit 2-1: Development Study Area



Base Map Source: Google Maps. Retrieved October 13, 2021, from https://www.google.ca/maps

2.2 Existing Road Network

The characteristics of the study area roadways are summarized below in **Exhibit 2-2**.

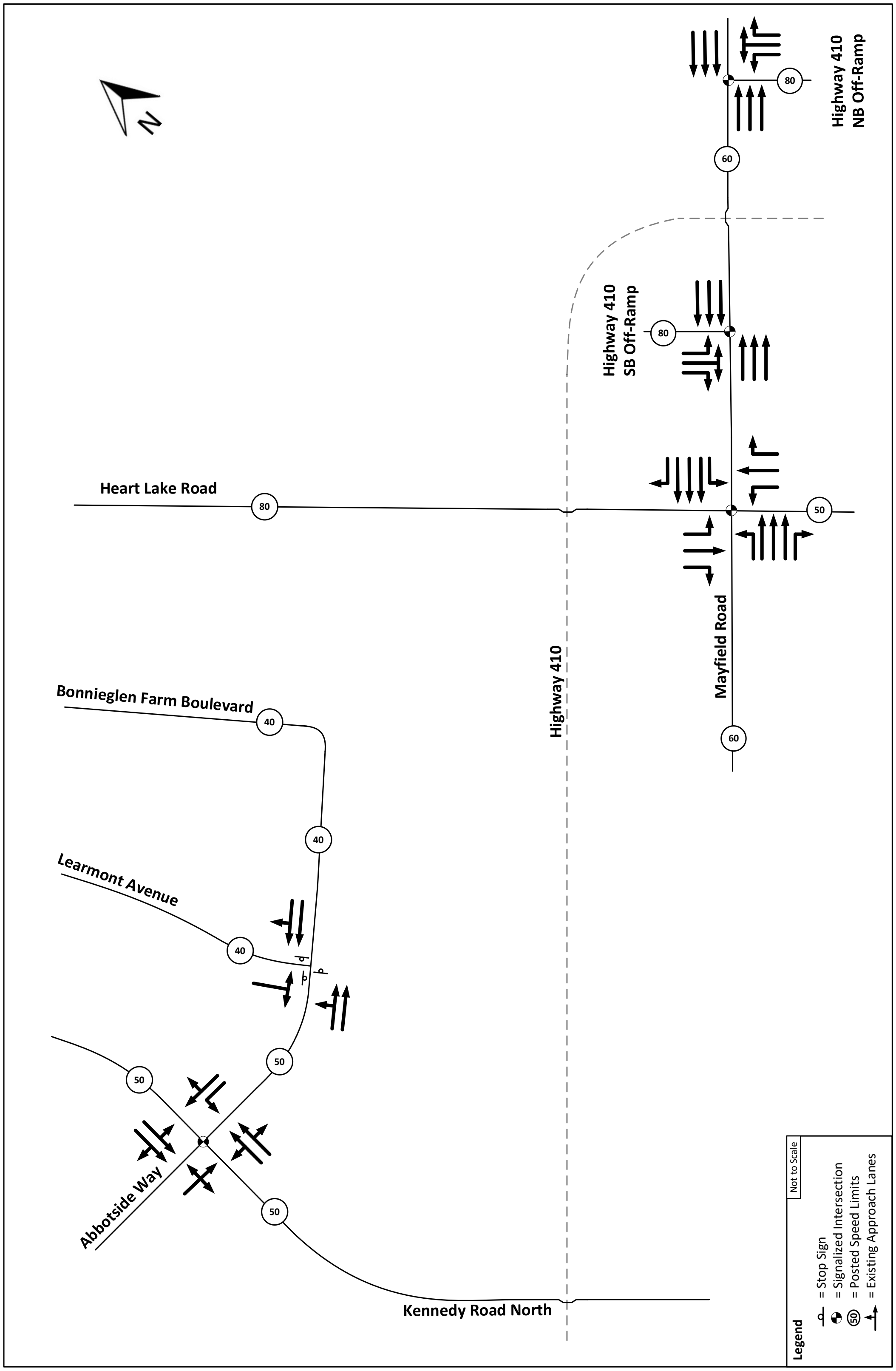
Exhibit 2-2: Study Roadway Characteristics

Street Name	Road Class	Orientation	Road Width (Lanes)	Traffic Direction	Roadway Boundary		On-Street Parking	Speed Limit
Mayfield Road (RR* 14)	Major Arterial	Northeast / Southwest	6	Two-way	Highway 50 (northeast)	Winston Churchill Boulevard (southwest)	Prohibited	60 km/h
Kennedy Road	Medium Capacity Arterial	Northwest / Southeast	4	Two-way	ON-9 (northwest)	Eglinton Avenue East (southeast)	Prohibited	50 km/h
Heart Lake Road	Medium Capacity Arterial	Northwest / Southeast	2	Two-way	ON-9 (northwest)	Bovaird Drive East (southeast)	Prohibited	50 km/h
Abbotside Way	Industrial Collector	Northeast / Southwest	4	Two-way	Kennedy Road (southwest)	Bonnieglen Farm Boulevard (northeast)	Prohibited	40 to 50 km/h
Learmont Avenue	Local	Northwest / Southeast	4	Two-way	Kennedy Road (northwest)	Abbotside Way (southeast)	Permitted on the west side	40 km/h
Bonnieglen Farm Boulevard	Local	Northwest / Southeast	2	Two-way	Kennedy Road (northwest)	Abbotside Way (southeast)	Permitted on the east side	40 km/h
Highway 410 SB Off-Ramp	Freeway Ramp	Northwest / Southeast	3	One-way	Hurontario Street (northwest)	Highway 401 (southeast)	Prohibited	80 km/h
Highway 410 NB Off-Ramp	Freeway Ramp	Northwest / Southeast	3	One-Way				

Note: RR* – Regional Road

Existing lane configurations for study area roadways are illustrated in **Exhibit 2-3**.

Exhibit 2-3: Existing Study Area Lane Configurations



2.3 Existing Transit Network

Currently, the site is accessible via bus service operated by the Brampton Transit. The nearest transit routes are illustrated in **Exhibit 2-4**, while service patterns and destinations of the routes in close proximity are shown in **Exhibit 2-5**.

Exhibit 2-4: Existing Transit Network

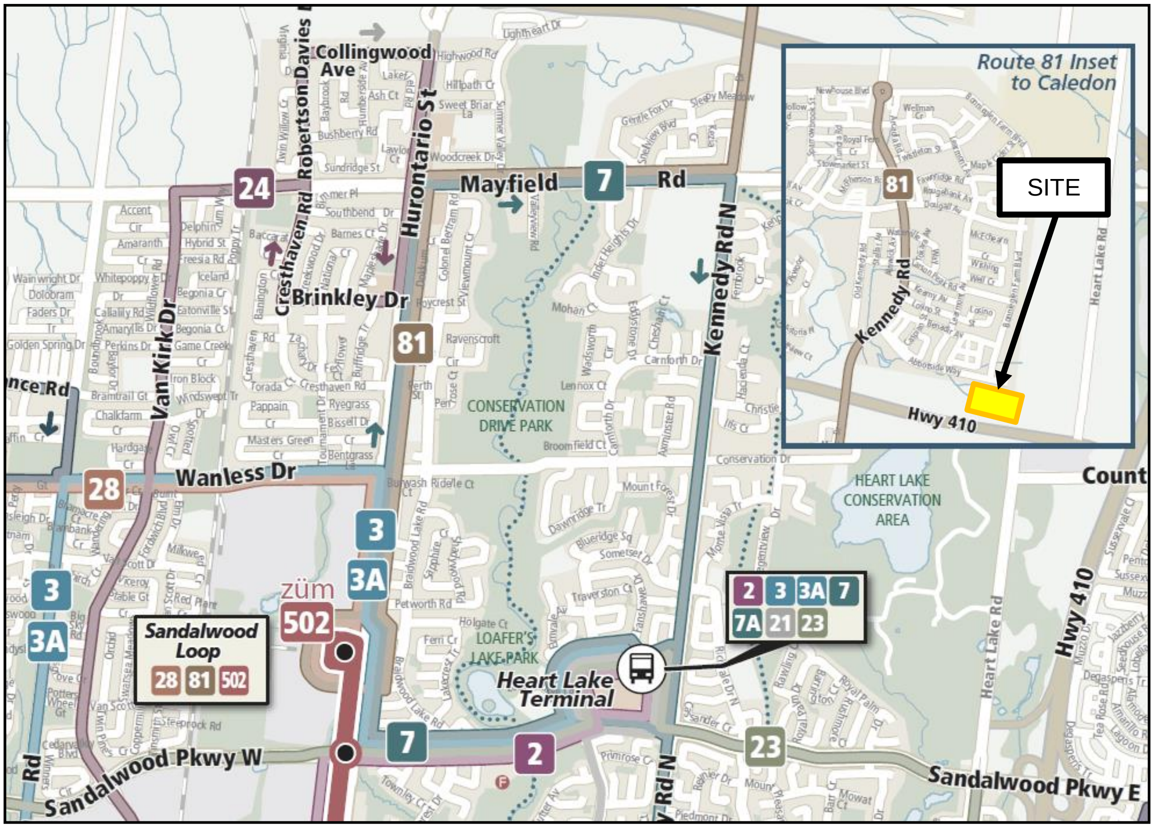


Image Source: Brampton Transit, retrieved October 13, 2021, from https://www.brampton.ca/EN/residents/transit/plan-your-trip/Documents/System_Map_November2020.pdf

The existing transit routes provide sufficient accessibility to the study area and connectivity to the City of Brampton and Peel Region transit network during weekday morning and afternoon peak hours.

Exhibit 2-5: Existing Transit Service Patterns

Route	Transit Route Boundary Connections	Walking Distance to Nearest Stop	Average Peak Hour Frequency
Route 81 – Mayfield West	Roundabout at Kennedy Road and Newhouse Boulevard / Bonnieglen Farm Boulevard (northeast); and Sandalwood Loop (southeast)	800 metres (10 minutes)	45 minutes (Monday to Friday, AM / PM Peak)

Information Source: Brampton Transit, retrieved October 13, 2021, from https://www.brampton.ca/EN/residents/transit/plan-your-trip/Documents/2021_09_FrequencyGuide_September.pdf

2.4 Existing Active Transportation Network

The site area is located within dedicated signed bicycle routes along Abbotside Way and Bonnieglen Farm Boulevard, which provide a suitable cycling route to the north and west connecting to the transit route along Kennedy Road. The site is also located approximately 800m east of the Etobicoke Creek Trail multi-use network, providing a continuous path all the way to Highway 407. The existing active transportation network is shown in **Exhibit 2-6**.

Exhibit 2-6: Existing Active Transportation Plan

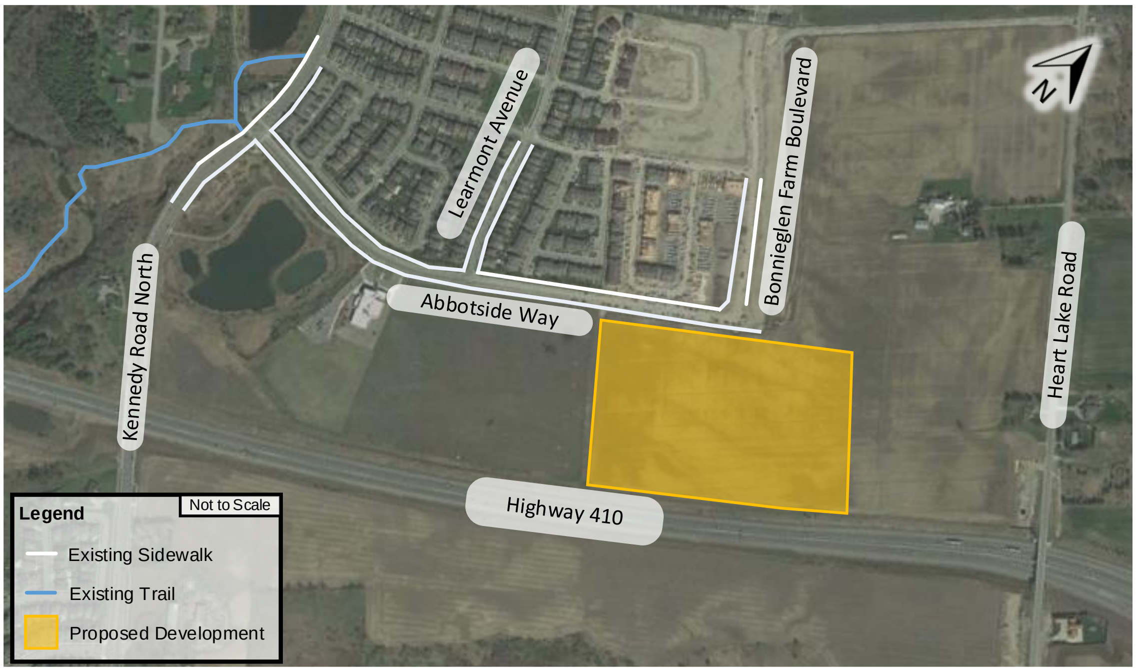


Image Source: Retrieved October 13, 2021, from Mayfield West Traffic Management Plan – Final Report by Entra Consultants, February 2008.

2.5 Turning Movement Counts

The latest turning movement counts (TMCs) for the study area intersections were acquired from the Town, Region and MTO. The TMC surveys were conducted from 7:00 AM to 9:00 AM on a typical weekday (Weekday AM peak period) and from 4:00 PM to 6:00 PM on a typical weekday (Weekday PM peak period) as outlined in **Exhibit 2-7**. A summary of the observed vehicle volumes is presented in **Exhibit 2-8**, heavy vehicles volumes shown in **Exhibit 2-9**, with complete turning movement count data enclosed in **Appendix B.**

Exhibit 2-7: Traffic Data Information

Intersection	TMC Data Source	Date	Peak Hour	
			AM	PM
Kennedy Road North and Abbotside Way (signalized)	Town	Wednesday, April 12, 2017	7:30 – 8:30	17:00 – 18:00
Abbotside Way and Learmont Avenue (unsignalized)	Town	Thursday, September 13, 2018	7:45 – 8:45	16:15 – 18:15
Heart Lake Road and Mayfield Road (signalized)	Region	Tuesday, November 29, 2016	7:30 – 8:30	16:00 – 17:00
Mayfield Road and Highway 410 Southbound Off-Ramp (signalized)	MTO	Thursday, May 26, 2016	7:15 – 8:15	16:15 – 18:15
Mayfield Road and Highway 410 Northbound Off-Ramp (signalized)	MTO	Thursday, May 26, 2016	7:15 – 8:15	16:45 – 17:45

The collected peak hour volumes were adjusted to be representative of the 2021 existing conditions by applying growth rates. The details of the growth rate application are discussed in **Section 5** of the report.

In addition, the review of historical aerial footage using the Google Earth application has shown the adjacent residential block in the northwest corner of Abbotside Way and Bonnieglen Farm Boulevard was constructed after the TMC survey was commissioned. Since traffic data was collected prior to the development completion, calibration to the traffic counts is applied to account for additional traffic generated from that residential block.

The residential block aerial unit count is used for trip generation. Supporting information used for traffic calibration discussed above is enclosed in **Appendix C**. The resulting traffic volumes used for the analysis of 2021 existing conditions are shown in **Exhibit 2-9**.

Exhibit 2-8: Collected Traffic Data – Total TMC

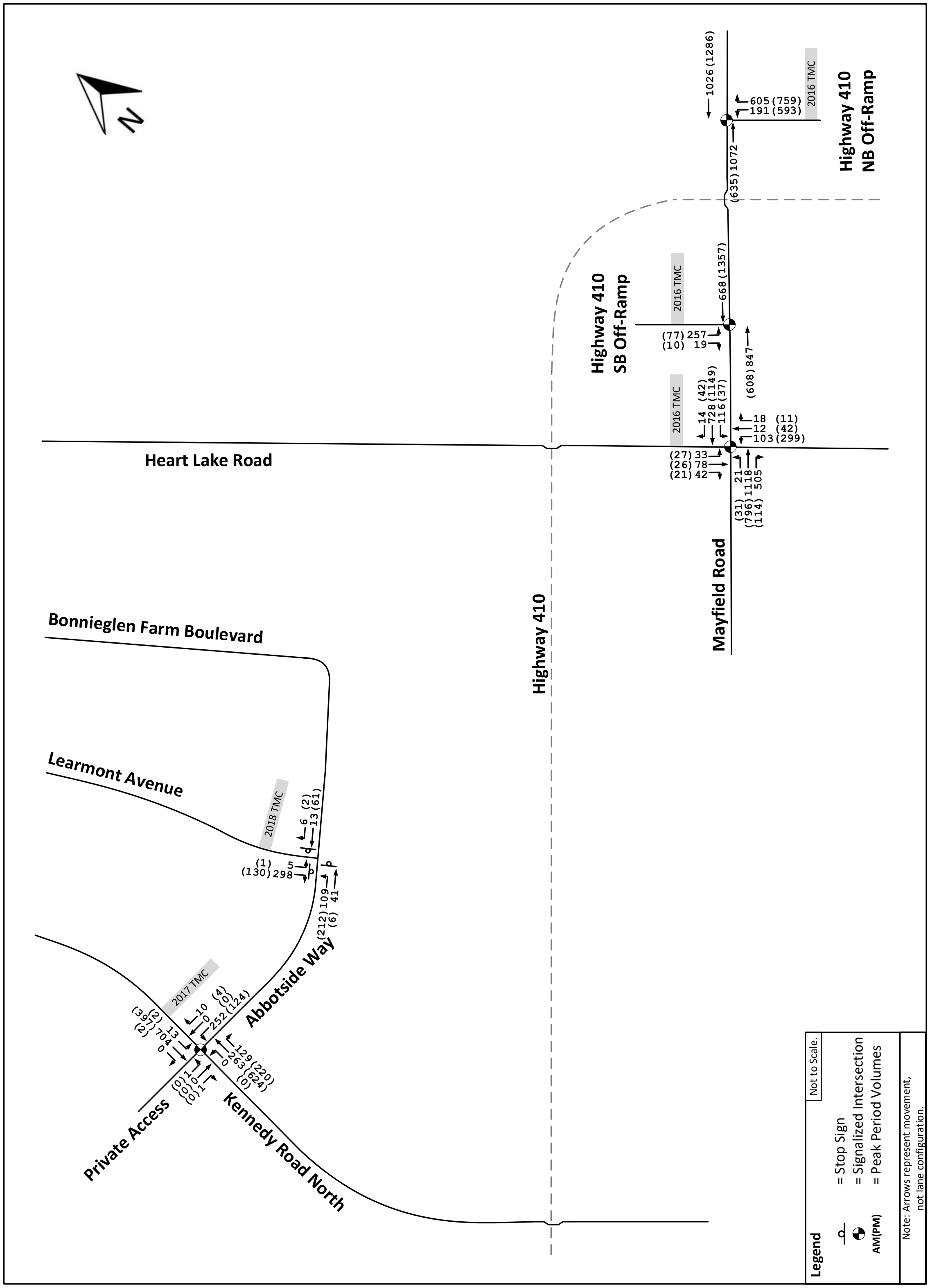


Exhibit 2-9: Collected Traffic Data – Trucks Only

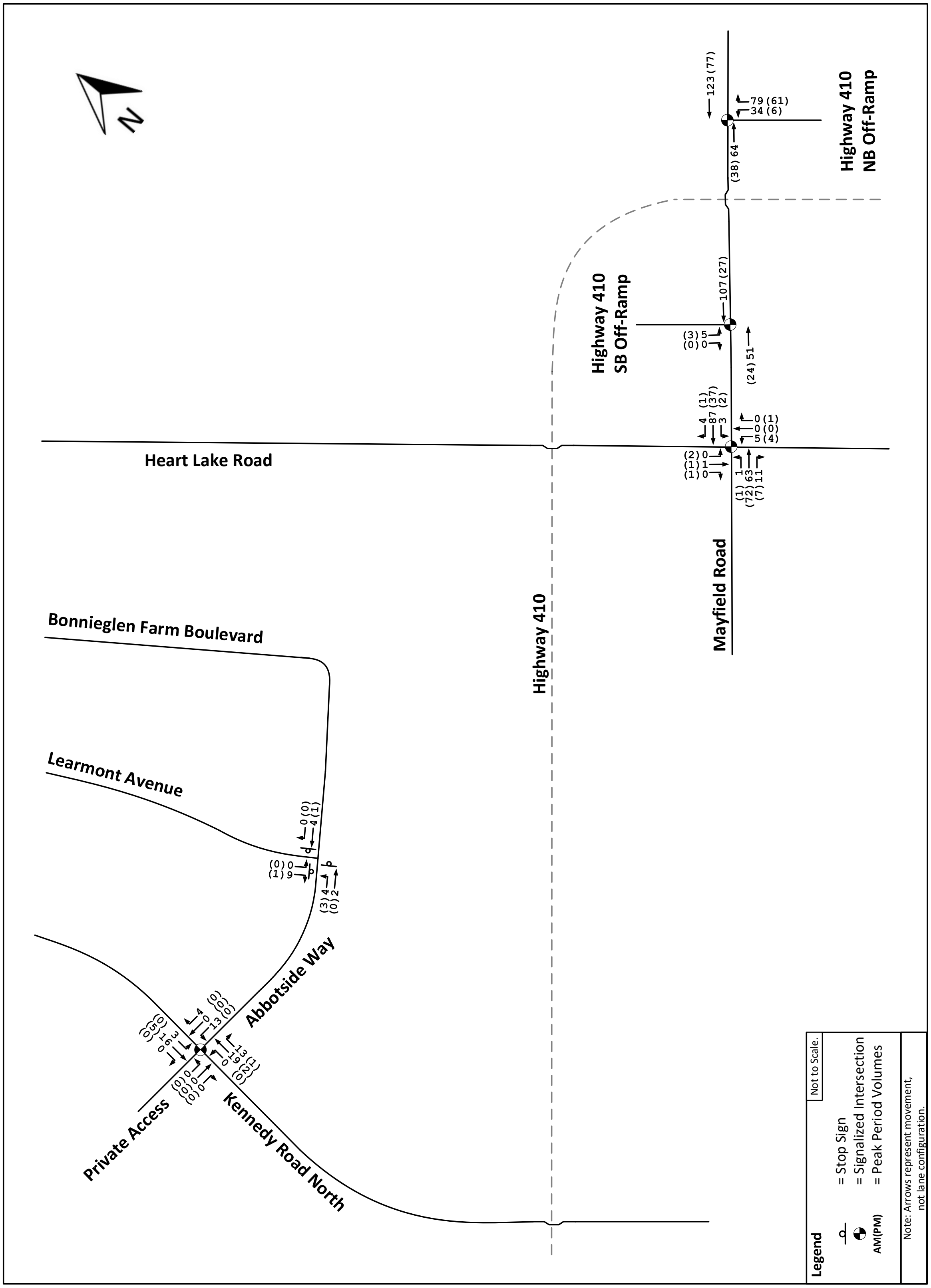
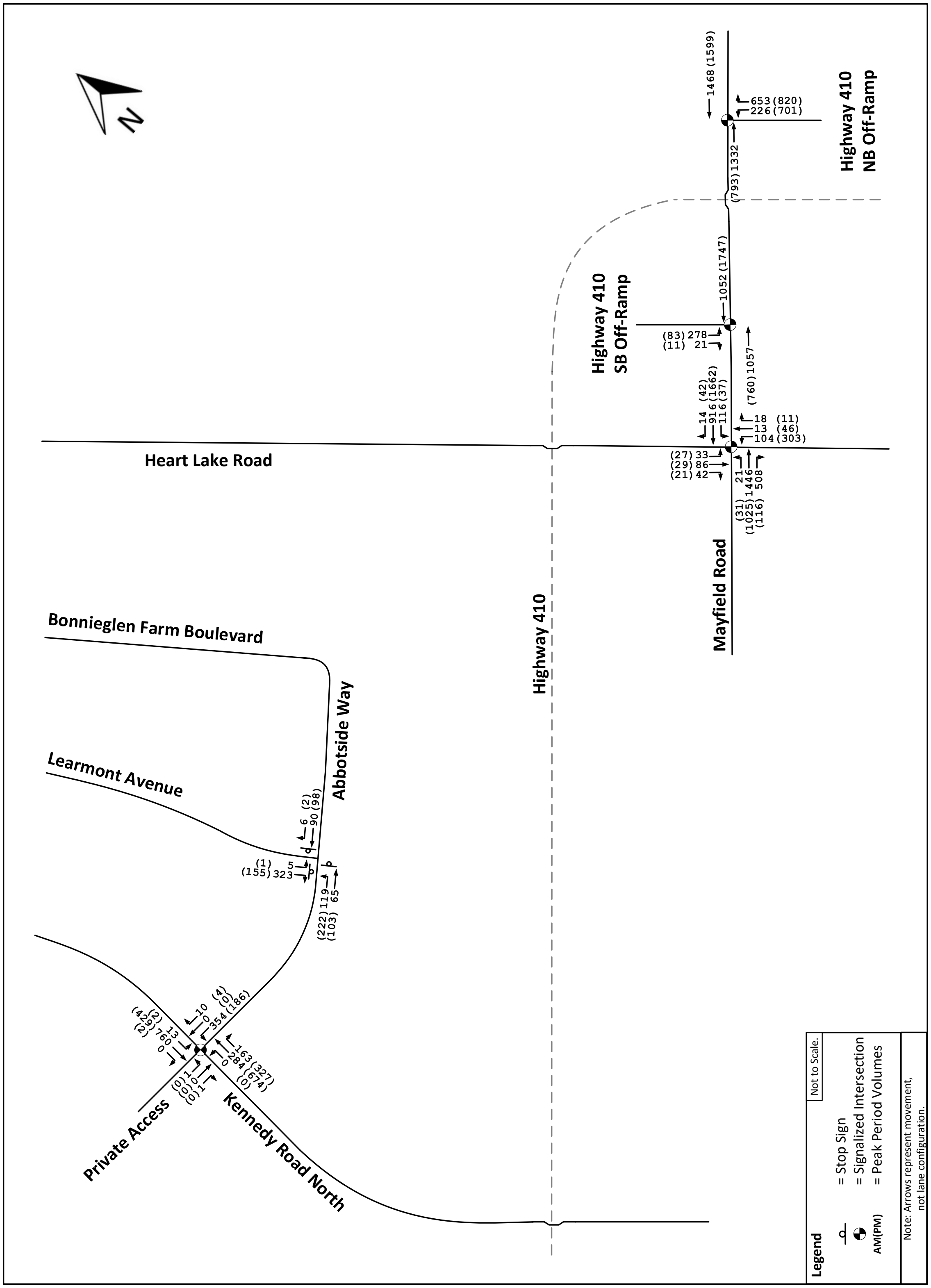


Exhibit 2-10: Calibrated 2021 Existing Conditions Traffic Volumes - Total



2.6 Existing Peak Hour Factors

The peak hour factors (PHF) for the study area intersections for the weekday AM and PM peak hours were calculated based on the existing traffic data and is summarized in **Exhibit 2-11** below.

Exhibit 2-11: Peak Hour Factor (PHF) Calculation Summary

Intersection	Weekday AM Peak Period			Weekday PM Peak Period		
	Peak 15 Minute Volume	Peak Volume	PHF	Peak 15 Minute Volume	Peak Volume	PHF
Heart Lake Road and Mayfield Road (signalized)	752	2789	0.93	682	2597	0.95
Mayfield Road and Highway 410 Southbound Off-Ramp (west ramp)	472	1791	0.95	554	2052	0.93
Mayfield Road and Highway 410 Northbound Off-Ramp (east ramp)	759	2894	0.95	865	3273	0.95
Kennedy Road North and Abbotside Way (signalized)	15-minute survey count information not available.		1.0 (assumed)	15-minute survey count information not available.		1.0 (assumed)
Abbotside Way and Learmont Avenue (unsignalized)	15-minute survey count information not available.		1.0 (assumed)	15-minute survey count information not available.		1.0 (assumed)

2.7 Signal Timing Plans

The Region provided the signal timing plans for the signalized intersections within the study area and is enclosed in **Appendix D**. Intersections operate using a semi-actuated coordinated mode of control during weekday AM and PM Peak Periods with main streets assigned as per road class discussed in **Section 2.2**.

2.8 Traffic Analysis Periods

Based on the proposed development's employment land uses, the following analysis periods were used in this study:

- AM Peak Period – 7:00 AM to 9:00 AM on a typical weekday; and,
- PM Peak Period – 4:00 PM to 6:00 PM on a typical weekday.

2.9 Traffic Analysis Criteria

The criteria for identifying movements that exceed the critical threshold at signalized intersections under the Town's jurisdiction were assessed based on Town's ***Transportation Impact Studies – Terms of Reference and Guidelines, March 2017*** and are as follows:

- Volume to capacity (v/c) ratio exceeds 0.9 or Level of service (LOS) "E" for through movements or shared through/turning movements;
- Volume to capacity (v/c) ratio exceeds 1.0 or Level of service (LOS) "E" for through for exclusive turning movements;
- 95th percentile (maximum) queue lengths for an individual movement exceed available storage.

Furthermore, the following criteria were used to identify unsignalized intersections or individual movements under the Town's jurisdiction that exceed the critical threshold are as follows:

- Level of service (LOS), based on average delay per vehicle, on individual movements exceeds LOS 'E'; and
- 95th percentile (maximum) queue lengths for an individual movement exceed available storage.

The criteria for identifying movements that exceed the critical threshold at signalized intersections under Region of Peel's jurisdiction were assessed based on ***Traffic Impact Study Guidelines,*** retrieved October 2021 from Regions website and are as follows:

- Volume to capacity (v/c) ratio exceeds 0.9 or Level of service (LOS) "E" for through movements or shared through/turning movements;
- Volume to capacity (v/c) ratio exceeds 1.0 or Level of service (LOS) "E" for through for exclusive turning movements;
- 95th percentile (maximum) queue lengths for an individual movement exceed available storage.

The criteria for identifying movements that exceed the critical threshold at signalized intersections under MTO's jurisdiction were assessed based on MTO's ***General Guidelines for the Preparation of Traffic Impact Studies, February 2021*** and are as follows:

- For ramps, the volume to capacity (v/c) ratio exceeds 0.75 for terminal ramp approach turning movements.

3 2021 Existing Conditions Analysis

Using the 2021 Existing Traffic condition volumes shown in **Exhibit 2-9**, the study area intersections were analyzed using the software package Synchro 11, which is based on the ***Highway Capacity Manual*** methodology. Synchro analysis detail reports for the existing conditions scenario is presented in **Appendix E**.

3.1 Signalized Intersections

The results of the 2021 Existing Conditions traffic operations analysis for signalized intersections are presented in **Exhibit 3-1**.

Exhibit 3-1: 2021 Existing Conditions Traffic Operations - Signalized Intersections

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
AM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	B	19	0.58	EBLTR	C	20.2	0.00	-	-
				WBTL	D	49.5	0.90	96.5	-
				WBR	C	20.3	0.01	-	-
				NBLT	A	8.8	0.15	16.3	-
				NBR	A	8.7	0.11	7.7	50
				SBLTR	B	10.9	0.41	46.2	-
Heart Lake Road & Mayfield Road	B	13.3	0.55	EBL	A	8.9	0.07	5.8	160
				EBT	B	12.2	0.50	81.3	-
				EBR	B	11.1	0.34	12.8	220
				WBL	A	9.5	0.53	13.4	150
				WBT	A	6.5	0.29	36.3	-
				WBR	A	5.1	0.01	-	150
				NBL	D	43.2	0.52	36.9	130
				NBT	D	38.6	0.04	8.1	-
				NBR	D	38.3	0.01	0.2	50
				SBL	D	48.1	0.25	17.2	120
				SBT	D	50.4	0.50	35.9	-
				SBR	D	46.2	0.03	3.9	50
Mayfield Road & Highway 410 Southbound Off-Ramp	B	17.8	0.39	EBT	B	18.7	0.63	52.6	-
				WBT	B	19.1	0.66	53.1	-
				SBL	B	10.7	0.18	20.9	-
				SBR	A	9.6	0.01	4.0	-
Highway 410 Northbound Off-Ramp & Mayfield Road	B	17.9	0.67	EBT	B	15.3	0.58	65.7	-
				WBT	B	16.5	0.66	76.0	-
				NBL	C	21.6	0.53	48.8	-
				NBR	C	28.7	0.68	77.5	-

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
PM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	A	10	0.37	EBLTR	-	-	-	-	-
				WBTL	D	39.4	0.68	47.3	-
				WBR	C	28.3	0.00	-	-
				NBLT	A	6.3	0.28	37.1	-
				NBR	A	6.1	0.20	9.5	50
				SBLTR	A	5.8	0.19	23.5	-
Heart Lake Road & Mayfield Road	C	34.5	0.71	EBL	B	11.5	0.23	9.5	160
				EBT	A	8.7	0.34	47.0	-
				EBR	A	7.0	0.08	6.6	220
				WBL	A	4.9	0.11	4.6	150
				WBT	A	7.2	0.48	64.9	-
				WBR	A	4.6	0.03	2.3	150
				NBL	F	287.8	1.49	135.5	130
				NBT	D	38.6	0.15	18.8	-
				NBR	D	37.5	0.01	-	50
				SBL	D	49.9	0.33	14.2	120
				SBT	D	48.5	0.26	15.2	-
				SBR	D	46.6	0.01	-	50
Mayfield Road & Highway 410 Southbound Off-Ramp	B	19.3	0.46	EBT	B	14.4	0.36	36.7	-
				WBT	C	21.6	0.83	103.9	-
				SBL	B	14.1	0.06	8.0	-
				SBR	B	13.8	0.02	3.8	-
Highway 410 Northbound Off-Ramp & Mayfield Road	C	22.9	0.77	EBT	B	12.8	0.34	35.4	-
				WBT	B	16.9	0.69	84.6	-
				NBL	C	30.8	0.85	100.3	-
				NBR	D	41.8	0.87	126.7	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 3-1**, multiple movements at the study area signalized intersections operating above critical thresholds during the Weekday PM peak hour were noted:

- At the intersection of Mayfield Road and Heart Lake Road, which is under Region's jurisdiction:
  - Northbound left-turn movement is operating above capacity (v/c ratio of 1.49) during the Weekday PM peak hour; and,
  - Northbound left-turn movements' 95th percentile queue lengths exceed the available storage lengths during the Weekday PM peak hour.
- At the interchange of Mayfield Road and Highway 410 Northbound Off-Ramp, which is under MTO jurisdiction:
  - The northbound left-turn movement is operating above capacity threshold during the Weekday PM (v/c = 0.85) peak hour; and,
  - The northbound right-turn movement operates above the capacity threshold during the Weekday PM (v/c = 0.87) peak hour.

3.2 Signalized Intersections – Mitigation Measures

In order to alleviate the movements that exceed the critical threshold, the following mitigation measures outlined in **Exhibit 3-2** were applied to improve the intersection operations:

Exhibit 3-2: 2021 Existing Conditions – Improvement Measures Description

Intersection	Peak Period	Improvement
Mayfield Road and Heart Lake Road	PM	• Manually adjusted total split timings by keeping the same cycle length of 135 seconds.
Mayfield Road and Highway 410 Northbound Off-Ramp	PM	• Signal timing total cycle length increased from 80 seconds to 110 seconds and manually adjusted total split timings;

The results of the analysis with the proposed mitigation measures listed above are summarized in **Exhibit 3-3**. The detailed Synchro HCM reports with mitigation measures are enclosed in **Appendix F**.

Exhibit 3-3: 2021 Existing Conditions Traffic Operations – Signalized Intersections with Improvements

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
PM Peak Hour									
Heart Lake Road & Mayfield Road	B	17.4	0.68	EBL	B	19.1	0.30	12.8	160
				EBT	B	13.5	0.39	61.3	-
				EBR	B	10.9	0.08	8.6	220
				WBL	A	8.4	0.13	6.8	150
				WBT	B	12.1	0.55	91.3	-
				WBR	A	7.7	0.03	3.3	150
				NBL	D	53.5	0.86	83.3	130
				NBT	C	30.7	0.10	16.5	-
				NBR	C	29.9	0.01	-	50
				SBL	D	49.8	0.34	14.4	120
				SBT	D	48.3	0.26	15.4	-
				SBR	D	46.5	0.01	-	50
Highway 410 Northbound Off-Ramp & Mayfield Road	C	28.1	0.76	EBT	C	24.1	0.42	57.7	-
				WBT	C	33.6	0.84	137.8	-
				NBL	C	22.9	0.65	104.2	-
				NBR	C	27.5	0.70	125.0	-

The traffic analysis with the proposed mitigation measures indicates that the signalized intersections operate below capacity threshold levels during the weekday AM and PM peak hours.

3.3 Unsignalized Intersections

The results of the 2021 Existing Conditions traffic operations analysis for unsignalized intersections are presented in **Exhibit 3-4**.

Exhibit 3-4: 2021 Existing Conditions Traffic Operations - Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
AM Peak Period							
Abbotside Way & Learmont Avenue	9.1	EBLT	A	8.9	0.23	-	-
		WBTR	A	7.8	0.09	-	-
		SBLR	A	9.5	0.37	-	-
PM Peak Period							
Abbotside Way & Learmont Avenue	9.1	EBLT	A	9.9	0.39	-	-
		WBTR	A	7.4	0.09	-	-
		SBLR	A	8.3	0.19	-	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 3-4**, no capacity or queuing concerns were observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours.

4 Future Background Transportation Context

This section discusses the proposed development horizon years, background traffic growth rates, anticipated future road network improvements, and other development-related traffic in the study area.

4.1 Proposed Study Horizon Years

Upon consultation with the Town, Region, and MTO staff, and as per the TIS guidelines, the opening of the proposed development (Year 2023), 5-year after the opening year (Year 2028), and 10-year after the opening year (Year 2033) were considered as the horizon years.

4.2 Review of Planned Transportation Network Improvements

The investigation was conducted by reviewing Town's and Region's plans for the study area roadways to determine the applicable future transportation network improvements. In addition, due to close proximity to the Town's boundaries, the review of the City of Brampton's plans was included. The following documents were reviewed:

- Mayfield West Traffic Management Plan by Entra Consultants, February 2008;
- Town of Caledon Transportation Master Plan (TMP), October 2017;
- Town of Caledon Official Plan (OP), April 2018;
- Peel Long Range Transportation Plan, Update 2012; and,
- City of Brampton Transportation Master Plan, September 2015.

4.2.1 Heart Lake Road

The Town conducted a Class Environmental Assessment for Heart Lake Road Improvements in October 2006. The EA covered an approximately 1.5-kilometre section of Heart Lake Road going north from Mayfield Road. Based on this study, the Town demonstrated the need for four travel lanes on Heart Lake Road in the year 2021 from Mayfield Road to Old School Road. The graphic extracted from Mayfield West Secondary Plan showing lane configuration is shown in **Exhibit 4-1**.

Exhibit 4-1: Mayfield West Secondary Plan – Heart Lake Lane Configuration

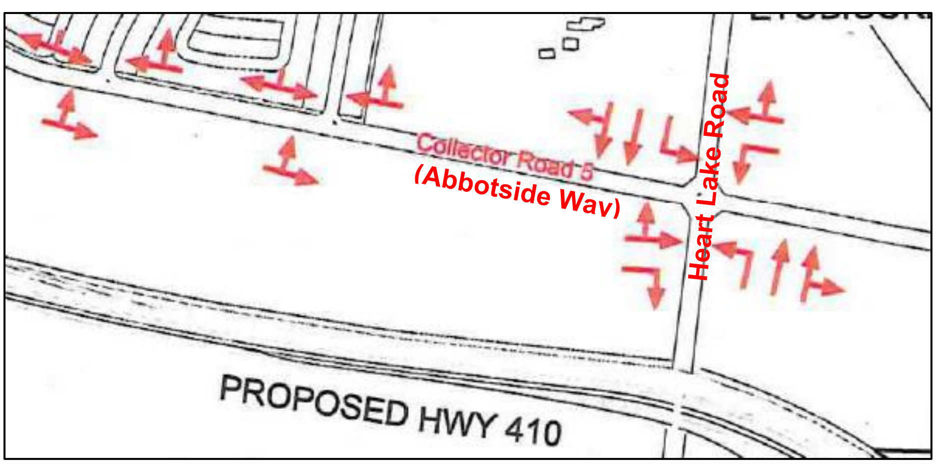


Image Source: Retrieved October 13, 2021, from Mayfield West Traffic Management Plan – Final Report by Entra Consultants, February 2008.

The review of planning documents (the Town's OP and TMP) and capital infrastructure projects does not include the widening of Heart Lake Road north of Mayfield Road.

For the purposes of this study, a two-lane cross-section with auxiliary lanes (Alternative B) was assumed in future horizon years of this traffic analysis. All analysis presented in this report reflects a two-lane mid-block cross-section on Heart Lake Road north of Mayfield Road.

4.2.2 Mayfield Road

The widening of Mayfield Road from 4-lane to 6-lane cross-section between Dixie Road and 300 metres west of Heart Lake Road has been completed. The Region has noted the future widening for Mayfield Road west of our study area while acknowledging that there are no planned improvements within the study area along Mayfield Road.

4.3 Future Background Peak Hour Factors

The PHF used at existing intersections was calculated based on the collected traffic data, as discussed in **Section 2.6**. It is assumed that the peak hour traffic volume variation will be similar to the existing conditions, therefore, calculated existing PHF are carried forward into the future.

4.4 Growth Rates

Study area appropriate traffic growth rates were determined in consultation with the Town, Region, and MTO. The growth rates were applied with respect to the roadways governing jurisdictional body and are summarized in **Exhibit 4-2.** Note that growth rates were not applied to the Abbotside Way, Learmont Avenue, Bonnieglen Farm Boulevard local roadways.

Exhibit 4-2: Traffic Growth Rates

Peak Period	Roadway			
	Kennedy Road	Heart Lake Road	Mayfield Road	Highway 410 Ramp Approaches
2016 to 2021	2%	2%	4%	1.5%
2021 to 2031	2%	2%	2.5%	1.5%
2031 to 2041	2%	2%	2.5%	1.5%

The correspondence with Town, Region, and MTO staff supporting the growth rates used in this study is enclosed in **Appendix G**.

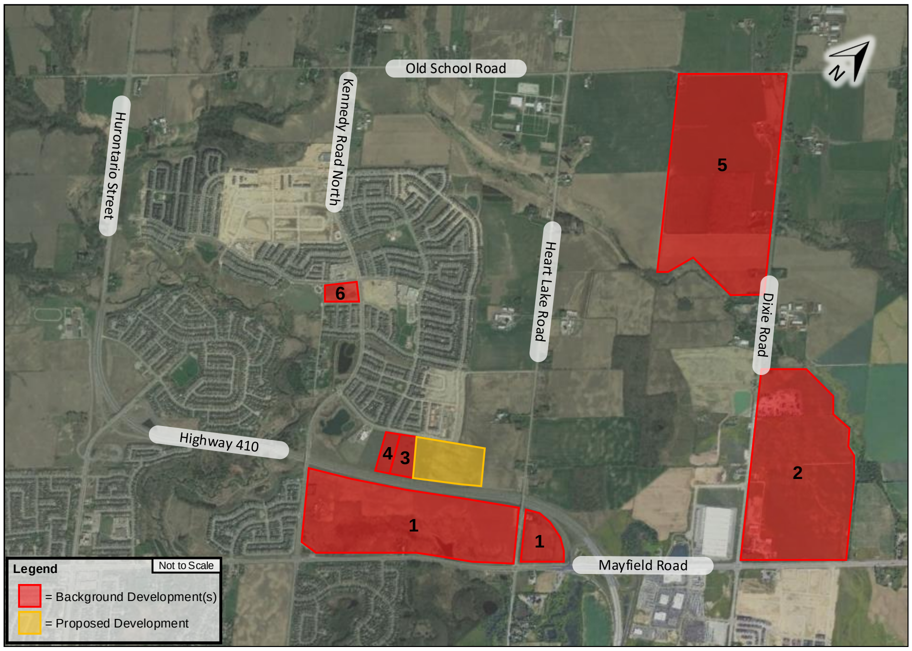
4.5 Background Developments

In response to the requested information in the ToR, the Town provided excerpts from the TIS reports completed for the following background developments in the vicinity of the proposed development.

1. BD1- Kennedy and Mayfield TIS (mixed-use residential/commercial development assumed the build-out year 2023).
2. BD2- 0 & 12305 Dixie Rd (industrial development assumed the build-out year 2028);
3. BD3- 0 Abbotside Way SPA 21-02 (industrial development assumed the build-out year 2028);
4. BD4- 0 Abbotside Way SPA 21-68 (industrial development assumed the build-out year 2028);
5. BD5- 12862 Dixie Rd (industrial development assumed the build-out year 2028); and,
6. BD6- Buttermill Development at Kennedy and Dougall (residential development assumed the build-out year 2028).

These developments are illustrated geographically in **Exhibit 4-3**.

Exhibit 4-3: Background Developments Geographic Location



Base Map Source: Google Maps. Retrieved May 31, 2021, from https://www.google.ca/maps

The TIS excerpts provided by the City are enclosed in **Appendix H**.

The site-generated traffic from each of the background developments was added and presented in **Exhibit 4-4** for 2023 horizon years, **Exhibit 4-5** showing truck traffic for 2028 horizon year, and **Exhibit 4-6** showing cumulative traffic for 2028 horizon year.

Exhibit 4-4: 2023 Background Developments Trip Assignment

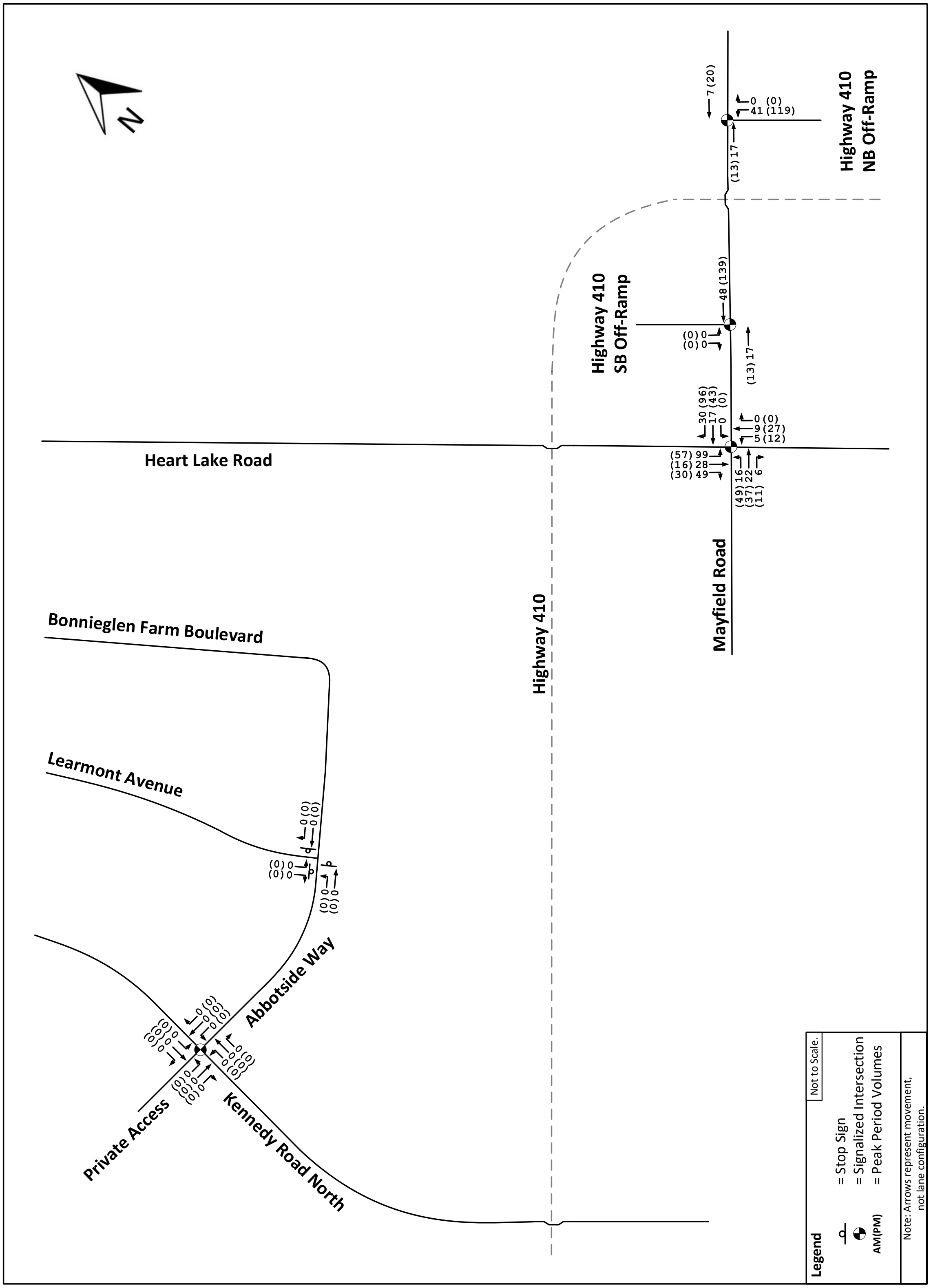


Exhibit 4-5: 2028 Background Developments Trip Assignment – Truck Total

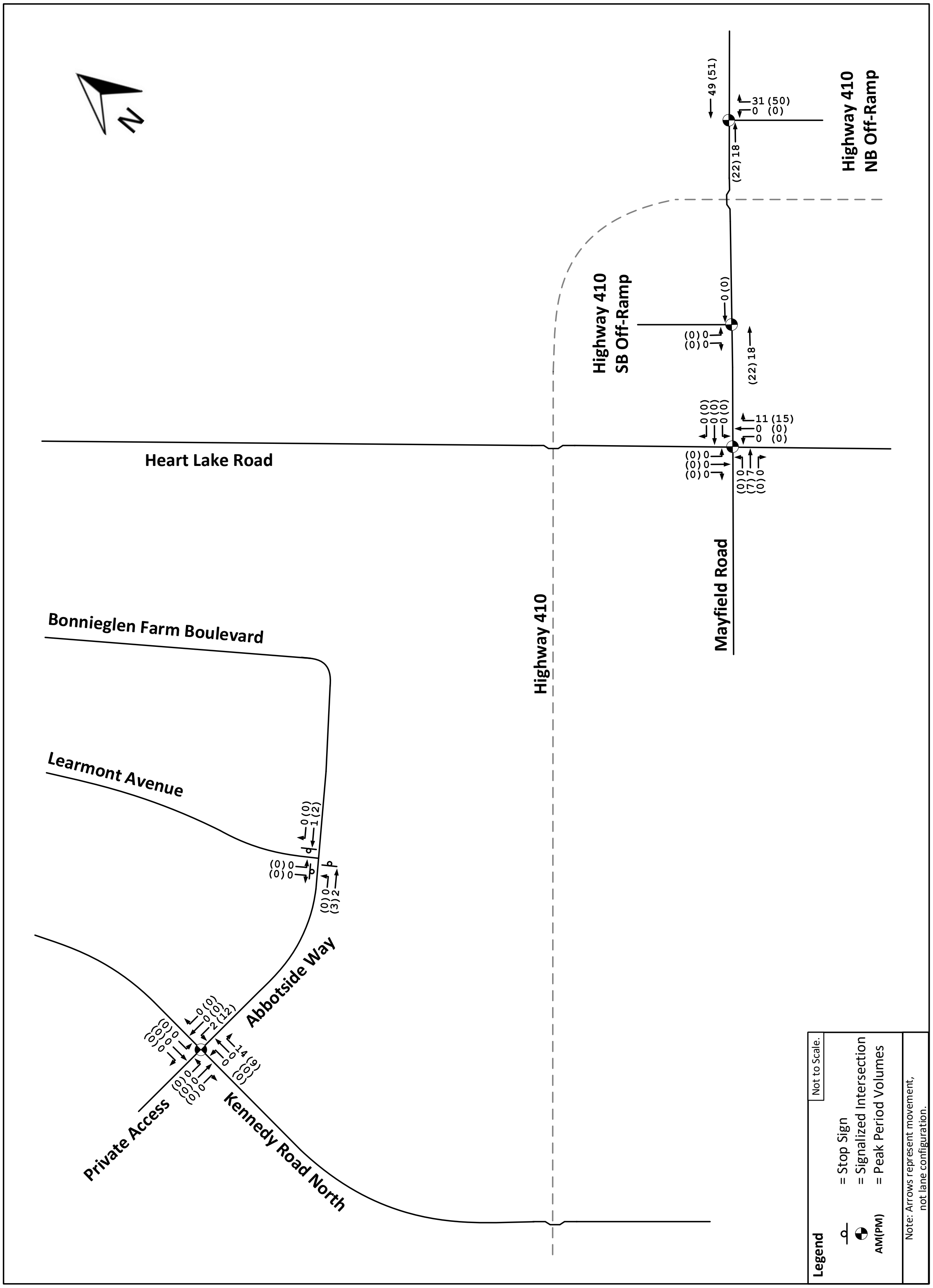
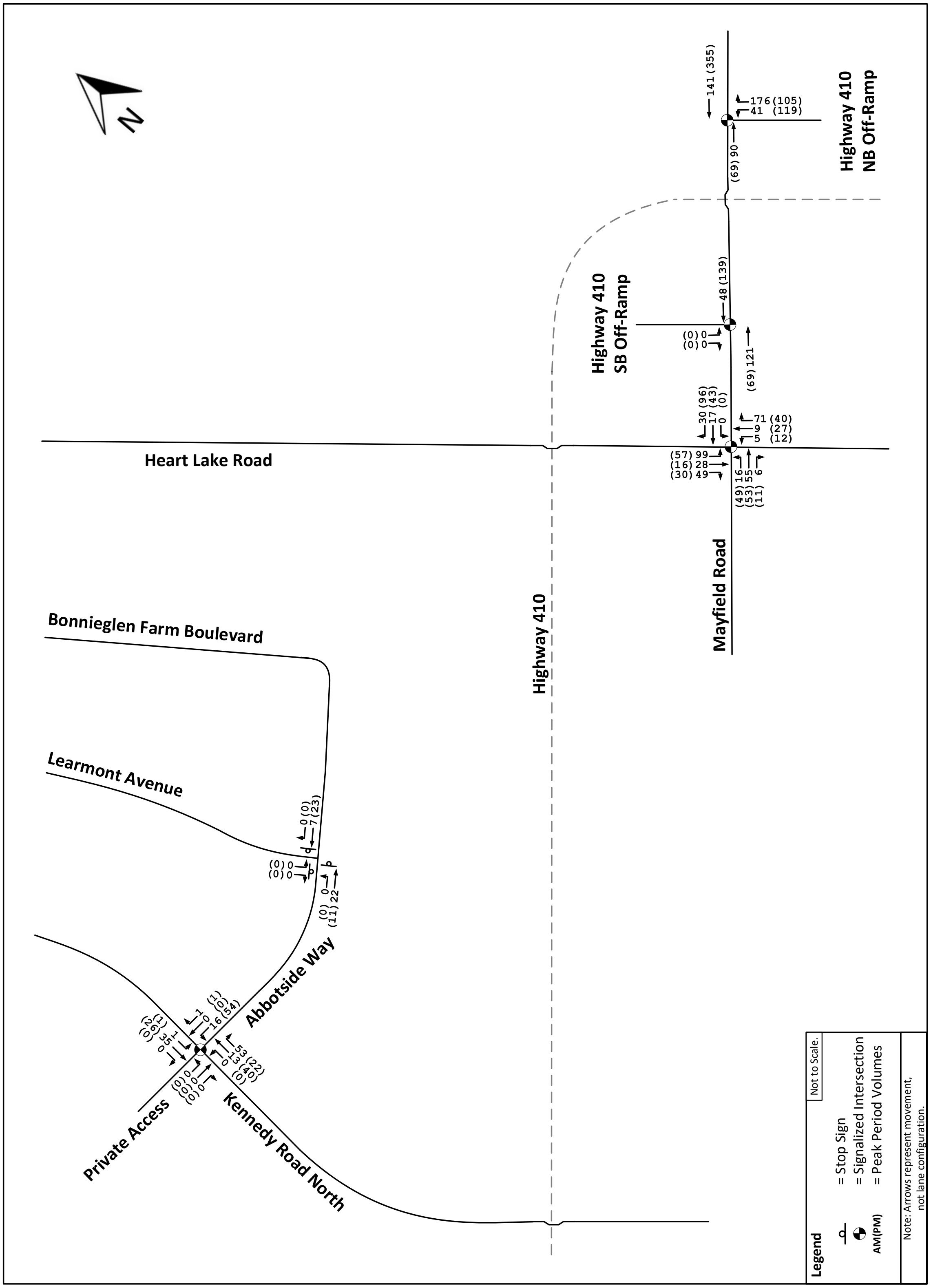


Exhibit 4-6: 2028 Background Developments Trip Assignment – Cumulative Total Traffic



5 2023 Future Background Conditions Analysis

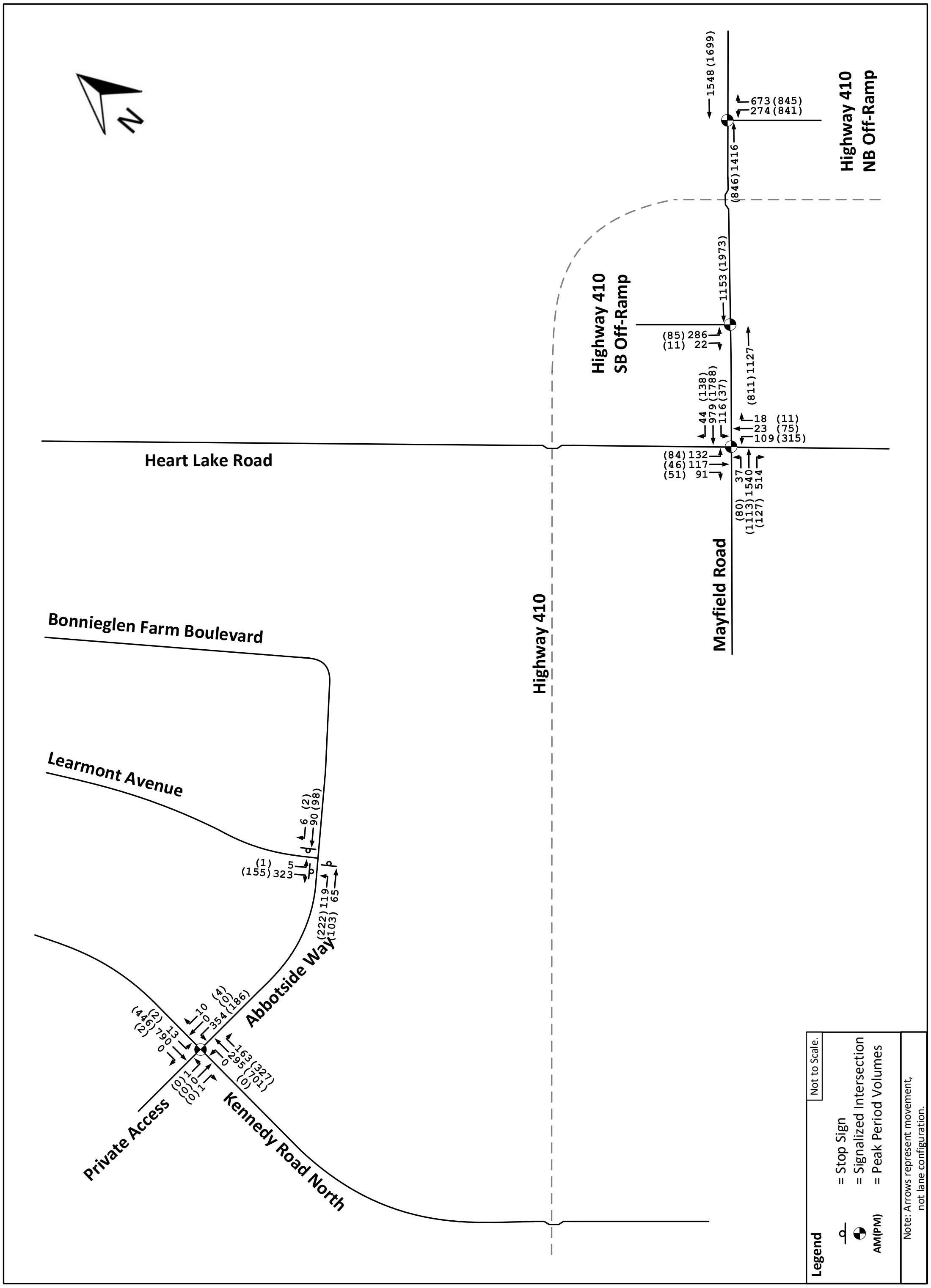
The following section covers the traffic analysis under 2023 Future Background conditions. The 2023 Future Background traffic volumes consist of the following components:

- Traffic generated from planned developments near the subject site; and,
- Traffic growth rate applied to through movements.

The 2023 Future Background conditions traffic volumes are illustrated in **Exhibit 5-1**.

The results of the 2023 Future Background analysis are summarized in the following subsections. Synchro software based on the Highway Capacity Manual methodology was used to assess traffic operation conditions under the 2023 Future Background conditions. The detailed Synchro HCM reports under the 2023 Future Background conditions are presented in **Appendix I**.

Exhibit 5-1: 2023 Future Background Conditions Traffic Volumes



5.1 Signalized Intersections

The results of the traffic operations analysis for signalized intersections under 2023 Future Background Conditions are presented in **Exhibit 5-2**.

Exhibit 5-2: 2023 Future Background Conditions Traffic Operations - Signalized Intersections

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
AM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	B	18.8	0.59	EBLTR	C	20.2	0.00	-	-
				WBTL	D	49.5	0.90	96.5	-
				WBR	C	20.3	0.01	-	-
				NBLT	A	8.8	0.16	16.9	-
				NBR	A	8.7	0.11	7.7	50
				SBLTR	B	11.0	0.43	48.4	-
Heart Lake Road & Mayfield Road	B	17.6	0.64	EBL	B	12.0	0.14	11.3	160
				EBT	B	15.6	0.56	111.5	-
				EBR	B	13.6	0.35	15.3	220
				WBL	B	16.7	0.62	20.1	150
				WBT	A	8.8	0.33	52.1	-
				WBR	A	6.9	0.04	3.9	150
				NBL	D	40.6	0.46	37.6	130
				NBT	D	36.8	0.06	11.7	-
				NBR	D	36.4	0.01	-	50
				SBL	E	58.2	0.69	53.0	120
				SBT	D	48.0	0.46	45.8	-
				SBR	D	44.1	0.06	14.6	50
Mayfield Road & Highway 410 Southbound Off-Ramp	B	17.8	0.41	EBT	B	18.2	0.63	56.5	-
				WBT	B	19.0	0.67	59.2	-
				SBL	B	11.9	0.19	22.4	-
				SBR	B	10.7	0.01	4.2	-
Highway 410 Northbound Off-Ramp & Mayfield Road	B	18.6	0.7	EBT	B	15.6	0.61	71.4	-
				WBT	B	16.9	0.69	82.2	-
				NBL	C	23.1	0.59	55.3	-
				NBR	C	30.7	0.71	89.8	-

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
PM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	A	9.9	0.38	EBLTR	-	-	-	-	-
				WBTL	D	39.4	0.68	47.3	-
				WBR	C	28.3	0.00	-	-
				NBLT	A	6.4	0.29	38.7	-
				NBR	A	6.1	0.20	9.5	50
				SBLTR	A	5.8	0.20	24.4	-
Heart Lake Road & Mayfield Road	C	23	0.99	EBL	F	156.1	1.09	40.1	160
				EBT	B	17.1	0.45	78.9	-
				EBR	B	13.4	0.09	10.2	220
				WBL	B	11.1	0.16	8.2	150
				WBT	B	16.3	0.63	122.7	-
				WBR	B	10.5	0.10	11.8	150
				NBL	D	42.2	0.76	85.6	130
				NBT	C	29.2	0.14	23.7	-
				NBR	C	28.0	0.01	-	50
				SBL	D	53.5	0.60	34.8	120
				SBT	D	45.5	0.22	20.5	-
				SBR	D	44.1	0.03	6.1	50
Mayfield Road & Highway 410 Southbound Off-Ramp	C	24	0.52	EBT	B	14.6	0.39	39.4	-
				WBT	C	28.4	0.93	140.1	-
				SBL	B	14.2	0.07	8.2	-
				SBR	B	13.9	0.02	4.0	-
Highway 410 Northbound Off-Ramp & Mayfield Road	C	30.4	0.83	EBT	C	24.4	0.45	62.0	-
				WBT	D	36.9	0.89	150.6	-
				NBL	C	24.8	0.72	122.9	-
				NBR	C	31.8	0.78	151.7	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 5-2**, the Eastbound left-turn movement at the intersection of Mayfield Road and Heart Lake Road will operate above capacity (v/c ratio of 1.09) during the Weekday PM peak hour.

5.2 Signalized Intersections – Mitigation Measures

Currently. the eastbound left-turn movement is controlled through permitted turn-type. In order to alleviate the traffic impact identified above, the left-turn phasing warrant analysis was conducted using the Left-Turn Phase Justification in Ontario Traffic Manual (OTM) Book 12. The analysis concludes that the left-turn phasing for the eastbound left-turn movement is warranted. The warrant analysis result is included in **Appendix J**. The mitigation measures outlined in **Exhibit 5-3** were applied to improve the intersection operations.

Exhibit 5-3: 2023 Future Background Conditions – Improvement Measures Description

Intersection	Peak Period	Improvement
Mayfield Road and Heart Lake Road	PM	• Eastbound left turn arrow phase is warranted. • Signal timing total cycle length increased from 135 seconds to 140 seconds and manually adjusted total split timings.

The analysis results with the proposed mitigation measures listed above are summarized in **Exhibit 5-4**. The detailed Synchro HCM reports with mitigation measures are enclosed in **Appendix J**.

Exhibit 5-4: 2023 Future Background Traffic Operations – Signalized Intersections with Improvements

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
PM Peak Hour									
Heart Lake Road & Mayfield Road	C	23.1	0.75	EBL	B	18.0	0.54	19.1	160
				EBT	B	14.4	0.42	73.5	-
				EBR	B	11.3	0.09	9.2	220
				WBL	B	10.8	0.15	7.5	150
				WBT	B	19.6	0.66	141.7	-
				WBR	B	12.6	0.11	14.8	150
				NBL	E	67.5	0.91	99.9	130
				NBT	C	33.7	0.16	26.2	-
				NBR	C	32.3	0.01	-	50
				SBL	E	55.7	0.61	36.2	120
				SBT	D	47.0	0.22	21.4	-
				SBR	D	45.6	0.03	6.7	50

The traffic analysis with the identified mitigation measures indicates that the signalized intersection of Heart Lake Road and Mayfield Road will operate below capacity threshold levels during the weekday PM peak hour.

5.3 Unsignalized Intersections

The results of the 2023 Future Background Conditions traffic operations analysis for unsignalized intersections are presented in **Exhibit 5-5**.

Exhibit 5-5: 2023 Future Background Conditions Traffic Operations - Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
AM Peak Period							
Abbotside Way & Learmont Avenue	9.1	EBLT	A	8.9	0.23	-	-
		WBTR	A	7.8	0.09	-	-
		SBLR	A	9.5	0.37	-	-
PM Peak Period							
Abbotside Way & Learmont Avenue	9.1	EBLT	A	9.9	0.39	-	-
		WBTR	A	7.4	0.09	-	-
		SBLR	A	8.3	0.19	-	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 5-5**, no capacity or queuing concerns are observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours.

6 2028 Future Background Conditions Analysis

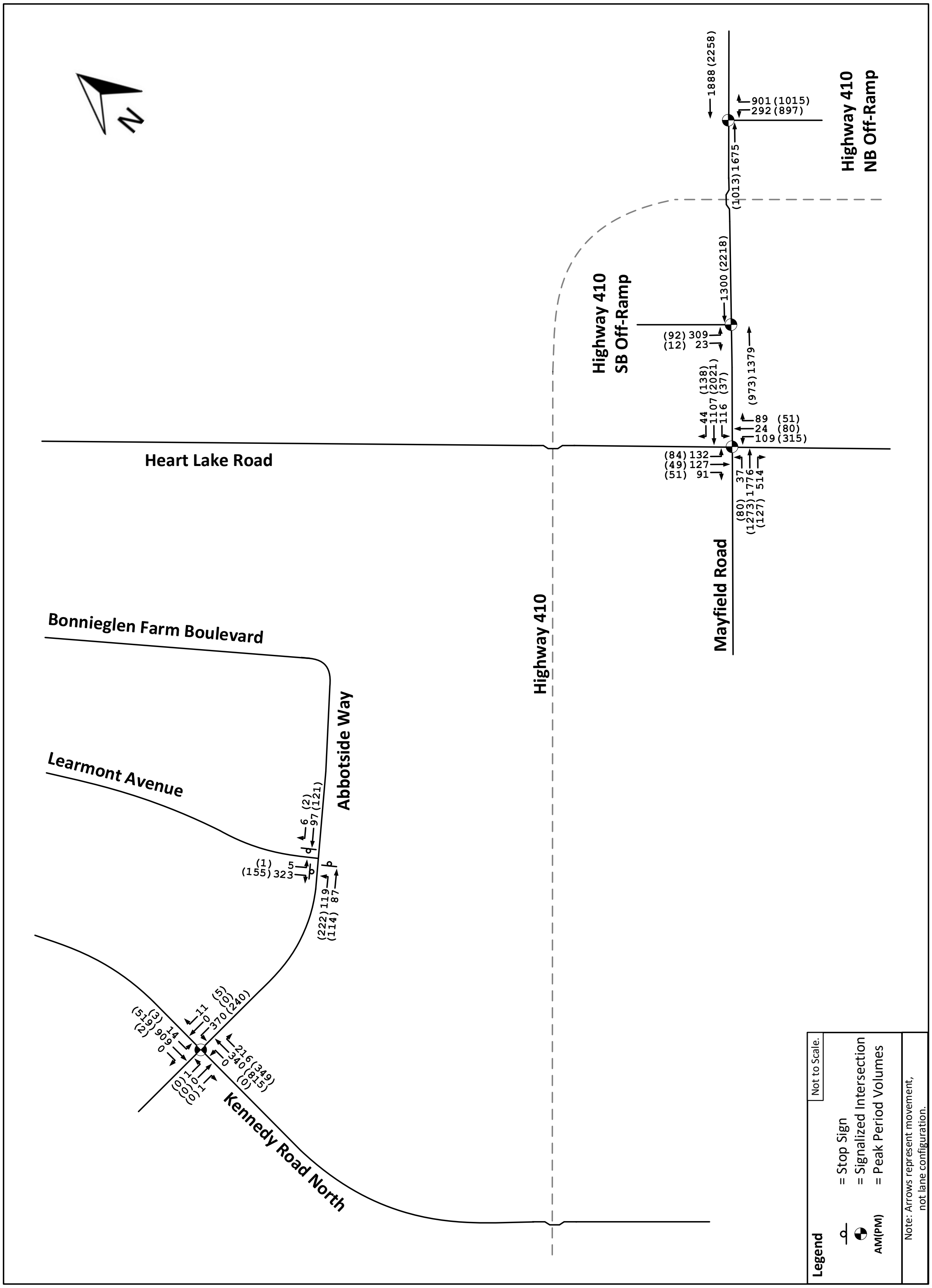
The following section covers the traffic analysis under 2028 Future Background conditions. The 2028 Future Background traffic volumes consist of the following components:

- Traffic generated from planned developments near the subject site; and,
- Traffic growth rate applied to through movements.

The 2028 Future Background conditions traffic volumes are illustrated in **Exhibit 6-1**.

The results of the 2028 Future Background analysis are summarized in the following subsections. Synchro software based on the Highway Capacity Manual methodology was used to assess traffic operation conditions under the 2028 Future Background conditions. The detailed Synchro HCM reports under the 2028 Future Background conditions are presented in **Appendix K**.

Exhibit 6-1: 2028 Future Background Conditions Traffic Volumes



6.1 Signalized Intersections

The results of the 2028 Future Background Conditions traffic operations analysis for signalized intersections are presented in **Exhibit 6-2**.

Exhibit 6-2: 2028 Future Background Conditions Traffic Operations - Signalized Intersections

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
AM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	B	19.7	0.64	EBLTR	C	20.1	0.00	-	-
				WBTL	D	54.7	0.93	102.2	-
				WBR	C	20.2	0.01	-	-
				NBLT	A	9.1	0.18	19.3	-
				NBR	A	9.2	0.15	8.8	50
				SBLTR	B	12.0	0.50	57.6	-
Heart Lake Road & Mayfield Road	B	19	0.75	EBL	B	12.6	0.16	11.7	160
				EBT	B	17.2	0.64	138.0	-
				EBR	B	13.6	0.35	15.3	220
				WBL	D	35.2	0.76	44.7	150
				WBT	A	9.2	0.37	60.4	-
				WBR	A	6.9	0.04	3.9	150
				NBL	D	40.8	0.47	37.6	130
				NBT	D	36.8	0.06	12.2	-
				NBR	D	37.0	0.08	14.1	50
				SBL	E	57.7	0.69	53.0	120
				SBT	D	48.4	0.50	49.0	-
				SBR	D	44.1	0.06	14.6	50
Mayfield Road & Highway 410 Southbound Off-Ramp	B	18.3	0.46	EBT	B	19.0	0.70	73.3	-
				WBT	B	18.7	0.69	68.9	-
				SBL	B	13.8	0.22	24.0	-
				SBR	B	12.4	0.02	5.0	-
Highway 410 Northbound Off-Ramp & Mayfield Road	C	24.5	0.9	EBT	B	17.6	0.72	90.5	-
				WBT	C	21.3	0.85	112.5	-
				NBL	C	26.4	0.89	71.4	-
				NBR	E	60.7	0.98	141.8	-

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
PM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	B	12.3	0.47	EBLTR	-	-	-	-	-
				WBTL	D	44.6	0.79	62.3	-
				WBR	C	26.4	0.00	-	-
				NBLT	A	8.0	0.36	46.8	-
				NBR	A	7.4	0.22	9.9	50
				SBLTR	A	7.2	0.24	28.9	-
Heart Lake Road & Mayfield Road	C	24.1	0.81	EBL	C	20.8	0.55	19.7	160
				EBT	B	15.1	0.47	86.7	-
				EBR	B	11.4	0.09	9.2	220
				WBL	B	11.2	0.18	7.6	150
				WBT	C	21.8	0.75	172.4	-
				WBR	B	12.7	0.12	16.5	150
				NBL	E	67.5	0.91	99.2	130
				NBT	C	33.8	0.17	27.6	-
				NBR	C	32.6	0.04	9.7	50
				SBL	E	55.7	0.61	36.2	120
				SBT	D	47.2	0.24	22.6	-
				SBR	D	45.5	0.03	6.7	50
Mayfield Road & Highway 410 Southbound Off-Ramp	D	42.2	0.58	EBT	B	15.3	0.47	48.3	-
				WBT	E	55.4	1.05	170.1	-
				SBL	B	14.3	0.07	8.8	-
				SBR	B	13.9	0.02	4.3	-
Highway 410 Northbound Off-Ramp & Mayfield Road	E	74.6	1.06	EBT	C	25.8	0.54	76.4	-
				WBT	F	128.6	1.20	256.2	-
				NBL	C	29.5	0.84	155.0	-
				NBR	D	52.0	0.95	220.8	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 6-2**, multiple movements at the study area signalized intersections observed to operate above critical thresholds during the Weekday AM and PM peak hours were noted:

- At the intersection of Mayfield Road & Highway 410 Southbound Off-Ramp, which is under the MTO's jurisdiction:
  - Southbound through movement will operate above capacity (v/c ratio of 1.05) during the Weekday PM peak hour.
- At the interchange of Mayfield Road and Highway 410 Northbound Off-Ramp, which is under the MTO's jurisdiction:

- The overall intersection will operate above capacity threshold during the Weekday PM (v/c = 1.06) peak hour;
- The northbound right-turn movement will operate above capacity threshold during the Weekday AM (v/c = 0.98) peak hour and Weekday PM (v/c = 0.95) peak hour; and,
- The westbound through movement will operate above capacity threshold during the Weekday PM (v/c = 1.20) peak hour.

6.2 Signalized Intersections – Mitigation Measures

In order to alleviate the traffic impact identified above, the following mitigation measures outlined in **Exhibit 6-3** were applied to improve the intersection operations:

Exhibit 6-3: 2028 Future Background Conditions – Improvement Measures Description

Intersection	Peak Period	Improvement
Mayfield Road & Highway 410 Southbound Off-Ramp	PM	• Signal timing total cycle length increased from 77 seconds to 100 seconds and manually adjusted total split timings.
Highway 410 Northbound Off-Ramp & Mayfield Road	AM	• Signal timing total cycle length increased from 80 seconds to 115 seconds and manually adjusted total split timings.
	PM	• Signal timing total cycle length increased from 110 seconds to 140 seconds and manually adjusted total split timings.

The analysis results with the proposed mitigation measures listed above are summarized in **Exhibit 6-4**. The detailed Synchro HCM reports with mitigation measures are enclosed in **Appendix L**.

Exhibit 6-4: 2028 Future Background Traffic Operations – Signalized Intersections with Improvements

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
AM Peak Hour									
Highway 410 Northbound Off-Ramp & Mayfield Road	C	34.1	0.84	EBT	C	31.1	0.81	143.9	-
				WBT	D	41.8	0.95	190.8	-
				NBL	C	22.9	0.55	80.1	-
				NBR	C	32.0	0.74	139.2	-
PM Peak Hour									
Mayfield Road & Highway 410 Southbound Off-Ramp	B	17.2	0.56	EBT	B	11.8	0.36	46.3	-
				WBT	B	19.2	0.82	148.3	-
				SBL	C	24.5	0.09	12.8	-
				SBR	C	23.8	0.02	5.7	-

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
Highway 410 Northbound Off-Ramp & Mayfield Road	F	91.9	1.02	EBT	D	35.1	0.57	99.6	-
				WBT	F	169.0	1.27	330.2	-
				NBL	C	27.0	0.75	170.2	-
				NBR	D	39.0	0.86	245.0	-

Note: Red font represents movements operating above critical thresholds.

The analysis with the signal timing improvement measures indicates that the signalized intersections will operate below capacity threshold levels during the weekday AM and PM peak hours at Highway 410 ramp approach lanes, with the exception of westbound through movement at Highway 410 Northbound Off-Ramp & Mayfield Road intersection during PM peak hour. Since this intersection is a highway interchange, the critical thresholds at ramp approach lanes are assessed according to the MTO's TIS guidelines. While the Mayfield east-west movements are assessed with respect to critical thresholds as outlined in the Region's TIS guidelines.

The MTO and Region should monitor the traffic operations of the Highway 410 Northbound Off-Ramp & Mayfield Road intersection in 2028 background conditions and determine the appropriate intersection improvement strategy if required.

6.3 Unsignalized Intersections

The results of the 2028 Future Background Conditions traffic operations analysis for unsignalized intersections are presented in **Exhibit 6-5**.

Exhibit 6-5: 2028 Future Background Conditions Traffic Operations - Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
AM Peak Period							
Abbotside Way & Learmont Avenue	9.1	EBLT	A	8.9	0.23	-	-
		WBTR	A	7.8	0.09	-	-
		SBLR	A	9.5	0.37	-	-
PM Peak Period							
Abbotside Way & Learmont Avenue	9.1	EBLT	A	9.9	0.39	-	-
		WBTR	A	7.4	0.09	-	-
		SBLR	A	8.3	0.19	-	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 6-5**, no capacity or queuing concerns were observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours.

7 2033 Future Background Conditions Analysis

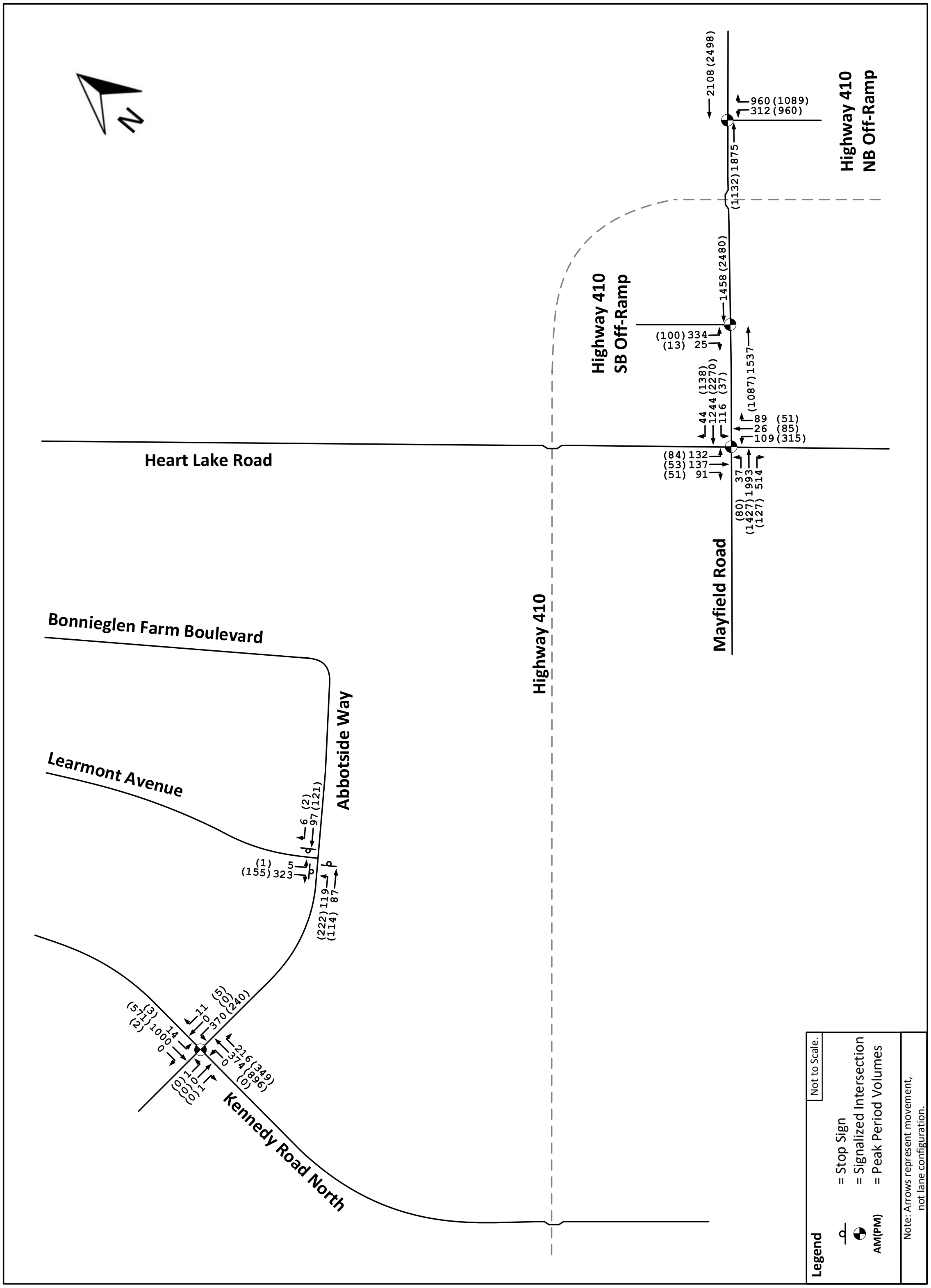
The following section covers the traffic analysis under 2033 Future Background conditions. The 2033 Future Background traffic volumes consist of the following components:

- Traffic generated from planned developments near the subject site; and,
- Traffic growth rate applied to through movements.

The 2033 Future Background conditions traffic volumes are illustrated in **Exhibit 7-1**.

The results of the 2033 Future Background analysis are summarized in the following subsections. Synchro software based on the Highway Capacity Manual methodology was used to assess traffic operation conditions under the 2033 Future Background conditions. The detailed Synchro HCM reports under the 2033 Future Background conditions are presented in **Appendix M**.

Exhibit 7-1: 2033 Future Background Conditions Traffic Volumes



7.1 Signalized Intersections

The results of the 2033 Future Background Conditions traffic operations analysis for signalized intersections are presented in **Exhibit 7-2**.

Exhibit 7-2: 2033 Future Background Conditions Traffic Operations - Signalized Intersections

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
AM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	B	19.5	0.68	EBLTR	C	20.1	0.00	-	-
				WBTL	D	54.7	0.93	102.2	-
				WBR	C	20.2	0.01	-	-
				NBLT	A	9.2	0.20	21.1	-
				NBR	A	9.2	0.15	8.8	50
				SBLTR	B	12.6	0.55	65.4	-
Heart Lake Road & Mayfield Road	C	20.1	0.8	EBL	B	13.3	0.19	12.2	160
				EBT	B	19.0	0.72	166.2	-
				EBR	B	13.6	0.35	15.3	220
				WBL	D	54.5	0.83	51.2	150
				WBT	A	9.6	0.41	69.8	-
				WBR	A	6.9	0.03	3.9	150
				NBL	D	41.0	0.49	37.6	130
				NBT	D	36.9	0.07	12.7	-
				NBR	D	37.1	0.09	14.7	50
				SBL	E	58.2	0.69	53.0	120
				SBT	D	49.3	0.53	52.5	-
				SBR	D	44.6	0.12	18.4	50
Mayfield Road & Highway 410 Southbound Off-Ramp	B	17	0.49	EBT	B	17.4	0.70	80.0	-
				WBT	B	17.2	0.69	75.5	-
				SBL	B	14.9	0.25	25.8	-
				SBR	B	13.3	0.03	5.4	-
Highway 410 Northbound Off-Ramp & Mayfield Road	D	50.4	0.91	EBT	C	29.6	0.83	158.8	-
				WBT	D	43.1	0.97	214.3	-
				NBL	C	26.9	0.63	93.1	-
				NBR	D	42.7	0.85	176.8	-

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
PM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	B	12.2	0.5	EBLTR	-	-	-	-	-
				WBTL	D	44.6	0.79	62.3	-
				WBR	C	26.4	0.00	-	-
				NBLT	A	8.3	0.39	52.6	-
				NBR	A	7.4	0.22	9.9	50
				SBLTR	A	7.4	0.27	32.1	-
Heart Lake Road & Mayfield Road	C	25.5	0.87	EBL	C	23.2	0.53	19.1	160
				EBT	B	15.8	0.53	99.9	-
				EBR	B	11.2	0.09	9.2	220
				WBL	B	11.6	0.21	7.4	150
				WBT	C	24.8	0.84	208.3	-
				WBR	B	12.3	0.09	9.9	150
				NBL	E	69.9	0.92	101.7	130
				NBT	C	34.0	0.18	29.0	-
				NBR	C	32.7	0.04	9.7	50
				SBL	D	54.7	0.59	36.0	120
				SBT	D	47.4	0.26	24.1	-
				SBR	D	45.6	0.03	6.7	50
Mayfield Road & Highway 410 Southbound Off-Ramp	E	72.6	0.65	EBT	B	15.9	0.53	55.4	-
				WBT	F	100.1	1.16	200.6	-
				SBL	B	14.3	0.08	9.3	-
				SBR	B	13.9	0.02	4.7	-
Highway 410 Northbound Off-Ramp & Mayfield Road	F	152.5	1.11	EBT	D	42.4	0.71	122.2	-
				WBT	F	305.3	1.57	402.4	-
				NBL	C	23.5	0.75	173.1	-
				NBR	C	34.9	0.86	251.0	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 7-2**, multiple movements at the study area signalized intersections will operate above critical thresholds during the Weekday PM peak hour were noted:

- At the interchange of Mayfield Road and Highway 410 Southbound Off-Ramp, which is under the MTO jurisdiction:
  - The westbound through movement will operate above the capacity threshold during the Weekday PM (v/c = 1.16) peak hour.

- At the interchange of Mayfield Road and Highway 410 Northbound Off-Ramp, which is under the MTO jurisdiction:
  - The westbound through movement will operate above capacity threshold during the Weekday PM (v/c = 1.57) peak hour.

7.2 Signalized Intersections – Mitigation Measures

In order to alleviate the movements that exceed the critical threshold, the following mitigation measures outlined in **Exhibit 3-2** were applied to improve the intersection operations:

Exhibit 7-3: 2033 Future Background Conditions – Improvement Measures Description

Intersection	Peak Period	Improvement
Mayfield Road and Highway 410 Southbound Off-Ramp	PM	• Manual adjustment of total splits while maintaining the intersection cycle length of 100 seconds.
Mayfield Road and Highway 410 Northbound Off-Ramp	PM	• Manual adjustment of total splits while maintaining the intersection cycle length of 140 seconds.

The analysis results with the proposed mitigation measures listed above are summarized in **Exhibit 7-4**. The detailed Synchro HCM reports with mitigation measures are enclosed in **Appendix N**.

Exhibit 7-4: 2033 Future Background Traffic Operations – Signalized Intersections with Improvements

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
PM Peak Hour									
Mayfield Road & Highway 410 Southbound Off-Ramp	B	17.7	0.61	EBT	B	11.0	0.39	50.1	-
				WBT	C	20.3	0.87	172.5	-
				SBL	C	24.8	0.10	13.8	-
				SBR	C	24.1	0.03	6.3	-

Note: Red font represents movements operating above critical thresholds.

The analysis with the signal timing improvement measures indicates that the signalized intersections will operate below capacity threshold levels during the weekday AM and PM peak hours at Highway 410 ramp approach lanes, with the exception of westbound through movement at Highway 410 Northbound Off-Ramp & Mayfield Road intersection during PM peak hour. Since this intersection is a highway interchange, the critical thresholds at ramp approach lanes are assessed according to the MTO's TIS guidelines. While the Mayfield east-west movements are assessed with respect to critical thresholds as outlined in the Region's TIS guidelines.

The MTO and Region should monitor the traffic operations of the Highway 410 Northbound Off-Ramp & Mayfield Road intersection in 2033 background conditions and determine the appropriate intersection improvement strategy if required.

7.3 Unsignalized Intersections

The results of the 2033 Future Background traffic operations analysis for unsignalized intersections are presented in **Exhibit 7-5**.

Exhibit 7-5: 2033 Future Background Conditions Traffic Operations - Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
AM Peak Period							
Abbotside Way & Learmont Avenue	9.1	EBLT	A	8.9	0.23	-	-
		WBTR	A	7.8	0.09	-	-
		SBLR	A	9.5	0.37	-	-
PM Peak Period							
Abbotside Way & Learmont Avenue	9.1	EBLT	A	9.9	0.39	-	-
		WBTR	A	7.4	0.09	-	-
		SBLR	A	8.3	0.19	-	-

Note: Red font represents movements operating above critical thresholds.

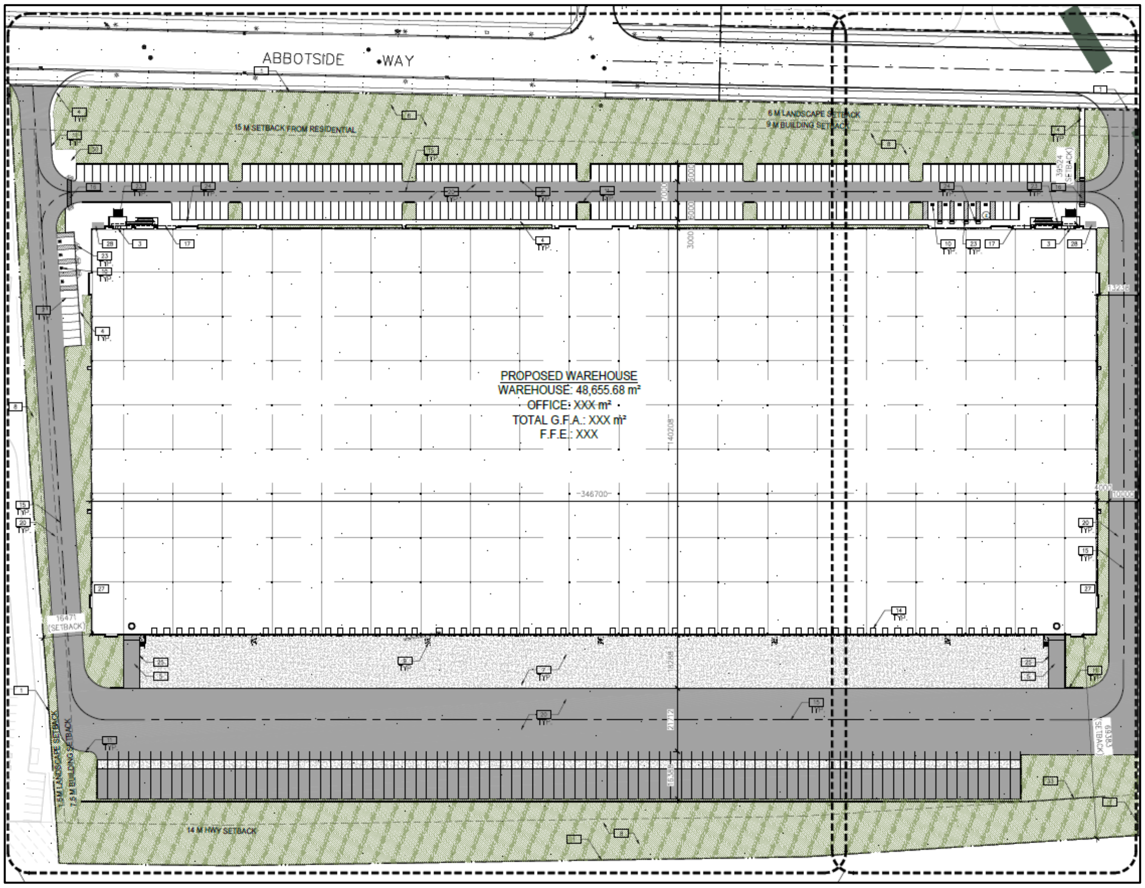
As shown in **Exhibit 7-5**, no capacity or queuing concerns were observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours.

8 Proposed Development

The proponent is proposing to construct an industrial warehouse building (the 'proposed development') with a total footprint of 48,655.68 m^2 (523,725.38 ft^2) that will consist of one level warehouse building and an accessory office. Accessory office footprint will cover less than 15% of the total gross floor area (GFA). The warehouse will have 67 dock-high doors and two grade-level doors for loading access. In addition, a total of 220 employee parking stalls, where 211 regular spaces and nine accessible spaces and 87 stalls to accommodate 53' trailers, are provided within Building 1 boundaries. Site plan review, which includes parking and curb radii requirements, is further discussed in **Section 14** of the report. Direct vehicular access will be provided to Abbotside Way road via two full move accesses.

The proposed site plan is illustrated in **Exhibit 8-1**. It must be noted that small changes in building sizes may occur as this development moves through the approval process. However, the assumptions in this report are conservative, and differences in traffic operations from these changes are expected to be negligible. Complete concept design drawing package for development that shows site statistics used in this study is enclosed in **Appendix O**.

Exhibit 8-1: Proposed Development Site



8.1 Future Site Accesses

As discussed in Section 8, direct vehicular accesses will be provided to Abbotside Way road via two full move accesses.

8.2 Trip Generation

The gross trips expected to be generated by the proposed development are examined in this section. The net trips generated are then assigned and distributed to the study area road network.

8.2.1 Gross Trip Generation

The trip generation rates from the ***Trip Generation Manual, 10th Edition*** (Institute of Transportation Engineers, September 2017) were used to estimate future automobile trips associated with the proposed development. Based on the nature of the development, location context, and the data quality, Land Use Code 150 fitted curve equation for vehicle trips was used. The estimated net new inbound and outbound vehicular trips (auto and truck trips) for the proposed development are presented in **Exhibit 8-2.**

Exhibit 8-2: Proposed Development Trip Generation

12304 Heart Lake Road					
LUC 150 Warehouse –– 523,725.38 (1,000 sq.ft. GFA) – Auto Trips					
Term	**Unit**	**Weekday AM Peak Hour**		**Weekday PM Peak Hour**	
Trip Generation Equation	vehicle trips / 1,000 sq.ft. GFA	T = 0.12(X) + 25.32		T = 0.12(X) + 27.82	
Trip Generation Rate	vehicle trips / 1,000 sq.ft. GFA	0.170		0.173	
Total Trips	vehicles / hour	**88**		**91**	
New Inbound Trips	vehicles / hour	67	77%	25	27%
New Outbound Trips	vehicles / hour	21	23%	66	73%
LUC 150 Warehouse –– 523.234 (1,000 sq.ft. GFA) – Trucks					
Term	**Unit**	**Weekday AM Peak Hour**		**Weekday PM Peak Hour**	
Trip Generation Rate	vehicle trips / 1,000 sq.ft. GFA	0.02		0.03	
Total Trips	vehicles / hour	**10**		**16**	
New Inbound Trips	vehicles / hour	5	52%	8	52%
New Outbound Trips	vehicles / hour	5	48%	8	48%
Development Total (Auto and Truck) Trips					
Term	**Unit**	**Weekday AM Peak Hour**		**Weekday PM Peak Hour**	
Total New Trips	vehicles / hour	**98**		**107**	
New Inbound Trips	vehicles / hour	72		33	
New Outbound Trips	vehicles / hour	26		74	

The proposed development is expected to generate 98 two-way (72 inbound and 26 outbound) trips during the weekday AM peak hour, and 107 two-way (33 inbound and 74 outbound) trips during the weekday PM peak hour. Of the total trips, ten trips in the AM peak hour and 16 trips in the PM peak hours are truck trips.

8.2.2 Trip Reductions

The 2016 Transportation Tomorrow Survey (2016 TTS) data review has shown that the employment lands use automobile mode for commuting to and from work. The existing area transit network provides connectivity between Mayfield West Community and the City of Brampton.

For the purposes of this study, providing a more conservative estimate, no trip reductions were considered for proposed development trip generation due to a lack of quantitative data.

8.2.3 Trip Distribution and Assignment

The trip distribution for site trips was determined using the 2016 TTS data. The trip distribution used is presented in **Exhibit** 8-3. The detailed 2016 TTS data analysis is presented in **Appendix P**.

Exhibit 8-3: Development Site Trip Distribution

To / From		AM Peak Hour		PM Peak Hour	
		Inbound Trips	Outbound Trips	Inbound Trips	Outbound Trips
North	Kennedy Road	1.0%	6.0%	1.0%	6.0%
	Heart Lake Road	1.0%	6.0%	1.0%	6.0%
South	Kennedy Road	3.0%	3.0%	3.0%	3.0%
	Heart Lake Road	3.0%	3.0%	3.0%	3.0%
	Highway 410	5.0%	5.0%	5.0%	5.0%
West	Kennedy Road	7.0%	3.0%	7.0%	3.0%
	Mayfield	7.0%	3.0%	7.0%	3.0%
	Highway 410	10.0%	6.0%	10.0%	6.0%
East	Mayfield	23.0%	25.0%	23.0%	25.0%
	Highway 410	40.0%	40.0%	40%	40.0%
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**

The site-generated trips were assigned to study area roadways-based trip distributions presented in Exhibit 8-3. As requested by Town, Region, and MTO staff, automobile site trips are presented in **Exhibit 8-4**, and truck site trips are presented in **Exhibit 8-5**.

Exhibit 8-4: New Site Traffic Volumes – Automobiles Only

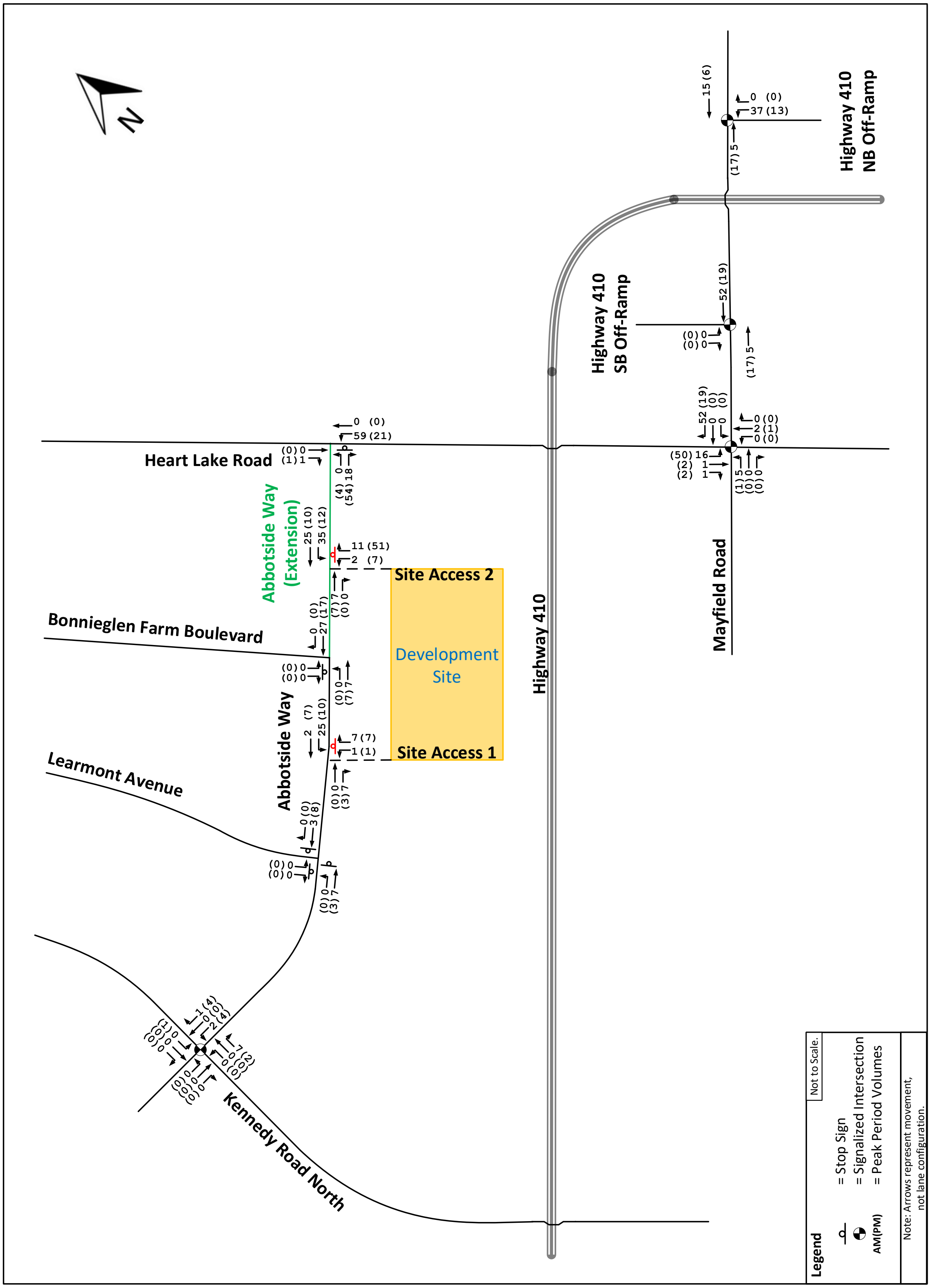
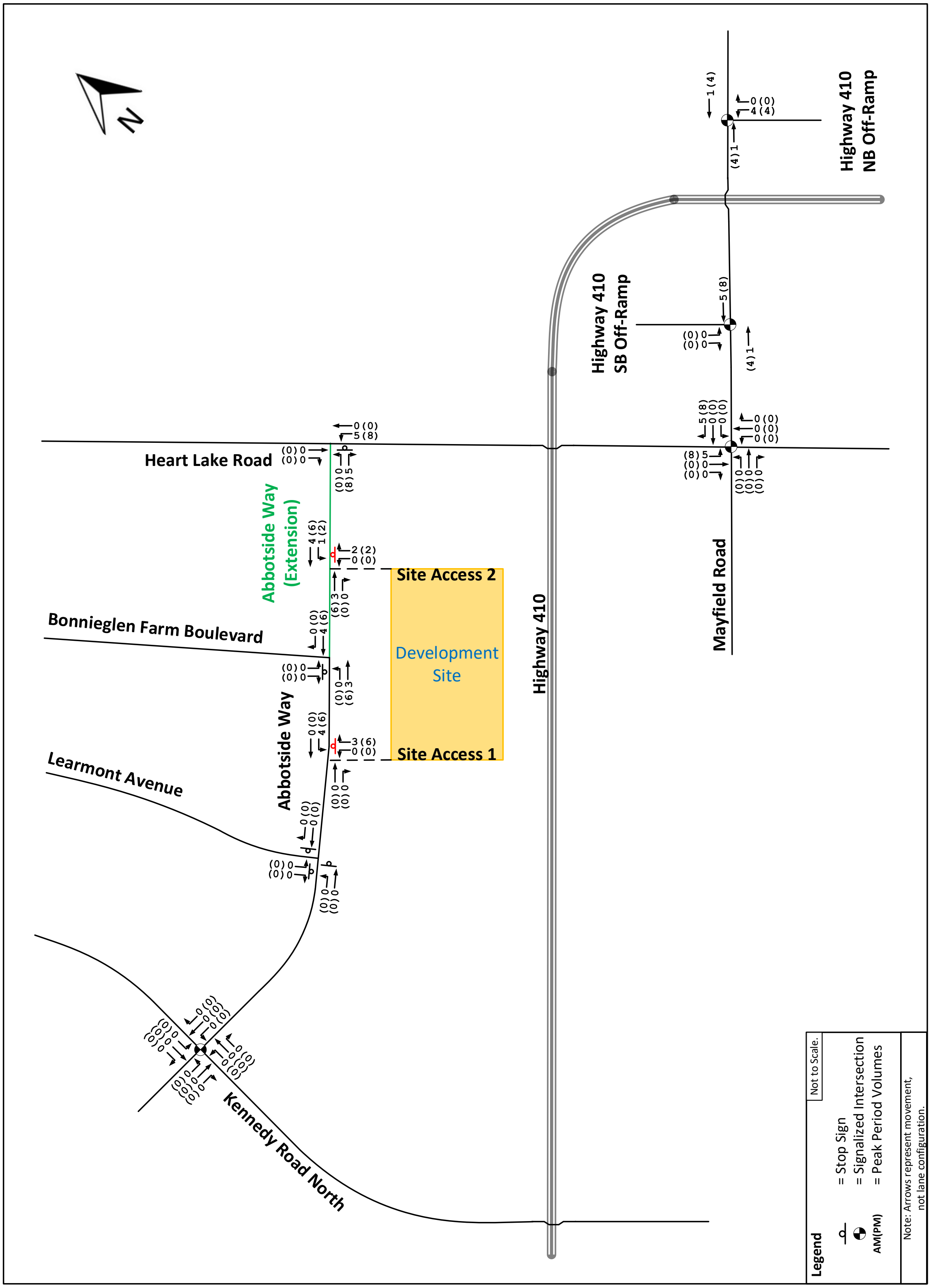


Exhibit 8-5: New Site Traffic Volumes – Trucks Only



9 Future Total Transportation Context

9.1 Abbotside Way Extension

In conversation with the Town's staff and per the DART (pre-consultation) meeting comments, Abbotside Way is to be constructed in conjunction with the adjacent employment lands to match the existing cross-section at its current terminus at Bonnieglen Farm Boulevard. The timing of the Abbotside Way east of heart lake Road is uncertain at the time of preparation of this report, as it is within the GTA West Corridor study area.

Therefore, for the purposes of this study, only the connection of the west leg of Abbotside Way to Heart Lake Road in the future traffic analysis is considered.

9.1.1 Extension Curb Radii

Under Schedule 'B' of the Town's OP, the development site is envisioned to be primarily zoned as 'Prestige Industrial', as illustrated in **Exhibit 9-1**.

Exhibit 9-1: Mayfield West Land Use Plan

Source: https://www.caledon.ca/en/town-services/resources/Documents/business-planning-development/Official_Plan_Schedule_B.pdf

Furthermore, Table 4.4 of the Town's 2017 TMP report, as illustrated in **Exhibit 9-2**, indicates that prestige industrial land uses are typically served by industrial collector roads, which generally comprise of 2 to 4 lanes, with 26-metre right-of-way width, and are intended for local deliveries.

Exhibit 9-2: Town of Caledon Road Characterization Matrix

Street Type	Land Use Designation	Through Lanes	Right of Way [m]	Desired Operating Speed [km/h]	Transit Role	Area for Pedestrians and Other Facilities[1]	Bicycle Facilities	Drainage Conditions	Freight Role
Rural Road	Prime Agricultural Area, Rural Lands	2 to 4	26 m	40 to 80 km/h	Very Limited and Site Specific	Shoulder	Shoulder	Rural Swale	Agricultural Material Transport and Local Deliveries Only
Rural Main Street	Rural Service Centre	2 to 4	20 to 26 m	40 to 60 km/h	Limited to Designated Stops or Stations	Village Specific - 1.5 m Minimum Sidewalk + Furnishing/Planting Zone + Splash Strip + Utility Zone	Behind the Curb where Design Speeds Exceed 50 km/h Otherwise On-Street	Curb and Gutter	Local Deliveries
Urban Main Street	Village or Hamlet	2 to 4	20 to 26 m	40 to 60 km/h	Major	Desired 1.5 m Minimum Sidewalk + Furnishing/Planting Zone + Splash Strip + Utility Zone	Behind the Curb	Curb and Gutter	Local Deliveries
Industrial Collector	General, Dry, Prestige Industrial	2 to 4	26 m	40 to 60 km/h	Moderate to Major	Location Specific - Desired 1.5 m Minimum Sidewalk + Planting Zone + Splash Strip + Utility Zone	Recommend the Use of Professional Judgement in High Volume Traffic Areas Where Access Points to Adjacent Uses or Intersections are <300m Apart	Curb and Gutter or Rural Swale Depending on Adjacent Uses	Local Deliveries

Source: *https://www.caledon.ca/en/government/resources/Documents/council-town-administration/Caledon-Transportation-Master-Plan.pdf*

From a review of the site plan, and given the above characteristics, the proposed Abbotside Way extension (between Heart Lake Road and Bonnieglen Farm Boulevard) may be described as an industrial collector.

It should also be noted that, based on *Schedule J* and *Schedule K* of the *Town's OP*, Heart Lake Road may be described as a collector road having a designated right-of-way width of 26 metres.

Based on the above, *Table 1.2* of the *Town's Development Standards Manual* (2019) indicates that the minimum intersection curve radii for instances where roads connect to industrial collector roads is 15.0 metres, as illustrated in **Exhibit 9-3**.

Exhibit 9-3: Town of Caledon Geometric Road Design Standards

	ADT	Posted Speed (km/h)	Hor. Curve Rad. (m)	Vert. Curve (Min. k) Sag	Vert. Curve (Min. k) Crest	Road Grade Max. (%)	Road Grade Min. (%)	Grade at Intersections Stop	Grade at Intersections Through	R.O.W Width (m)	Pav't Width (m)	Inter-section Angle	Cul-de-sac Radius Pav (m)	Cul-de-sac Max Grade
Local Residential	<1000	50	90	12	8	6.0%	0.75%	2.0%	3.0%	18	7.9	85->95	15	3.0%
Local Industrial	<1000	50	115	18	15	4.0%	0.75%	2.0%	3.0%	22.5	10.4	85->95	20	3.0%
Residential Collector	1000 to 3000	60	130	18	15	6.0%	0.75%	2.0%	3.0%	20	8.9	85->95	N/A	N/A
Industrial Collector	1000 to 3000	70	190	25	25	6.0%	0.75%	2.0%	3.0%	26	13.9	85->95	N/A	N/A
Arterial	> 6000	80	250	30	35	6.0%	0.75%	2.0%	3.0%	30	7.0-15.0	85->95	N/A	N/A

1. Climb Lane	Add where grade is more than 4%
2. Widen R.O.W.	Through Intersection as Required
3. Hor. Curve Radii	Given at Centerline
4. Max. Cul-de-sac	150m Without Emergency Access
5. Dual Carriageway	Where 2nd. Access Not Available
6. Min. Fire Route	6.1m for One Way Traffic 9.0m for Two Way Traffic
7. Min. Lane Width	3.8m for Through of Right Turn 3.25m for Left Turn 2.5m for Curb Side Parking
8. Min. Sight Distance	30.0m for industrial driveway setback
9. Corner Lot Rad.	5.0m Min. Property Radius
10. Cul de Sac	Min. 0.75% Grade at Gutter
11. Driveway Grade	2.0% Min. 6.0% Max. 4.0% Preferred
12. Vertical Curves	When there are grade changes in excess of 1.5%
13. Minimum Intersection Curve Radii (measured at Edge of Pavement)	
• Arterial to Residential Collector	12.0m
• Arterial to Industrial Collector	15.0m
• Industrial Collector to Residential Collector	15.0m
• Industrial Collector to Local Industrial	15.0m
• Local Industrial to Local Industrial	15.0m
• Residential Collector to Local Residential	10.0m
• Local Residential to Local Residential	10.0m
• Residential Road to Laneway	10.0m

Source: https://www.caledon.ca/en/town-services/resources/Documents/business-planning-development/Development-Standards-Manual.pdf

On the site plan, the curb radii for the proposed intersection of Abbotside Way Extension and Heart Lake Road is 15.0 metres, which meets the Town's standard.

9.1.2 Extension Lane Width

According to *Table 1.2* of the *Town's Development Standards Manual* (2019), the minimum lane width is 3.8 metres for through or right-turn lanes.

The pavement width of the Abbotside Way extension is approximately 14.0 metres. The Cross-section is planned to be maintained and extended to Heart Lake Road. As a result, the proposed lane width of the Abbotside Way extension is expected to meet the appropriate Town guidelines. Standard cross-section for the Abbotside Way extension is presented in **Exhibit 9-4**.

Exhibit 9-4: Traffic Diversion – Abbotside Way Extension

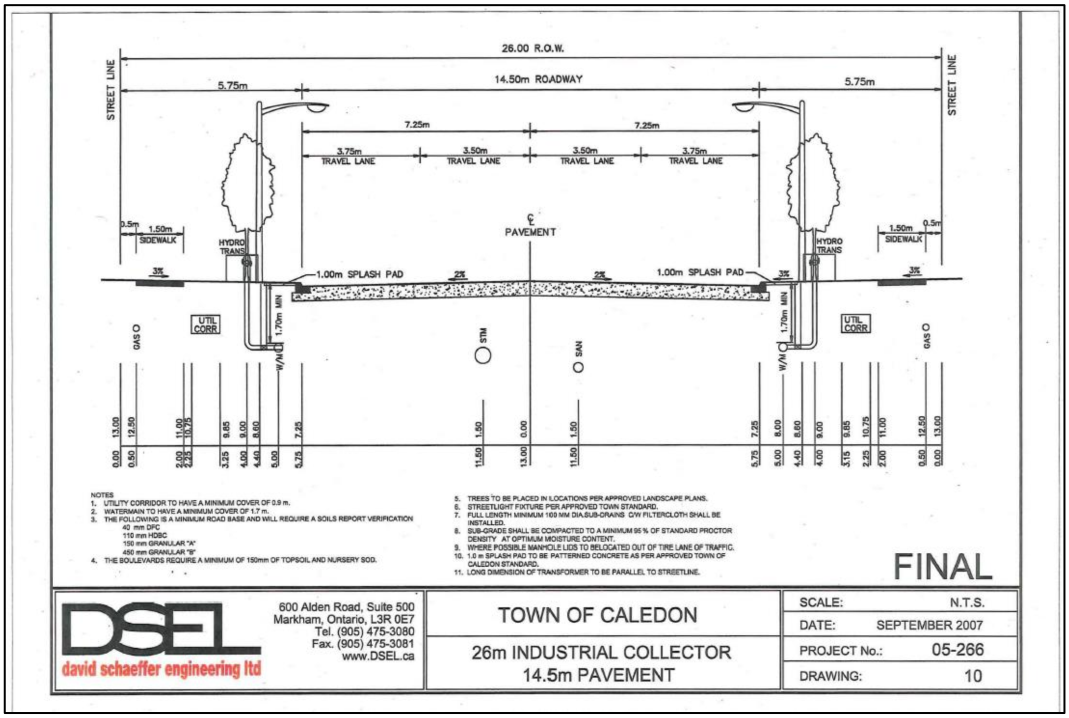


Image Source: Retrieved October 13, 2021, from Mayfield West Traffic Management Plan – Final Report by Entra Consultants, February 2008.

9.1.3 Clear Throat Length

Clear throat length refers to the distance from the end of the access curb return radii at the roadway and the first point of conflict on site. The provision of sufficient clear throat length is intended to reduce the likelihood of inbound traffic queuing onto the main roadway in the event of a traffic conflict at the first internal intersection through which inbound traffic passes.

Table 8.9.3 from the *TAC Guide* indicates that a minimum clear throat length of 15.0 metres is recommended for light industrial developments of at least 45,000 m^2 in size on collector roads.

9.2 Local Traffic Diversion

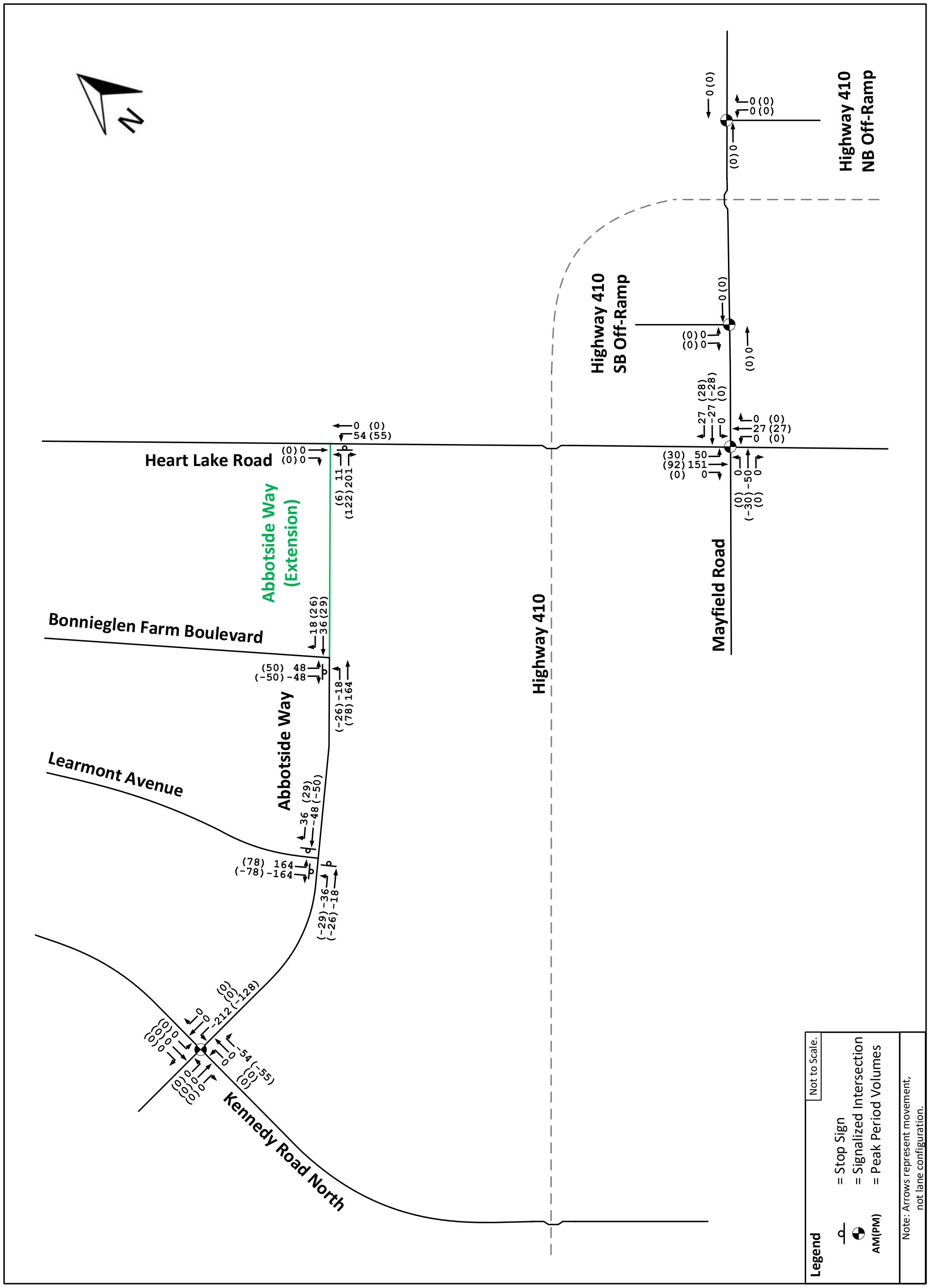
The *Mayfield West Community Plan Transportation Study* review has shown that the land will generate the traffic assigned to the community's local and minor collector road uses only. No diversion was considered between Kennedy Road and Heart Lake Road background through traffic. As a result, the planned Abbotside Way extension is expected to impact the local traffic patterns only. Considering the information provided in the report, it is impossible to differentiate between employment and residential trip distributions and assignments. Although, we noted that the approach volumes from Learmont Avenue and Bonnieglen Farm to Abbotside way split approximately 50/50 east/west direction.

For the purposes of this study, the diversion estimates are based on straight-line travel time calculation, considering the total travel distance and travel path corresponding speed limits. The travel time from Learmont Avenue and Abbotside Way intersection to Highway 410 interchanges on Mayfield Road was calculated with and without Abbotside Way extension. It is observed that the travel time is approximately equal when comparing travel paths with and without Abbotside Way extension. It is expected that approximately half of the local residential traffic at Learmont

Avenue and Bonnieglen Farm Boulevard intersection will be diverted through Abbotside Way extension to reach Highway 410 interchange.

Estimated traffic diversion associated with the extension of Abbotside Way between Heart Lake Road and Bonnieglen Farm Boulevard is presented in **Exhibit 9-5**Exhibit 9-5.

Exhibit 9-5: Traffic Diversion – Abbotside Way Extension



9.3 Peak Hour Factors - Future Total Traffic Volumes

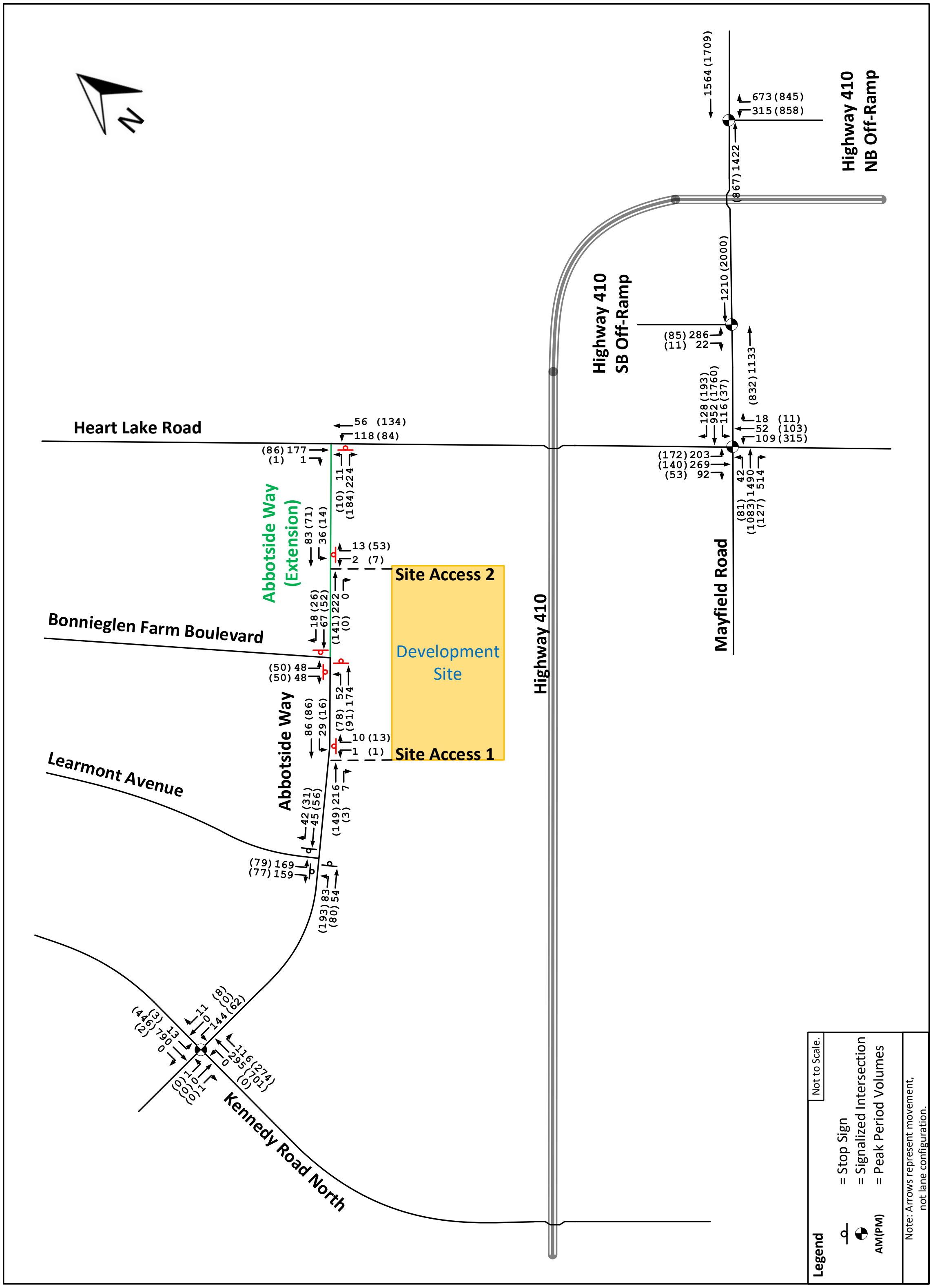
The PHF used at existing intersections was calculated based on the collected traffic data, as discussed in **Section 2.6**. It is assumed that the variation in the peak hour traffic volume will be similar to the existing conditions, therefore, the existing PHF are used in future scenarios. It is assumed that the new intersections will inherit the peak hour traffic volume variation of adjacent existing intersections. Therefore, a new intersection PHF was assigned with respect to the adjacent existing intersections.

10 2023 Future Total Traffic Conditions Analysis

New trips resulting from the proposed development were added to the 2023 future background conditions scenario, producing the 2023 Future Total traffic volumes illustrated in **Exhibit 10-1**.

Traffic operations analysis was conducted using the 2023 Future Total traffic volumes to determine future intersection performance with the impact of the proposed development. The results of the traffic operations analysis are presented in the following subsections. The traffic analysis under the 2023 Future Total conditions scenario is presented in **Appendix Q.**

Exhibit 10-1: 2023 Future Total Conditions Traffic Volumes



10.1 Warrant Analysis

This section covers the all-way stop warrant, signal warrant and auxiliary left turn lane warrant analyses are considered for the new private driveways and new public roadway intersections under 2023 Future Total traffic conditions

10.1.1 All-way Stop Warrant Analysis

The All-Way Stop warrant analysis was completed for the unsignalized intersections using *Ontario Traffic Manual (OTM) Book 5 – Regulatory Signs*. The warrant calculations are included in **Appendix R**. The analysis concluded that:

- All-Way Stop traffic control is warranted at Abbotside Way and Bonnieglen Farm Boulevard intersection; and,
- All-Way Stop traffic control is not warranted at Heart Lake Road and Abbotside Way intersection.

10.1.2 Signal Warrant Analysis

The signal warrant analysis was completed for both the unsignalized intersections using Justification 7 of the Ontario Traffic Manual (OTM) Book 12. The warrant calculations are included in **Appendix R**. The analysis concluded that signal traffic control is not warranted at the following intersections:

- Abbotside Way and Bonnieglen Farm Boulevard;
- Abbotside Way and Site Access 1;
- Abbotside Way and Site Access 2; and,
- Heart Lake Road and Abbotside Way.

10.1.3 Left Turn Lane Warrant Analysis

The signal warrant analysis was completed for both the unsignalized intersections using *MTO Design Supplement for TAC Geometric Design Guide (GDG) for Canadian Roads*. The warrant calculations are included in **Appendix R**. The analysis concluded that the auxiliary left left-turn lanes are not warranted at the following intersections:

- Abbotside Way and Bonnieglen Farm Boulevard;
- Abbotside Way and Site Access 1;
- Abbotside Way and Site Access 2; and,
- Heart Lake Road and Abbotside Way.

10.2 Signalized Intersections

The results of the 2023 Future Total Conditions traffic operations analysis for signalized intersections are presented in **Exhibit 10-2**.

Exhibit 10-2: 2023 Future Total Conditions Traffic Operations - Signalized Intersections

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
AM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	A	9.1	0.42	EBLTR	C	25.9	0.00	-	-
				WBTL	D	39.5	0.70	33.1	-
				WBR	C	26.0	0.01	-	-
				NBLT	A	4.5	0.13	14.4	-
				NBR	A	4.4	0.08	5.8	50
				SBLTR	A	5.7	0.36	41.4	-
Heart Lake Road & Mayfield Road	C	23.6	0.71	EBL	B	15.5	0.16	15.0	160
				EBT	B	20.0	0.58	131.1	-
				EBR	B	18.8	0.44	64.2	220
				WBL	C	23.0	0.67	29.5	150
				WBT	B	12.1	0.34	64.8	-
				WBR	B	10.0	0.09	9.0	150
				NBL	D	44.0	0.61	36.5	130
				NBT	C	34.9	0.11	20.6	-
				NBR	C	33.9	0.01	-	50
				SBL	E	62.4	0.79	80.4	120
				SBT	E	55.1	0.74	98.4	-
				SBR	D	41.4	0.08	15.2	50
Mayfield Road & Highway 410 Southbound Off-Ramp	B	17.8	0.42	EBT	B	17.9	0.61	56.9	-
				WBT	B	19.0	0.68	62.9	-
				SBL	B	12.4	0.20	22.4	-
				SBR	B	11.1	0.01	4.2	-
Highway 410 Northbound Off-Ramp & Mayfield Road	B	18.8	0.7	EBT	B	15.7	0.61	71.7	-
				WBT	B	17.0	0.70	83.5	-
				NBL	C	23.7	0.62	59.5	-
				NBR	C	30.7	0.71	90.1	-

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
PM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	A	4.9	0.28	EBLTR	-	-	-	-	-
				WBTL	D	39.1	0.47	19.0	-
				WBR	C	35.0	0.01	-	-
				NBLT	A	3.3	0.25	25.0	-
				NBR	A	3.2	0.17	6.1	50
				SBLTR	A	3.1	0.17	15.8	-
Heart Lake Road & Mayfield Road	C	28.6	0.77	EBL	C	21.8	0.52	23.6	160
				EBT	B	19.6	0.45	91.1	-
				EBR	B	15.5	0.09	11.2	220
				WBL	B	14.7	0.16	10.1	150
				WBT	C	26.8	0.72	176.2	-
				WBR	B	17.4	0.13	13.8	150
				NBL	D	53.2	0.84	93.7	130
				NBT	C	32.0	0.18	33.1	-
				NBR	C	30.1	0.01	-	50
				SBL	E	65.1	0.78	68.9	120
				SBT	D	46.5	0.42	51.9	-
				SBR	D	42.5	0.04	6.5	50
Mayfield Road & Highway 410 Southbound Off-Ramp	C	25.1	0.53	EBT	B	14.7	0.40	40.5	-
				WBT	C	29.9	0.95	143.5	-
				SBL	B	14.2	0.07	8.2	-
				SBR	B	13.9	0.02	4.0	-
Highway 410 Northbound Off-Ramp & Mayfield Road	C	30.8	0.84	EBT	C	24.6	0.46	63.7	-
				WBT	D	37.4	0.90	151.9	-
				NBL	C	24.9	0.72	124.6	-
				NBR	C	32.9	0.80	160.3	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 10-2**, no capacity or queuing concerns are observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours.

10.3 Unsignalized Intersections

The traffic analysis results under the 2023 Future Total Traffic Conditions for unsignalized intersections are presented in **Exhibit 10-3**.

Exhibit 10-3: 2023 Future Total Conditions Traffic Operations - Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
AM Peak Period							
Abbotside Way & Learmont Avenue	9.3	EBLT	A	8.5	0.17	-	-
		WBTR	A	7.4	0.05	-	-
		SBLR	A	10.2	0.40	-	-
Abbotside Way / Abbotside Way (Extension) & Bonnieglen Farm Boulevard	7.6	EBLT	A	7.7	0.16	-	-
		WBTR	A	7.0	0.06	-	-
		SBLR	A	8.1	0.12	-	-
Heart Lake Road and Abbotside Way (Extension)	5.8	EBL	B	12.7	0.02	-	-
		EBR	B	10.7	0.26	8	-
		NBLT	A	5.6	0.09	2	-
		SBTR	-	-	0.11	-	-
Site Access 1 (BLDG 1) & Abbotside Way	0.9	EBTR	-	-	0.08	-	-
		WBLT	A	4.1	0.02	-	-
		NBLR	A	9.5	0.01	-	-
Site Access 2 (BLDG 1) & Abbotside Way	1.2	EBTR	-	-	0.09	-	-
		WBLT	A	4.5	0.03	-	-
		NBLR	A	9.4	0.02	-	-
PM Peak Period							
Abbotside Way & Learmont Avenue	8.8	EBLT	A	9.4	0.33	-	-
		WBTR	A	7.1	0.05	-	-
		SBLR	A	8.7	0.20	-	-
Abbotside Way / Abbotside Way (Extension) & Bonnieglen Farm Boulevard	7.5	EBLT	A	7.7	0.15	-	-
		WBTR	A	6.8	0.05	-	-
		SBLR	A	7.9	0.12	-	-
Heart Lake Road and Abbotside Way (Extension)	5.1	EBL	B	11.5	0.02	-	-
		EBR	A	9.6	0.19	5	-
		NBLT	A	3.2	0.06	2	-
		SBTR	-	-	0.05	-	-
Site Access 1 (BLDG 1) & Abbotside Way	0.9	EBTR	-	-	0.06	-	-
		WBLT	A	3	0.01	-	-
		NBLR	A	9.4	0.01	-	-
Site Access 2 (BLDG 1) & Abbotside Way	2.3	EBTR	-	-	0.05	-	-
		WBLT	A	2.9	0.01	-	-
		NBLR	A	9.1	0.06	-	-

Note: Red font represents movements operating above critical thresholds.

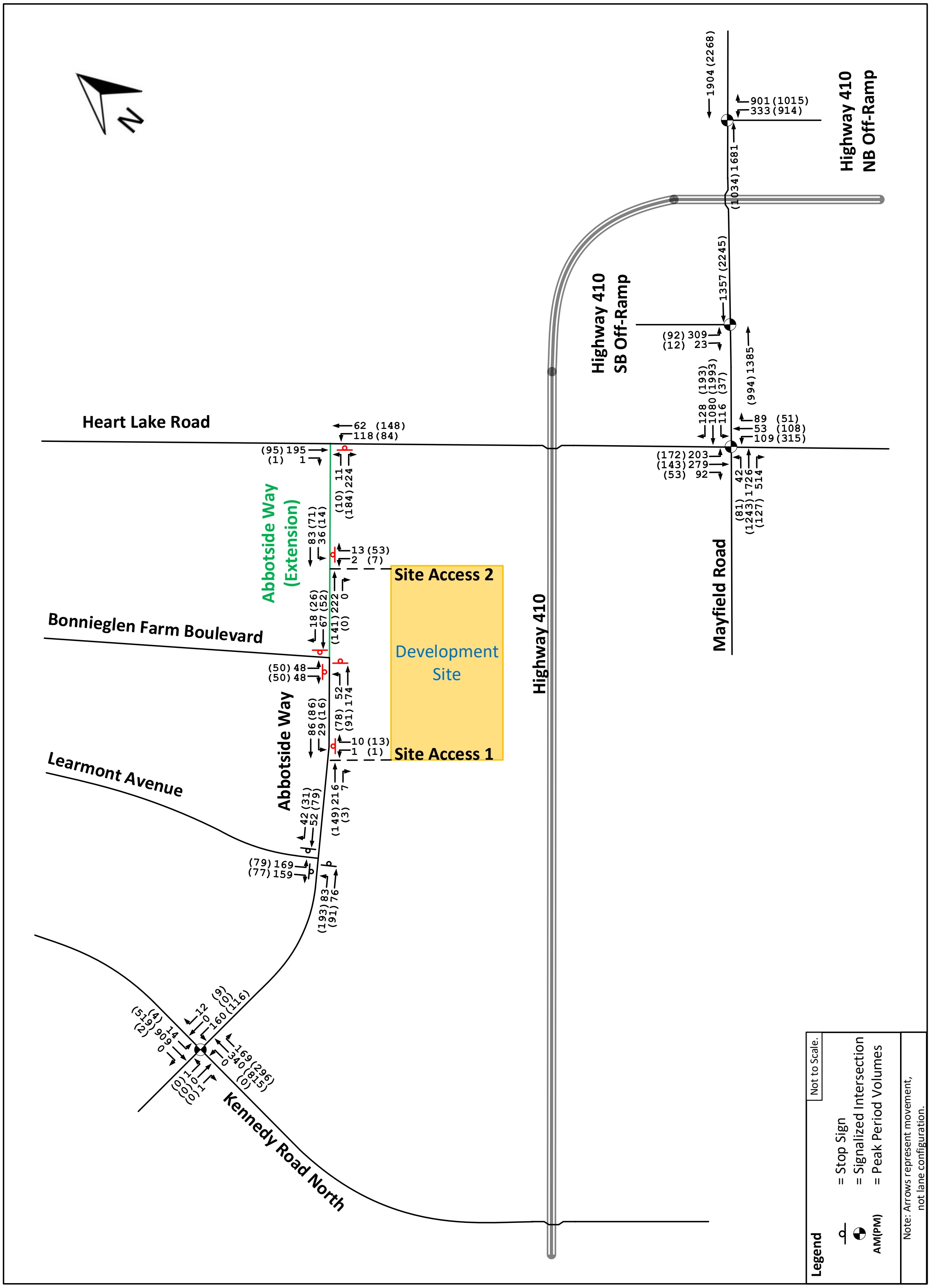
As shown in **Exhibit 10-3**, no capacity or queuing concerns are observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours.

11 2028 Future Total Conditions Analysis

New trips resulting from the proposed development were added to the 2028 future background conditions scenario, producing the 2028 Future Total traffic volumes illustrated in **Exhibit 11-1**.

Traffic operations analysis was conducted using the 2028 Future Total traffic volumes to determine future intersection performance with the impact of the proposed development. The results of the traffic operations analysis are presented in the following subsections. The traffic analysis under the 2028 Future Total conditions scenario is presented in **Appendix S.**

Exhibit 11-1: 2028 Future Total Conditions Traffic Volumes



11.1 Warrant Analysis

This section covers the all-way stop warrant, signal warrant and auxiliary left turn lane warrant analyses are considered for the new private driveways and new public roadway intersections under 2028 Future Total traffic conditions

11.1.1 Signal Warrant Analysis

The signal warrant analysis was completed for both the unsignalized intersections using Justification 7 of the Ontario Traffic Manual (OTM) Book 12. The warrant calculations are included in **Appendix T**. The analysis concluded that signal traffic control is not warranted at the following intersections:

- Abbotside Way and Bonnieglen Farm Boulevard;
- Abbotside Way and Site Access 1;
- Abbotside Way and Site Access 2; and,
- Heart Lake Road and Abbotside Way.

11.1.2 Left Turn Lane Warrant Analysis

The signal warrant analysis was completed for both the unsignalized intersections using *MTO Design Supplement for TAC Geometric Design Guide (GDG) for Canadian Roads*. The warrant calculations are included in **Appendix T**. The analysis concluded that the auxiliary left left-turn lanes are not warranted at the following intersections:

- Abbotside Way and Bonnieglen Farm Boulevard;
- Abbotside Way and Site Access 1;
- Abbotside Way and Site Access 2; and,
- Heart Lake Road and Abbotside Way.

11.2 Signalized Intersections

The results of the 2028 Future Total Conditions traffic operations analysis for signalized intersections are presented in **Exhibit 11-2**.

Exhibit 11-2: 2028 Future Total Conditions Traffic Operations - Signalized Intersections

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
AM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	A	9.5	0.48	EBLTR	C	24.4	0.00	-	-
				WBTL	C	33.0	0.64	36.4	-
				WBR	C	24.5	0.01	-	-
				NBLT	A	5.6	0.15	17.4	-
				NBR	A	5.6	0.12	7.2	50
				SBLTR	A	7.4	0.43	52.2	-
Heart Lake Road & Mayfield Road	C	25.2	0.83	EBL	B	16.4	0.19	15.5	160
				EBT	C	22.3	0.67	162.4	-
				EBR	B	19.3	0.45	69.3	220
				WBL	D	53.6	0.84	53.4	150
				WBT	B	12.8	0.39	75.2	-
				WBR	B	10.2	0.09	9.0	150
				NBL	D	44.7	0.62	36.5	130
				NBT	C	34.8	0.11	21.0	-
				NBR	C	34.4	0.07	13.1	50
				SBL	E	60.8	0.78	80.4	120
				SBT	E	55.8	0.75	102.2	-
				SBR	D	41.3	0.09	16.1	50
Mayfield Road & Highway 410 Southbound Off-Ramp	B	18.4	0.46	EBT	B	18.9	0.70	73.7	-
				WBT	B	19.0	0.71	72.6	-
				SBL	B	13.9	0.22	24.0	-
				SBR	B	12.5	0.02	5.2	-
Highway 410 Northbound Off-Ramp & Mayfield Road	C	33.2	0.85	EBT	C	30.0	0.80	142.3	-
				WBT	D	39.6	0.94	190.1	-
				NBL	C	24.1	0.59	86.9	-
				NBR	C	33.5	0.76	141.7	-

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
PM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	A	7.2	0.37	EBLTR	-	-	-	-	-
				WBTL	D	45.1	0.68	31.7	-
				WBR	C	31.9	0.01	-	-
				NBLT	A	4.6	0.31	38.6	-
				NBR	A	4.3	0.19	7.9	50
				SBLTR	A	4.2	0.21	24.0	-
Heart Lake Road & Mayfield Road	C	29.9	0.83	EBL	C	24.6	0.52	23.7	160
				EBT	C	20.1	0.50	106.4	-
				EBR	B	15.2	0.09	11.0	220
				WBL	B	15.5	0.19	10.1	150
				WBT	C	30.1	0.82	214.3	-
				WBR	B	17.5	0.13	13.8	150
				NBL	D	54.2	0.84	93.7	130
				NBT	C	32.1	0.19	34.8	-
				NBR	C	30.5	0.04	8.9	50
				SBL	E	65.5	0.79	69.0	120
				SBT	D	46.6	0.43	53.3	-
				SBR	D	42.4	0.04	6.5	50
Mayfield Road & Highway 410 Southbound Off-Ramp	B	15.6	0.55	EBT	B	10.8	0.36	45.3	-
				WBT	B	17.4	0.80	143.5	-
				SBL	C	24.6	0.09	12.8	-
				SBR	C	24.0	0.02	5.6	-
Highway 410 Northbound Off-Ramp & Mayfield Road	F	107.4	1.03	EBT	D	38.0	0.62	106.0	-
				WBT	F	206.7	1.35	343.4	-
				NBL	C	24.7	0.73	165.4	-
				NBR	C	34.5	0.83	219.4	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 11-2**, no capacity or queuing concerns are observed at the signalized intersections within the study area during the Weekday AM and PM peak hours, with exception of westbound through movement at Highway 410 Northbound Off-Ramp & Mayfield Road intersection during the PM peak hour, similar to future background conditions. Since this is intersection is a Highway 410 interchange, the critical V/C thresholds at ramp intersections approach lanes are assessed with respect to the MTO guidelines, while the Mayfield Road east-west movements are assessed with respect to critical V/C thresholds as outlined in the Region's guidelines.

The MTO and Region should monitor the operations of the Highway 410 Northbound Off-Ramp & Mayfield Road intersection in the 2028 horizon year and determine the appropriate intersection improvement strategy if required.

11.3 Unsignalized Intersections

The results of the 2028 Future Total Conditions traffic operations analysis for unsignalized intersections are presented in **Exhibit 11-3**.

Exhibit 11-3: 2028 Future Total Conditions Traffic Operations - Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
AM Peak Period							
Abbotside Way & Learmont Avenue	9.4	EBLT	A	8.6	0.18	-	-
		WBTR	A	7.5	0.05	-	-
		SBLR	A	10.4	0.40	-	-
Abbotside Way / Abbotside Way (Extension) & Bonnieglen Farm Boulevard	7.6	EBLT	A	7.7	0.16	-	-
		WBTR	A	7.0	0.06	-	-
		SBLR	A	8.1	0.12	-	-
Heart Lake Road and Abbotside Way (Extension)	5.7	EBL	B	13.0	0.02		
		EBR	B	10.9	0.27	8	
		NBLT	A	5.5	0.09	2	
		SBTR	-	-	0.12	-	-
Site Access 1 (BLDG 1) & Abbotside Way	0.9	EBTR	-	-	0.08	-	-
		WBLT	A	4.1	0.02	-	-
		NBLR	A	9.5	0.01	-	-
Site Access 2 (BLDG 1) & Abbotside Way	1.2	EBTR	-	-	0.09	-	-
		WBLT	A	4.5	0.03	-	-
		NBLR	A	9.4	0.02	-	-
PM Peak Period							
Abbotside Way & Learmont Avenue	8.9	EBLT	A	9.5	0.34	-	-
		WBTR	A	7.3	0.08	-	-
		SBLR	A	8.8	0.20	-	-
Abbotside Way / Abbotside Way (Extension) & Bonnieglen Farm Boulevard	7.5	EBLT	A	7.7	0.15	-	-
		WBTR	A	6.8	0.05	-	-
		SBLR	A	7.9	0.12	-	-
Heart Lake Road and Abbotside Way (Extension)	4.9	EBL	B	11.8	0.02		
		EBR	A	9.7	0.19	5	
		NBLT	A	3.1	0.06	2	
		SBTR	-	-	0.06	-	-
Site Access 1 (BLDG 1) & Abbotside Way	0.8	EBTR	-	-	0.06	-	-
		WBLT	A	2.8	0.01	-	-
		NBLR	A	8.9	0.01	-	-
Site Access 2 (BLDG 1) & Abbotside Way	2.3	EBTR	-	-	0.05	-	-
		WBLT	A	2.9	0.01	-	-
		NBLR	A	9.1	0.06	-	-

Note: Red font represents movements operating above critical thresholds.

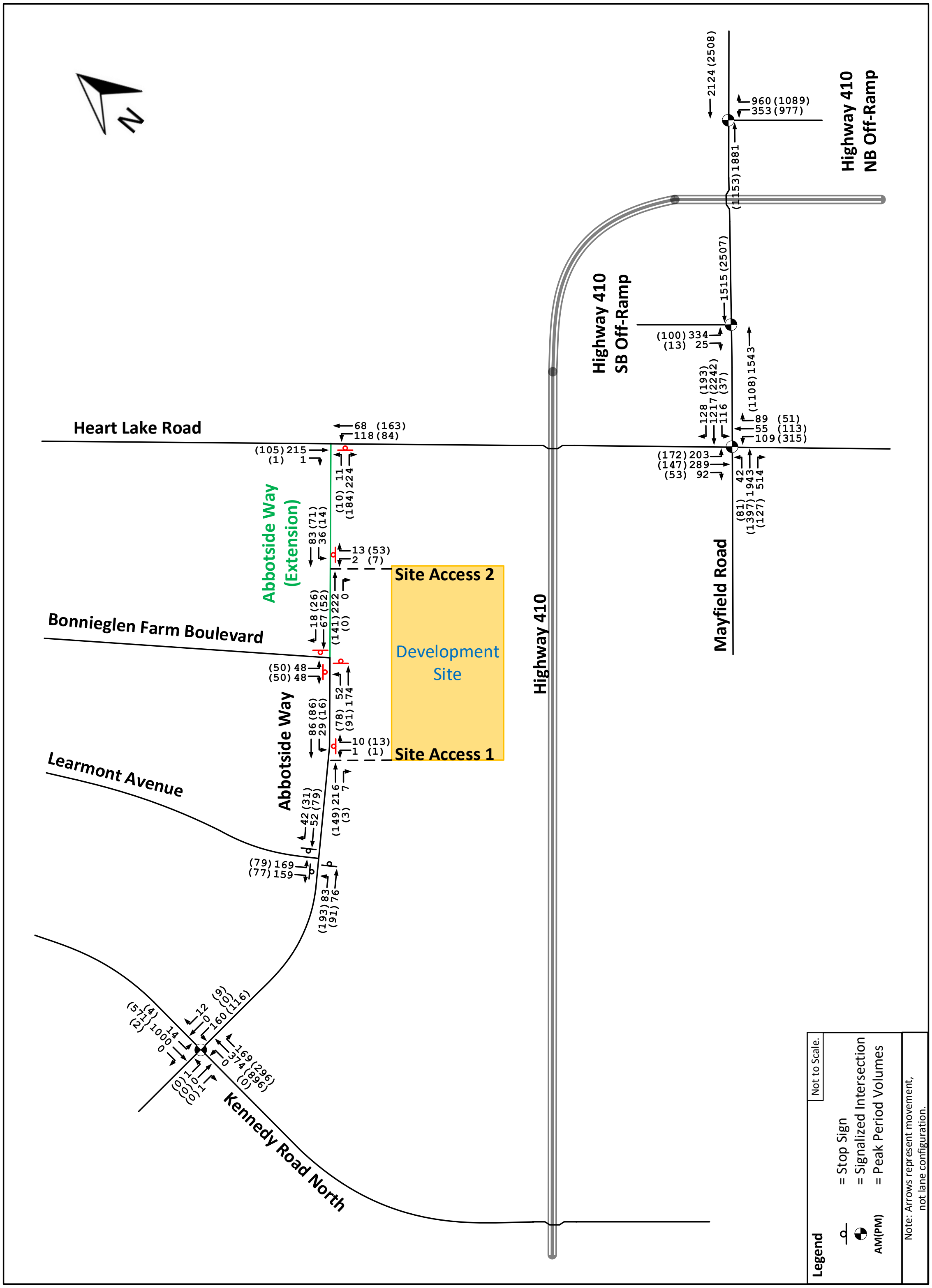
As shown in **Exhibit 11-3**, no capacity or queuing concerns are observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours.

12 2033 Future Total Traffic Conditions Analysis

New trips resulting from the construction of the proposed development were added to the 2033 future background conditions scenario, producing the 2033 Future Total traffic volumes illustrated in **Exhibit 12-1**.

Traffic operations analysis was conducted using the 2033 Future Total traffic volumes to determine future intersection performance with the impact of the proposed development. The results of the traffic operations analysis are presented in the following subsections. The traffic analysis under the 2033 Future Total conditions scenario is presented in **Appendix U.**

Exhibit 12-1: 2033 Future Total Conditions Traffic Volumes



12.1 Warrant Analysis

This section covers the all-way stop warrant, signal warrant and auxiliary left turn lane warrant analyses are considered for the new private driveways and new public roadway intersections under 2033 Future Total traffic conditions

12.1.1 Signal Warrant Analysis

The signal warrant analysis was completed for both the unsignalized intersections using Justification 7 of the Ontario Traffic Manual (OTM) Book 12. The warrant calculations are included in **Appendix V**. The analysis concluded that signal traffic control is not warranted at the following intersections:

- Abbotside Way and Bonnieglen Farm Boulevard;
- Abbotside Way and Site Access 1;
- Abbotside Way and Site Access 2; and,
- Heart Lake Road and Abbotside Way.

12.1.2 Left Turn Lane Warrant Analysis

The signal warrant analysis was completed for both the unsignalized intersections using *MTO Design Supplement for TAC Geometric Design Guide (GDG) for Canadian Roads*. The warrant calculations are included in **Appendix V**. The analysis concluded that the auxiliary left left-turn lanes are not warranted at the following intersections:

- Abbotside Way and Bonnieglen Farm Boulevard;
- Abbotside Way and Site Access 1;
- Abbotside Way and Site Access 2; and,

The analysis also concluded that the northbound auxiliary left turn lane is warranted at Heart Lake Road and Abbotside Way intersection with a minimum storage length of 25 m. Given the high percentage of trucks turning left, it is recommended that an additional 10 m of storage length be provided.

12.2 Signalized Intersections

The results of the 2033 Future Total Conditions traffic operations analysis for signalized intersections are presented in **Exhibit 12-2**.

Exhibit 12-2: 2033 Future Total Conditions Traffic Operations - Signalized Intersections

Intersection	Intersection			Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
	LOS	Delay (s)	v/c Ratio						
AM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	A	9.6	0.51	EBLTR	C	24.4	0.00	-	-
				WBTL	C	33.0	0.64	36.4	-
				WBR	C	24.5	0.01	-	-
				NBLT	A	5.7	0.17	19.1	-
				NBR	A	5.6	0.12	7.2	50
				SBLTR	A	7.7	0.47	59.1	-
Heart Lake Road & Mayfield Road	C	26.6	0.81	EBL	B	18.2	0.23	16.5	160
				EBT	C	25.4	0.77	198.9	-
				EBR	C	20.0	0.46	73.8	220
				WBL	E	55.1	0.81	55.0	150
				WBT	B	13.3	0.43	87.0	-
				WBR	B	10.2	0.09	9.0	150
				NBL	D	47.1	0.65	36.5	130
				NBT	C	34.8	0.11	21.6	-
				NBR	C	34.3	0.07	12.3	50
				SBL	E	61.0	0.78	80.4	120
				SBT	E	57.9	0.78	106.2	-
				SBR	D	41.6	0.11	18.9	50
Mayfield Road & Highway 410 Southbound Off-Ramp	B	19.2	0.51	EBT	B	19.7	0.76	85.4	-
				WBT	B	19.7	0.76	84.4	-
				SBL	B	15.0	0.25	25.8	-
				SBR	B	13.4	0.03	6.0	-
Highway 410 Northbound Off-Ramp & Mayfield Road	D	36.9	0.9	EBT	C	30.8	0.79	180.5	-
				WBT	D	39.1	0.92	228.7	-
				NBL	D	35.2	0.68	122.6	-
				NBR	D	53.8	0.88	211.0	-

Intersection	Intersection LOS	Intersection Delay (s)	Intersection v/c Ratio	Movement	LOS	Delay (s)	v/c Ratio	95th Percentile Queue (m)	Storage Length (m)
PM Peak Hour									
Kennedy Road & Private Access/Abbotside Way	A	6.8	0.38	EBLTR	-				-
				WBTL	D	-	-	-	-
				WBR	C	42.7	0.65	31.3	-
				NBLT	A	32.1	0.01	-	-
				NBR	A	4.6	0.34	41	50
				SBLTR	A	4.1	0.19	7.5	-
Heart Lake Road & Mayfield Road	C	30.9	0.91	EBL	C	26.0	0.52	23.4	160
				EBT	B	18.8	0.55	119.5	-
				EBR	B	13.5	0.09	10.8	220
				WBL	B	14.1	0.22	9.4	150
				WBT	C	30.5	0.88	256.4	-
				WBR	B	15.4	0.13	13.0	150
				NBL	F	80.6	0.96	94.9	130
				NBT	C	33.3	0.22	36.0	-
				NBR	C	31.5	0.04	9.0	50
				SBL	E	62.1	0.78	65.9	120
				SBT	D	44.6	0.43	52.3	-
				SBR	D	40.5	0.04	5.9	50
Mayfield Road & Highway 410 Southbound Off-Ramp	C	20.5	0.63	EBT	B	12.2	0.42	54.5	-
				WBT	C	24.0	0.91	186.3	-
				SBL	C	24.8	0.10	13.8	-
				SBR	C	24.1	0.03	6.4	-
Highway 410 Northbound Off-Ramp & Mayfield Road	F	167.3	1.12	EBT	D	45.1	0.76	127.9	-
				WBT	F	340.5	1.64	412.2	-
				NBL	C	22.0	0.74	169.8	-
				NBR	C	31.8	0.84	232.5	-

Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 12-2**, no capacity or queuing concerns are observed at the signalized intersections within the study area during the Weekday AM and PM peak hours, with exception of westbound through movement at Highway 410 Northbound Off-Ramp & Mayfield Road intersection during the PM peak hour, similar to future background conditions. Since this is intersection is a Highway 410 interchange, the critical V/C thresholds at ramp intersections approach lanes are assessed with respect to the MTO guidelines, while the Mayfield Road east-west movements are assessed with respect to critical V/C thresholds as outlined in the Region's guidelines.

The MTO and Region should monitor the operations of the Highway 410 Northbound Off-Ramp & Mayfield Road intersection in the 2033 horizon year and determine the appropriate intersection improvement strategy if required

12.3 Unsignalized Intersections

The results of the 2033 Future Total Conditions traffic operations analysis for unsignalized intersections are presented in **Exhibit 12-3**.

Exhibit 12-3: 2033 Future Total Conditions Traffic Operations - Unsignalized Intersections

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Lane v/c Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
AM Peak Period							
Abbotside Way & Learmont Avenue	9.4	EBLT	A	8.6	0.18	-	-
		WBTR	A	7.5	0.05	-	-
		SBLR	A	10.4	0.40	-	-
Abbotside Way / Abbotside Way (Extension) & Bonnieglen Farm Boulevard	7.6	EBLT	A	7.7	0.16	-	-
		WBTR	A	7.0	0.06	-	-
		SBLR	A	8.1	0.12	-	-
Heart Lake Road and Abbotside Way (Extension)	5.5	EBL	B	13.3	0.02		
		EBR	B	11.1	0.28	8	
		NBLT	A	8.0	0.10	2	
		SBTR	-	-	0.14	-	-
Site Access 1 (BLDG 1) & Abbotside Way	0.9	EBTR	-	-	0.08	-	-
		WBLT	A	4.1	0.02	-	-
		NBLR	A	9.5	0.01	-	-
Site Access 2 (BLDG 1) & Abbotside Way	1.2	EBTR	-	-	0.09	-	-
		WBLT	A	4.5	0.03	-	-
		NBLR	A	9.4	0.02	-	-
PM Peak Period							
Abbotside Way & Learmont Avenue	8.9	EBLT	A	9.5	0.34	-	-
		WBTR	A	7.3	0.08	-	-
		SBLR	A	8.8	0.20	-	-
Abbotside Way / Abbotside Way (Extension) & Bonnieglen Farm Boulevard	7.5	EBLT	A	7.7	0.15	-	-
		WBTR	A	6.8	0.05	-	-
		SBLR	A	7.9	0.12	-	-
Heart Lake Road and Abbotside Way (Extension)	4.5	EBL	B	12.0	0.02		
		EBR	A	9.8	0.19	5	
		NBLT	A	7.7	0.06	2	
		SBTR	-	-	0.07	-	-
Site Access 1 (BLDG 1) & Abbotside Way	0.9	EBTR	-	-	0.06	-	-
		WBLT	A	3.0	0.01	-	-
		NBLR	A	9.4	0.01	-	-
Site Access 2 (BLDG 1) & Abbotside Way	2.3	EBTR	-	-	0.05	-	-
		WBLT	A	2.9	0.01	-	-
		NBLR	A	9.1	0.06	-	-

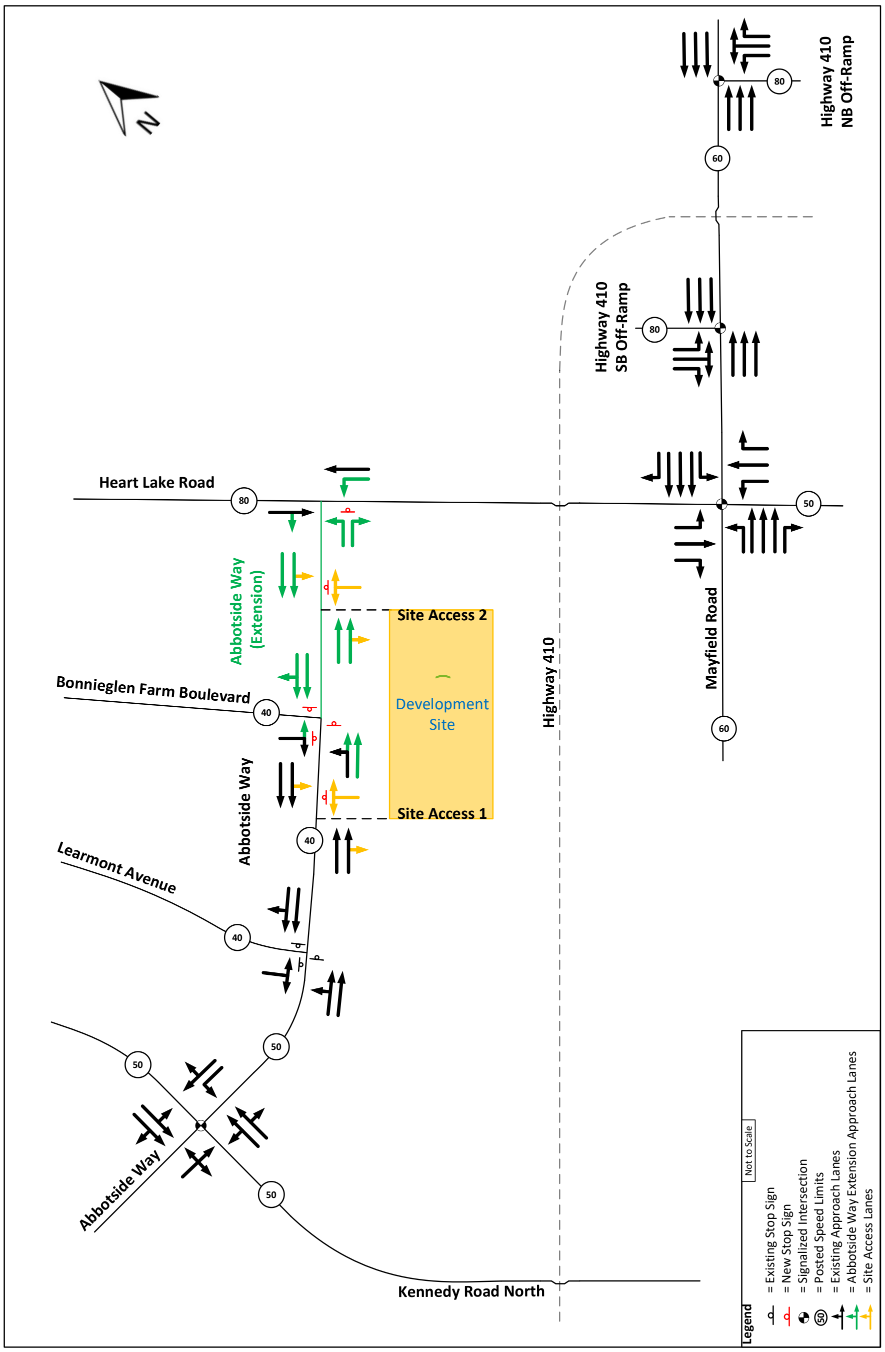
Note: Red font represents movements operating above critical thresholds.

As shown in **Exhibit 12-3**, no capacity or queuing concerns are observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours.

13 Traffic Analysis Summary

The final lane configuration at the study area intersections as a result of warrant calculations and mitigation measures is presented in **Exhibit 13-1**.

Exhibit 13-1: 2033 Future Total Conditions Lane Configuration



A comparison of signalized intersections operations under 2033 future background traffic conditions and 2033 future total traffic conditions is presented in **Exhibit 13-2**.

Exhibit 13-2: Signalized Intersection Traffic Operations Comparison

Intersection	Peak Hour	Movement	2033 Future Background Conditions			2033 Future Total Conditions			Comparison		
			Delay (s)	v/c Ratio	95th Percentile Queue Length (m)	Delay (s)	v/c Ratio	95th Percentile Queue Length (m)	Delay (s)	v/c Ratio	95th Percentile Queue Length (m)
Kennedy Road & Private Access/Abbotside Way	AM	EBLTR	20.1	0	-	24.4	0	-	4.3	0	
		WBTL	54.7	0.93	102.2	33	0.64	36.4	-21.7	-0.29	-65.8
		WBR	20.2	0.01	-	24.5	0.01	-	4.3	0	-
		NBLT	9.2	0.2	21.1	5.7	0.17	19.1	-3.5	-0.03	-2
		NBR	9.2	0.15	8.8	5.6	0.12	7.2	-3.6	-0.03	-1.6
		SBLTR	12.6	0.55	65.4	7.7	0.47	59.1	-4.9	-0.08	-6.3
	PM	EBLTR	-	-	-	-	-	-	-	-	-
		WBTL	44.6	0.79	62.3	42.7	0.65	31.3	-1.9	-0.14	-31
		WBR	26.4	0	-	32.1	0.01	-	5.7	0.01	-
		NBLT	8.3	0.39	52.6	4.6	0.34	41	-3.7	-0.05	-11.6
		NBR	7.4	0.22	9.9	4.1	0.19	7.5	-3.3	-0.03	-2.4
		SBLTR	7.4	0.27	32.1	4.1	0.23	25.2	-3.3	-0.04	-6.9
Heart Lake Road & Mayfield Road	AM	EBL	13.3	0.19	12.2	18.2	0.23	16.5	4.9	0.04	
		EBT	19	0.72	166.2	25.4	0.77	198.9	6.4	0.05	32.7
		EBR	13.6	0.35	15.3	20	0.46	73.8	6.4	0.11	58.5
		WBL	54.5	0.83	51.2	55.1	0.81	55	0.6	-0.02	3.8
		WBT	9.6	0.41	69.8	13.3	0.43	87	3.7	0.02	17.2
		WBR	6.9	0.03	3.9	10.2	0.09	9	3.3	0.06	5.1
		NBL	41	0.49	37.6	47.1	0.65	36.5	6.1	0.16	-1.1
		NBT	36.9	0.07	12.7	34.8	0.11	21.6	-2.1	0.04	8.9
		NBR	37.1	0.09	14.7	34.3	0.07	12.3	-2.8	-0.02	-2.4
		SBL	58.2	0.69	53	61	0.78	80.4	2.8	0.09	27.4
		SBT	49.3	0.53	52.5	57.9	0.78	106.2	8.6	0.25	53.7
		SBR	44.6	0.12	18.4	41.6	0.11	18.9	-3	-0.01	0.5
	PM	EBL	23.2	0.53	19.1	26	0.52	23.4	2.8	-0.01	4.3
		EBT	15.8	0.53	99.9	18.8	0.55	119.5	3	0.02	19.6
		EBR	11.2	0.09	9.2	13.5	0.09	10.8	2.3	0	1.6
		WBL	11.6	0.21	7.4	14.1	0.22	9.4	2.5	0.01	2
		WBT	24.8	0.84	208.3	30.5	0.88	256.4	5.7	0.04	48.1
		WBR	12.3	0.09	9.9	15.4	0.13	13	3.1	0.04	3.1
		NBL	69.9	0.92	101.7	80.6	0.96	94.9	10.7	0.04	-6.8
		NBT	34	0.18	29	33.3	0.22	36	-0.7	0.04	7
		NBR	32.7	0.04	9.7	31.5	0.04	9	-1.2	0	-0.7
		SBL	54.7	0.59	36	62.1	0.78	65.9	7.4	0.19	29.9
		SBT	47.4	0.26	24.1	44.6	0.43	52.3	-2.8	0.17	28.2
		SBR	45.6	0.03	6.7	40.5	0.04	5.9	-5.1	0.01	-0.8

Intersection	Peak Hour	Movement	2033 Future Background Conditions			2033 Future Total Conditions			Comparison		
			Delay (s)	v/c Ratio	95th Percentile Queue Length (m)	Delay (s)	v/c Ratio	95th Percentile Queue Length (m)	Delay (s)	v/c Ratio	95th Percentile Queue Length (m)
Mayfield Road & Highway 410 Southbound Off-Ramp	AM	EBT	17.4	0.7	80	19.7	0.76	85.4	2.3	0.06	5.4
		WBT	17.2	0.69	75.5	19.7	0.76	84.4	2.5	0.07	8.9
		SBL	14.9	0.25	25.8	15	0.25	25.8	0.1	0	0
		SBR	13.3	0.03	5.4	13.4	0.03	6	0.1	0	0.6
	PM	EBT	11	0.39	50.1	12.2	0.42	54.5	1.2	0.03	4.4
		WBT	20.3	0.87	172.5	24	0.91	186.3	3.7	0.04	13.8
		SBL	24.8	0.1	13.8	24.8	0.1	13.8	0	0	0
		SBR	24.1	0.03	6.3	24.1	0.03	6.4	0	0	0.1
Highway 410 Northbound Off-Ramp & Mayfield Road	AM	EBT	29.6	0.83	158.8	30.8	0.79	180.5	1.2	-0.04	21.7
		WBT	43.1	0.97	214.3	39.1	0.92	228.7	-4	-0.05	14.4
		NBL	26.9	0.63	93.1	35.2	0.68	122.6	8.3	0.05	29.5
		NBR	42.7	0.85	176.8	53.8	0.88	211	11.1	0.03	34.2
	PM	EBT	42.4	0.71	122.2	45.1	0.76	127.9	2.7	0.05	5.7
		WBT	305.3	1.57	402.4	340.5	1.64	412.2	35.2	0.07	9.8
		NBL	23.5	0.75	173.1	22	0.74	169.8	-1.5	-0.01	-3.3
		NBR	34.9	0.86	251	31.8	0.84	232.5	-3.1	-0.02	-18.5

Note: Red font represents movements operating above critical thresholds.

The traffic operations analysis indicates that the addition of development site traffic to the study is expected to have a minimal contribution to the movements operating above critical thresholds at Highway 410 interchanges. Other signalized intersection operates at acceptable LOS with minimum delays.

14 Site Plan Review

This section examines the location and configuration of the proposed site access, including available sight distance, vehicle swept path analysis, and parking required to support concept design.

14.1 Vehicle Swept Path Analysis

A vehicle swept path analysis was conducted using AutoTURN software demonstrating tractor-trailer trucks can enter and exit the site in a forward motion and access to loading docks (for tractor-trailer trucks) and parking areas (for example) passenger vehicles is functional.

The vehicle swept path analysis is presented in **Appendix W** and indicates that loading areas are functional, a fire truck can access the site and maneuver within site, and waste can be collected without significant maneuverability conflicts.

14.2 Access Location Review

This section examines the location and configuration of the proposed site access, including available sight distance, the need for dedicated turn lanes, and the need for a traffic control signal.

14.3 Proposed Access Widths and Curb Radii

Table 8.9.3 from the *Transportation Association of Canada Geometric Design Guide for Canadian Roads* (June 2017) (the '*TAC Guide*') indicates that for two-way driveways serving industrial land uses typical widths fall between 9.0 and 15.0 metres.

The driveway isles shared use by standard automobiles, and trailer trucks are proposed with 10.0 m pavement width. However, the driveway isle planned for the standard vehicle exclusive uses fronting the building is designed with 7.0 metres width.

The curb radii at the site access driveways are 15.0 metres, while curb radii throughout the site are 9.0 metres, which meets the City's requirements.

14.4 Sight Distance Analysis

The Transportation Association of Canada's (TAC) *Geometric Design Guide for Canadian Roads* (June 2017) document was used to determine if sight distances departing from and approaching the site access to meet minimum standards. A design speed of 50 km/h was used (the municipal default speed limit of 40 km/h for Abbotside way, plus 10 km/h to account for driver speed variances).

14.4.1 Stopping Sight Distance

Exhibit 14-1: Stopping Sight Distance Summary

Scenario	Minimum TAC Required Stopping Sight Distance	Future Available Sight Distance
Approaching Proposed Site Access 1 Egress from west	65 m	200 m
Approaching Proposed Site Access 2 Egress from west	65 m	200 m

As shown in **Exhibit 14-1**, the observed stopping sight distance meets the minimum distances required by TAC guidelines for vehicles approaching the access from the west (eastbound travelling vehicles).

Although TAC suggests a minimum stopping sight distance of 65 metres should be available for a 50 km/h design speed, it would be unlikely for a westbound vehicle travelling along Abbotside Way (after making the right turn from Heart Lake Road) to have reached the operating speed of the roadway before passing the location of the full moves driveways. Furthermore, it is suggested that the drivers will be more alert after making the southbound right turn in comparison to already travelling westbound at full speed. Therefore, stopping sight distances requirements are satisfied for vehicles approaching Heart Lake Road (westbound travelling vehicles).

14.4.2 Departure Sight Distance

Departure sight distance (also known as Intersection Sight Distance) refers to the sight distance necessary for a driver to depart from a driveway and merge into traffic without causing a vehicle travelling along Abbotside Way to take evasive action (e.g. speed change, lane change).

The required departure sight distance for automobiles is given by Equation 9.9.1 in TAC:

$$ISD = 0.278\,(V_{major} \times t_g)$$

where:

ISD = Intersection sight distance (m)
V_{major} = Design speed (50 km/h)
t_g = Time gap for turning movement from stop
(7.5 s for left turns by automobiles, 6.5 s for right turns by automobiles)

This calculation produces intersection sight distance requirements, as illustrated in **Exhibit 14-2**.

Exhibit 14-2: Departure Sight Distance Summary

Scenario	Minimum Departure Sight Distance	Future Available Sight Distance
Left turn from Proposed Site Access 1 – looking west	105 m	200 m
Right turn from Proposed Site Access 1 – looking east	90 m	200 m
Left turn from Proposed Site Access 2 – looking west	105 m	200 m
Right turn from Proposed Site Access 2 – looking east	90 m	200 m

As illustrated in **Exhibit 14-2**, the observed departure sight distances exceed the minimum distances required by TAC guidelines for automobiles making left or right turns from the Proposed Site Egress when looking west.

With respect to looking east, the driver will be able to see a vehicle slowing down to make the right turn from Heart Lake Road or Learmont Avenue before starting to pick up speed. It is unlikely that the vehicle will reach full speed in advance of the Proposed Site Egress. Therefore, departure sight distances are, in effect, met for outbound vehicles looking to the east and west.

14.5 Parking Space Analysis

The purpose of the parking review is to determine if the proposed parking supply of 211 regular spaces and nine accessible spaces is appropriate to accommodate anticipated demand from the proposed development. This section analyzes the zoning by-law requirements, parking observations at similar warehouse/distribution centre developments, and other transportation demand management measures that may be considered to supplement a reduction in parking requirements.

14.5.1 Zoning By-law Requirements

The Town's Comprehensive Zoning By-Law 2006-50 (ZBL) presently governs the development site. As stipulated in the ZBL, the relevant vehicle parking requirements are presented in **Exhibit 14-3** and **Exhibit 14-4**.

Exhibit 14-3: ZBL Standard Parking Requirements, (Town's Comprehensive Zoning By-law 2006-50)

Land Use	Regulation1[2]	Parking Requirement
Parking Requirements		
Warehouse ($48,655.68\ m^2$)	Standard Space: 168 parking spaces, plus 1 parking space per $170\ m^2$ of net floor area or portion thereof over $20,000\ m^2$ (for developments larger than $20,000\ m^2$)	168 + (28,655 ÷ 170) ≈ 339 spaces
Total		
Total Standard Parking Requirement		339 spaces
Proposed Standard Parking Supply		211 spaces
ZBL Standard Parking Surplus / Deficiency		-128 spaces

Note: Red text represents a parking supply deficiency.

As shown in **Exhibit 14-3**, the proposed development would be required to provide 339 parking spaces under the Town's ZBL parking requirements. With a proposed parking supply of 211 parking spaces, a parking deficiency results in 128 spaces with respect to ZBL. Review of Parking Rates and Opportunities

The Town ZBL parking requirements and the proposed parking supply were subsequently compared to parking rates prescribed in the ITE publication ***Parking Generation Manual, 5th Edition*** (January 2019) (the 'parking generation manual'), using Land Use Code 150: Warehousing.

Furthermore, parking survey data was collected from various similar warehouse/distribution centre developments in the City of Brampton, as documented in the ***7900 Airport Road Traffic Impact and Parking Study – PEIL*** (Dillon Consulting, September 2007) (the 'Dillon TIS'), was also referenced. While the relative age of the parking survey data collected from the Dillon TIS should be noted, parking demand rates under current-day conditions are likely to be lower than reported, given technological advancements in warehouse logistics and automation and the resultant reductions in the numbers of employees.

The peak parking demand rates from both the parking generation manual and the aforementioned proxy sites are summarized in **Exhibit 14-4**. Source data is provided in **Appendix X.**

Exhibit 14-4: Parking Rates Comparison

Data Source	Peak Parking Demand		Anticipated Surplus / Deficiency
	Rate	Spaces Required based on $48,655.68\ m^2$ ($523,725.38\ ft^2$)	
ITE Parking Generation Manual, 5th Edition	0.390 per 1,000 ft^2	205	+6
Dillon TIS, 'Bentall' proxy site	0.385 per 100 m^2	188	+23
Dillon TIS, 'Hopewell' proxy site	0.198 per 100 m^2	97	+114
Dillon TIS, 'Canadian Tire' proxy site	0.315 per 100 m^2	154	+57

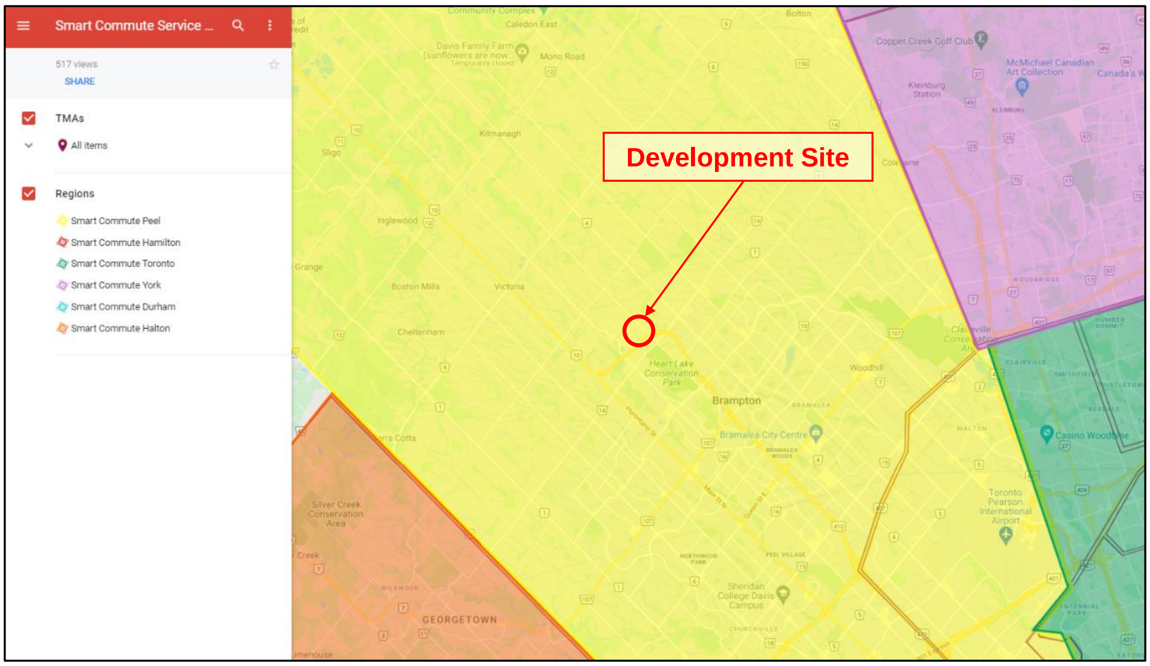
[2] Net floor area, as per the ZBL, refers to the aggregate of the floor area of a building above or below established grade, but excluding parking areas within the building, stairways, elevator shafts, service/mechanical rooms and penthouses, washrooms, garbage/recycling rooms, staff locker and lunch rooms, loading areas, any space with a floor to ceiling height of less than 1.8 metres and any part of a basement that is unfinished, is used solely for storage purposes and is not accessible to the public. For the purposes of calculations for the parking analysis, 'gross floor area' is assumed to be equivalent to 'net floor area'.

As shown in **Exhibit 14-4**, applying the rates from the parking generation manual and the Dillon TIS proxy survey data to the proposed development would result in a maximum peak parking demand of 205 spaces. When applied to the proposed development, a parking supply surplus of 6 vehicle parking spaces is anticipated.

Parking demands for the proposed development may also be decreased by introducing carpooling programs, such as Smart Commute – a program intended to discourage single-occupant auto travel for other, more sustainable transportation modes.

As shown in **Exhibit 14-5**, the development site is located within the Smart Commute Peel service area.

Exhibit 14-5: Smart Commute Service Area Map



Source: https://www.smartcommute.ca/Public/PublicPage.aspx?ItemName=ServiceArea

As the development site is located within a service area of Smart Commute, employees may choose to commute via carpool, resulting in a reduction of parking demands of the proposed development.

14.5.2 Parking Review Summary

Overall, given that the parking rates prescribed in the parking generation manual offer a more realistic representation of typical peak parking demands and that the development site falls within a Smart Commute service area, the proposed parking supply of 211 standard spaces and 9 accessible spaces is anticipated to be sufficient to accommodate future parking demands of the proposed development. The proposed development also plans to provide 9 accessible parking spaces, meeting the Town's ZBL 2015-58 requirements. The dimension requirements for regular parking and accessible parking are satisfied with respect to the Town's ZBL 2006-50 and ZBL 2015-58.

14.6 Loading Space Analysis

The Town's Comprehensive Zoning By-Law 2006-50 (ZBL) presently governs the development site. The relevant vehicle parking requirements, as stipulated in the ZBL, are presented in **Exhibit 14-6**.

Exhibit 14-6: ZBL Loading Space Requirements, Town's Comprehensive Zoning By-Law 2006-50

Land Use	Regulation	Parking Requirement
Parking Requirements		
Warehouse ($48,655.68 m^2$)	3 loading spaces plus 1 additional loading space for each additional 9,300 m^2 or portion thereof in excess of 7,441 m^2.	3 + (48,655.68-7,441) ÷ 9,300 ≈ 8 spaces
Total		
Total Loading Area Requirement		8 spaces
Proposed Loading Area Supply		69 spaces
ZBL Accessible Parking Surplus / Deficiency		+61 spaces

Note: Red text represents a parking supply deficiency.

As shown in **Exhibit 14-6**, the proposed development would be required to provide 8 loading areas under the Town's ZBL loading area requirements. With a proposed loading area supply of 69 loading areas, a parking surplus results in 61 loading areas with respect to ZBL.

The loading area dimension provided on the site plan meets the Town's ZBL 2006-50.

15 Transportation Demand Management

Transportation Demand Management (TDM) refers to various strategies to reduce traffic congestion, minimize the number of single-occupant vehicles, encourage non-auto modes of travel, and reduce vehicle dependency to create a sustainable transportation system. In summary, TDM works to change how, when, where and why people travel.

TDM strategies have multiple benefits, including the following:

- Reduced auto-related emissions to improve air quality;
- Decreased traffic congestion to reduce travel time;
- Increased travel options for residents and commuters;
- Reduced personal transportation costs and energy consumption; and,
- Support Provincial Smart Growth Objectives.

The above-combined benefits will assist in creating a more active and livable community.

15.1 TDM Strategies Identification

15.1.1 Walking and Cycling

The Town is a pedestrian and cycling supportive community that aims to increase walkable connections by encouraging both utilitarian and recreational travel by walking and cycling through a safe and desirable Town-wide network.

A proposed pedestrian and cycling network have been recommended to accommodate the growing popularity of cycling both as a recreational activity and a mode of transportation for short-distance trips as part of the Peel Region's Sustainable Transportation Strategy. This master plan was developed based on the Region's vision of encouraging residents to participate and engage in active transportation to improve and maintain a healthy lifestyle, as well as to minimize any congestion to the roadway network.

A mobility plan is used to support the TDM plan to assist in the reduction of auto site trips. It provides a review of the available walking and cycling opportunities within the study area. It further conceptualizes how the future pedestrian and cycle facilities within the new development will interact with the existing and future infrastructure through the pedestrian and cycling circulation plans.

The Town is a supportive pedestrian and cycling community that embraces the 'complete streets' concept by encouraging utilitarian and recreational travel by walking and cycling through a safe and desirable City-wide network of on-road and off-road pedestrian and cycling facilities.

The existing walking and cycling network provide a sufficient service level; therefore, no future transit improvements are recommended.

15.1.2 Public Transit and High Occupancy Vehicle (HOV) Opportunities

An increase in transit use is fundamental to the overall reduction of automobile use. In general, people associate aspects with each mode of transportation (such as safety, reliability, comfort, accessibility, speed, cost, travel time, etc.). Their modal choice is also based on the relative costs associated with one mode versus another mode. The two characteristics of travel modes most likely to influence modal choice are monetary cost and travel time.

One of the barriers to increased transit ridership is inconvenient transfers and questionable connections between municipal borders. The Move Ontario 2020 vision was a breakthrough in its promise to replace this fragmentation with an adequately integrated network, giving commuters seamless service across municipal boundaries and convenient connection points.

The existing transit network provides a sufficient level of service; therefore, no future transit improvements are recommended.

15.2 TDM Strategies Implementation

TDM programs nationally have experienced a wide range of implementation successes. This TDM plan will be site-focused to achieve the desired outcome at the reduced dependency on single-occupant vehicles (SOV) from a holistic perspective.

15.2.1 Transit Incentive

An increase in transit use is fundamental to the overall reduction of automobile use. In general, people associate utilities with each mode of transportation (such as safety, reliability, comfort, accessibility, speed, cost, and travel time). Their mode choice is based on the relative costs associated with one versus another mode. The two characteristics that will most likely influence mode choice are monetary cost and travel time.

Transit productivity is a measure of return on investment in the transit system. It measures how many travellers use the transit service provided in a region. Local buses with few passengers suggest that transit systems are not providing transportation benefits consistent with their capital and operating costs. Having more passengers on each bus generates more revenue for transit agencies and results in better air quality and less congestion. Moreover, transit service levels (i.e. network coverage and frequency) strongly correlate with transit demand (i.e. ridership).

15.2.2 Marketing

It is recommended that the Region make an information package to inform new/prospective residents of alternative travelling options. It is recommended that the Owner consults with the Region to provide the following materials to promote active transportation:

- City of Brampton Transit Map;
- Town of Caledon Trails Map; and,
- Region of Peel Trails Map.

In addition to the above-noted materials, the information package will also include information on transit schedules (i.e. Brampton Transit) to assist residents in planning their trips (i.e. to/from work/school) utilizing the existing and growing transit network system. A location map will also be prepared to indicate the nearby facilities and points of interest (i.e. retail store, grocery store, school, community centre and library) within convenience and comfortable walking distance to further discourage vehicle dependency.

15.3 TDM Monitoring

A commuter survey typically gathers quantitative data (i.e. percentage use of the various modes of transportation) and qualitative data (i.e. respondents' perception of the alternative transportation programs). This survey will produce and collect essential information to understand the effectiveness of the proposed TDM strategies, which will provide valuable indications (if any) in the determination of adjustments to the TDM initiatives to be required to achieve or exceed the targeted outcomes. Moreover, the collected data can also be used to focus on the marketing initiatives and efforts of the Region.

The questionnaire is recommended to contain no more than five questions, as the length of the survey has a negative correlation with both respondent rate and accuracy. Keeping the survey short and simple to understand is the first principle in achieving substantial survey data. In general, the survey should gather the following information:

- **Trip Rate** – to obtain information on how many people travel during the morning and afternoon peak hours (sample question 1);
- **Modal Split** – what is the primary transportation modes when travelling during peak hours (sample question 2);
- **Trip Purpose** – this is to test whether the majority of trips are the journey-to-work trip or other trips, as the TDM strategies should be altered accordingly between work trips and non-work trips (sample question 3);
- **Traveller's preference** – to understand aside from driving alone, which TDM measures have the most significant potential further to reduce vehicle dependency (sample question 4); and,
- **Comments** – to allow respondents to express any comments that can improve the proposed/implemented TDM strategies (sample question 5).

The statistical reliability of a survey depends in part on the response rate, which is the number of correctly completed surveys compared to the total number of distributed surveys. Therefore, it is important to maximize the survey response rate. Some of the methods that can be used to maximize the response rate are listed as follows:

- Place a notice on a bulletin board and other high pedestrian locations, and attach a cover memorandum to the questionnaire describing the purpose of the survey and requesting cooperation;
- Inform recipients of the duration it takes to respond to the questionnaire, and note that their responses are strictly confidential;
- Offer prizes to respondents, and it is preferably based on a drawing to ensure unbiased;
- Offer a contact person and phone number to respond to any questions that survey recipients may have;
- Facilitate access to the survey questionnaire by posting it on a webpage. As an alternative, deliver the questionnaire and pick-up responses of the different tenants;
- Providing the survey in different languages to assist in non-English speaking residents to understand the survey; and,
- Send one or more reminders (e-mail and flyers) requesting to complete the survey by the due date.

As noted previously, allowing the completion of the survey online can help reduce the time and effort spent circulating and administrating the study.

It is recommended to conduct a baseline survey of residents before starting the TDM program. This can assist in evaluating the program's effectiveness (before and after comparative analysis). Besides, comparing the results of the biennial survey to previous years can evaluate the program's progress and potential modifications. It is possible to add survey questions to assess the new improvements. Furthermore, Brampton Transit and Go Transit can be consulted for ridership statistics. The Owner shall coordinate with the City of Brampton and the Town of Caledon to distribute travel surveys to all new residents and collect information for all blocks at the time of closing unit sale. Monitoring a TDM program can be accomplished by conducting a biennial commuter survey to determine the success of the TDM measures (individually or as a combination). It is recommended that the first survey be conducted (1) year after lease signing.

15.4 TDM Communication Strategy

To facilitate the implementation of TDM strategies, information and incentives must be passed from the Region to the public effectively.

The owner is to contact the Region, which will, in turn, provide information packages with site-specific information on nearby pedestrian, bicycle, and transit facilities. These information packages are to be provided by the Region and distributed by the Owner at the time of lease signing.

16 Conclusions

This section summarizes the key findings of this transportation impact study (TIS) based on analysis horizon year.

2021 Existing Conditions Conclusions

- The collected peak hour volumes were adjusted to be representative of the existing conditions. The 2021 existing projected traffic volumes have been estimated by applying growth rate to the through movements of study intersections.
- Traffic analysis of signalized intersections concluded that:
  - At the intersection of Mayfield Road and Heart Lake Road, which is under Region’s jurisdiction:
    - Northbound left-turn movement is operating above capacity (v/c ratio of 1.49) during the Weekday PM peak hour; and,
    - Northbound left-turn movements’ 95th percentile queue lengths exceed the available storage lengths during the Weekday PM peak hour.
  - At the interchange of Mayfield Road and Highway 410 Northbound Off-Ramp, which is under MTO jurisdiction:
    - The northbound left-turn movement is operating above capacity threshold during the Weekday PM (v/c = 0.85) peak hour;
    - The northbound right-turn movement operates above the capacity threshold during the Weekday PM (v/c = 0.87) peak hour.
  - Mitigation measures applied to signalized intersections under Existing Conditions are outlined in **Section 17**.
- In general, the existing active transportation network in the area provides a pedestrian-friendly and inviting environment.
- In general, the existing active transportation network in the area provides a cycling-friendly and inviting environment.
- Currently, the Town does not have transit services that operate in the Mayfield West Community. Transit services along Kennedy Road are offered by the City of Brampton, providing a transit-friendly and inviting environment.
- Traffic analysis of unsignalized intersections concluded that no capacity or queuing concerns were observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours under Existing Traffic Conditions.

2023 Future Background Conditions Conclusions

- Study area appropriate traffic growth rates were determined in consultation with the Town, Region, and MTO. Note, that growth rates were not applied to the Abbotside Way, Learmont Avenue, Bonnieglen Farm Boulevard local roadways.
- Background development trips were assigned to study area roadways based on trip assignment information extracted from TIS excerpts.
- Traffic analysis of signalized intersections concluded that:
  - At the intersection of Mayfield Road and Heart Lake Road, which is under Region's jurisdiction:
    - ♦ The eastbound left-turn movement operates above capacity (v/c ratio of 1.09) during the Weekday PM peak hour.
  - Mitigation measures applied to signalized intersections under 2023 Future Background conditions are outlined in **Section 17**.
- Traffic analysis of unsignalized intersections concluded that no capacity or queuing concerns were observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours under 2023 Future Background Conditions.

2028 Future Background Conditions Conclusions

- Study area appropriate traffic growth rates were determined in consultation with the Town, Region, and MTO. Note, that growth rates were not applied to the Abbotside Way, Learmont Avenue, Bonnieglen Farm Boulevard local roadways.
- Background development trips were assigned to study area roadways based on trip assignment information extracted from TIS excerpts.
- Traffic analysis of signalized intersections concluded that:
  - At the intersection of Mayfield Road & Highway 410 Southbound Off-Ramp, which is under MTO's jurisdiction:
    - ♦ Southbound through movement is operating above capacity (v/c ratio of 1.05) during the Weekday PM peak hour; and,
  - At the interchange of Mayfield Road and Highway 410 Northbound Off-Ramp, which is under MTO's jurisdiction:
    - ♦ The overall intersection is operating above the capacity threshold during the Weekday PM (v/c = 1.06) peak hour
    - ♦ The northbound left-turn movement is operating above capacity threshold during the Weekday AM (v/c = 0.89) peak hour and Weekday PM (v/c = 0.84) peak hour;
    - ♦ The northbound right-turn movement is operating above capacity threshold during the Weekday AM (v/c = 0.98) peak hour and Weekday PM (v/c = 0.95) peak hour;
    - ♦ The westbound through movement is operating above capacity threshold during the Weekday PM (v/c = 1.20) peak hour
  - Mitigation measures applied to signalized intersections under 2028 Future Background conditions are outlined in **Section 17**.

- Traffic analysis of unsignalized intersections concluded that no capacity or queuing concerns were observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours under 2028 Future Background Conditions.

2033 Future Background Conditions Conclusions

- Study area appropriate traffic growth rates were determined in consultation with the Town, Region, and MTO. Note, that growth rates were not applied to the Abbotside Way, Learmont Avenue, Bonnieglen Farm Boulevard local roadways.
- Background development trips were assigned to study area roadways based on trip assignment information extracted from TIS excerpts.
- Traffic analysis of signalized intersections concluded that:
  - At the interchange of Mayfield Road and Highway 410 Southbound Off-Ramp, which is under MTO jurisdiction:
    - The westbound through movement operates above the capacity threshold during the Weekday PM (v/c = 1.16) peak hour.
  - At the interchange of Mayfield Road and Highway 410 Northbound Off-Ramp, which is under MTO jurisdiction:
    - The westbound through movement operates above the capacity threshold during the Weekday PM (v/c = 1.57) peak hour.
  - Mitigation measures applied to signalized intersections under 2033 Future Background conditions are outlined in **Section 17**.
- Traffic analysis of unsignalized intersections concluded that no capacity or queuing concerns were observed at the unsignalized intersections within the study area during the Weekday AM and PM peak hours under 2033 Future Background Conditions.

Proposed Development and Trip Generation Summary

- The proponent is proposing to construct an industrial warehouse building (the ‘proposed development’) with a total footprint of 48,655.68 m^2 (523,725.38 ft^2) consisting of one level warehouse building and an accessory office. Accessory office footprint will cover less than 15% of GFA. The warehouse will have 67 dock-high doors and 2 grade-level doors for loading access. In addition, a total of 220 employee parking stalls and 87 stalls to accommodate 53’ trailers are provided within Building 1 boundary. Direct vehicular access will be provided to Abbotside Way road via two full move accesses.
- The proposed development is expected to generate 98 two-way (72 inbound and 26 outbound) trips during the weekday AM peak hour, and 107 two-way (33 inbound and 74 outbound) trips during the weekday PM peak hour. For the purposes of this study to provide a more conservative estimate, no trip reductions were considered for proposed development trip generation due to a lack of quantitative data.

2023 Future Total Conditions Conclusions

- Traffic analysis of signalized and unsignalized intersections concluded that no capacity or queuing concerns were observed at the signalized and unsignalized intersections within the study area during the Weekday AM and PM peak hours under 2023 Future Total Conditions.
- Warrant analysis summary applied to signalized intersections under 2023 Future Total conditions are outlined in **Section 17**.

2028 Future Total Conditions Conclusions

- Traffic analysis of signalized intersections within the study area during the Weekday AM and PM peak hours showed no capacity constraints, with exception of westbound through movement at Highway 410 Northbound Off-Ramp & Mayfield Road during PM peak hour, similar to background conditions. Since this is intersection is a highway interchange, the critical thresholds at ramp approach lanes are assessed with respect to MTO guidelines, while the Mayfield east-west movements are assessed with respect to critical thresholds as outlined in Region's guidelines.
- Traffic analysis of unsignalized intersections concluded that no capacity or queuing concerns were observed at the signalized and unsignalized intersections within the study area during the Weekday AM and PM peak hours under 2028 Future Total Conditions.
- Warrant analysis summary applied to signalized intersections under 2028 Future Total conditions are outlined in **Section 17**.

2033 Future Total Conditions Conclusions

- Traffic analysis of signalized intersections within the study area during the Weekday AM and PM peak hours showed no capacity constraints, with exception of westbound through movement at Highway 410 Northbound Off-Ramp & Mayfield Road during PM peak hour, similar to background conditions. Since this is intersection is a highway interchange, the critical thresholds at ramp approach lanes are assessed with respect to MTO guidelines, while the Mayfield east-west movements are assessed with respect to critical thresholds as outlined in Region's guidelines.
- Traffic analysis of unsignalized intersections concluded that no capacity or queuing concerns were observed at the signalized and unsignalized intersections within the study area during the Weekday AM and PM peak hours under 2033 Future Total Conditions.
- Warrant analysis summary applied to signalized intersections under 2033 Future Total conditions are outlined in **Section 17**.

Vehicle Swept Path Analysis

- Vehicle swept path analysis using AutoTurn concludes that truck traffic can enter and exit the site in a forward motion and that access to waste collection and loading areas are functional.

Sight Distance Requirements

- The observed stopping sight distance meets the minimum distances required by TAC guidelines for vehicles approaching the site access east and west.
- The observed departure sight distance at the proposed site accesses exceeds the minimum departure distance required by TAC guidelines for automobiles making left-turn and right-turn.

Parking and Loading Area Analysis

- The proposed development would be required to provide 339 parking spaces under the Town's ZBL 2006-50 parking requirements. With a proposed parking supply of 211 parking spaces, a parking deficiency results in 128 spaces with respect to ZBL.
- Application of the rates from the parking generation manual and the Dillon TIS proxy survey data to the proposed development would result in a maximum peak parking demand of 205 spaces. When applied to the proposed development, a parking supply surplus of 6 vehicle parking spaces is anticipated.
- The proposed development plans to provide 9 accessible parking spaces, meeting the Town's ZBL 2015-58 requirements.
- Parking demands for the proposed development may also be decreased by introducing carpooling programs, such as Smart Commute – a program intended to discourage single-occupant auto travel for other, more sustainable transportation modes.
- The proposed development would be required to provide 8 loading areas under the Town's ZBL loading area requirements. With a proposed loading area supply of 69 loading areas, a parking surplus results in 61 loading areas with respect to ZBL.
- The dimension requirements for regular parking, accessible parking and loading areas are satisfied with respect to the Town's ZBL 2006-50 and ZBL 2015-58.

17 Recommendations and Warrant Summary

Based on the key findings of this transportation impact study, the following recommendations are submitted:

	Intersection	Peak Period	Improvement
2021 Existing	Mayfield Road and Heart Lake Road	PM	• Manually adjusted total split timings by keeping the same cycle length of 135 seconds.
	Mayfield Road and Highway 410 Northbound Off-Ramp	PM	• Signal timing total cycle length increased from 80 seconds to 110 seconds and manually adjusted total split timings;
2023 Future Background	Mayfield Road and Heart Lake Road	PM	• Eastbound left turn arrow phase is warranted. • Signal timing total cycle length increased from 135 seconds to 140 seconds and manually adjusted total split timings.
2028 Future Background	Mayfield Road & Highway 410 Southbound Off-Ramp	PM	• Signal timing total cycle length increased from 77 seconds to 100 seconds and manually adjusted total split timings.
	Highway 410 Northbound Off-Ramp & Mayfield Road	AM	• Signal timing total cycle length increased from 80 seconds to 115 seconds and manually adjusted total split timings.
		PM	• Signal timing total cycle length increased from 110 seconds to 140 seconds and manually adjusted total split timings.
2033 Future Background	Mayfield Road and Highway 410 Southbound Off-Ramp	PM	• Manual adjustment of total splits while maintaining the intersection cycle length of 100 seconds.
	Mayfield Road and Highway 410 Northbound Off-Ramp	PM	• Manual adjustment of total splits while maintaining the intersection cycle length of 140 seconds.

Future Conditions Warrant Summary

Left Turn Signal Phase Warrant Analysis

- Left Turn Signal Phase is warranted at eastbound left turn under 2023 Future Background Conditions at Mayfield Road and Heart Lake Road.

All-way Stop Warrant Analysis

- All-Way Stop traffic control is warranted under 2023 Future Total Conditions at Abbotside Way and Bonnieglen Farm Boulevard.
- All-Way Stop traffic control is not warranted at Heart Lake Road and Abbotside Way.

Signal Warrant Analysis

The analysis concluded that signal traffic control is not warranted at the following intersections:

- Abbotside Way and Bonnieglen Farm Boulevard;
- Abbotside Way and Site Access 1;
- Abbotside Way and Site Access 2; and,
- Heart Lake Road and Abbotside Way.

Left Turn Lane Warrant Analysis

The analysis concluded that the auxiliary left left-turn lanes are not warranted at the following intersections:

- Abbotside Way and Bonnieglen Farm Boulevard;
- Abbotside Way and Site Access 1;
- Abbotside Way and Site Access 2; and,

The analysis also concluded that the northbound auxiliary left turn lane is warranted at Heart Lake Road and Abbotside Way intersection with a minimum storage length of 25 m. Given the high percentage of trucks turning left, it is recommended that an additional 10 m of storage length be provided.

Appendix A

Summary of Consultation with Agencies

Dumitru Liubeznii

From: Jillian Britto <Jillian.Britto@caledon.ca>
Sent: Thursday, September 30, 2021 5:25 PM
To: Dumitru Liubeznii
Cc: Rao Marthi; rosalie.shan@peelregion.ca; Arash Olia
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region
Attachments: Abbotside @ Kennedy - TMC AM Peak Hr Report-2017-04-12.pdf; Abbotside @ Learmont - TMC AM Peak Hr Report-2018-09-13.pdf; Buttermill TIS_Nov 2019 _Excerpts.pdf; 0 & 12305 Dixie Rd - Traffic-11-03-21_Excerpts.pdf; 0 Abbotside Way SPA 21-02 - Traffic Impact Study - 01.21.2021_Excerpts.pdf; 0 Abbotside Way SPA 21-68 - Transportation Impact Study - 08.20.2021_Excerpts.pdf; 12862 Dixie Rd - Transportation Study-25-02-2021_Excerpts.pdf

Good afternoon Dumitru,

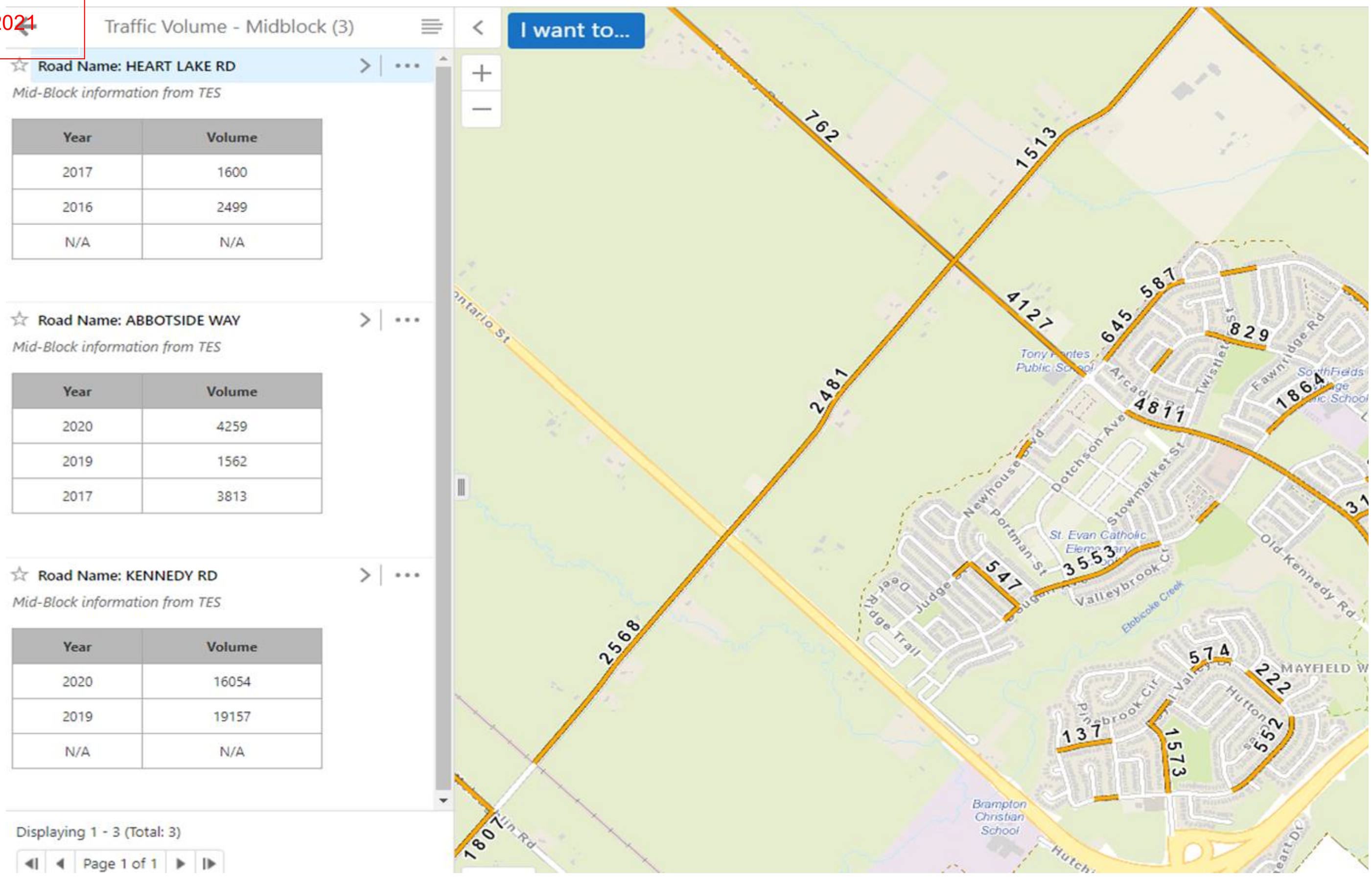
Hope this email finds you well.

Thank you for providing the Town an opportunity to comment on the scope of work for this study. Please see our comments below and the corresponding attached documents:

- All traffic signal timing plans can be obtained from the Region of Peel.
- We have the following counts (see attached):
    - Abbotside @ Kennedy – 2017-04-12
    - Abbotside @ Learmont – 2018-09-13

It would be ideal to use pre-Covid-19 traffic data grown accordingly to 2021. However, we understand that this is not always available. If new counts are needed, please ensure they are balanced with adjacent intersections.

- Please use the MW1 Traffic Management Plan as a starting point to determine future traffic diversion as a result of the Abbotside Way connection to Heart Lake Road. We can schedule a meeting to discuss the methodology if required. https://caledonca-my.sharepoint.com/:f:/g/personal/jillian_britto_caledon_ca/Evo7o2iSoplOkbzbytv94noBNbI4NVgdi-xd7-JNjsCZwA?e=Jc2lDb
- Please see the available ADT available for this area:



Road Name: HEART LAKE RD

Year	Volume
2017	1600
2016	2499
N/A	N/A

Road Name: ABBOTSIDE WAY

Year	Volume
2020	4259
2019	1562
2017	3813

Road Name: KENNEDY RD

Year	Volume
2020	16054
2019	19157
N/A	N/A

- The following developments should be included in the future background analysis (please see attached excerpts):
  - 0 Abbotside Way SPA 21-02
  - 0 Abbotside Way SPA 21-68
  - Buttermill Development at Kennedy and Dougall
  - 12862 Dixie Road
  - 0 & 12305 Dixie Road
- The traffic impact study should also include a review of loading requirements and provisions.

Please let me know if you have any questions.

Thanks,

Jillian Britto, P.Eng.
Coordinator, Transportation Development
Transportation Engineering
Engineering Services

Office: 905.584.2272 x 4108
Email: Jillian.Britto@caledon.ca

Town of Caledon | www.caledon.ca | www.visitcaledon.ca | Follow us @YourCaledon

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From: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Sent: Tuesday, September 28, 2021 11:02 AM
To: Jillian Britto <Jillian.Britto@caledon.ca>; rosalie.shan@peelregion.ca
Cc: Rao Marthi <rao.marthi@ibigroup.com>

Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region
Importance: High

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the contents to be safe.

Hi Jillian and Rosalie,

I hope you are doing well. On September 16 IBI has circulated Terms of Reference (TOR) to Township, Region, and MTO for Traffic Impact Study (TIS) in support of a new warehouse development at 12304 Heart Lake Road. Just to let you know, we already received feedback from MTO.

Please acknowledge that you have received this TOR and let us know when to expect your review feedback. We appreciate if you could reply to this inquiry at your earliest convenience, as we need to commission the traffic surveys for this study. In case you missed original TOR email, see attached conceptual site plan for reference.

Kind regards,

Dumitru Liubeznii, EIT
Traffic Operations and Safety Analyst
IBI Group Inc.

From: Dumitru Liubeznii
Sent: Thursday, September 23, 2021 10:56 AM
To: Jillian.Britto@caledon.ca; rosalie.shan@peelregion.ca; Mark.j.white@ontario.ca
Cc: Rao Marthi <rao.marthi@ibigroup.com>
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region
Importance: High

Hi Jillian, Rosalie and Mark,

I hope you are doing well. A week ago IBI has circulated Terms of Reference to Township, Region, and MTO for Traffic Impact Study (TIS) in support of a new warehouse development at 12304 Heart Lake Road. Please acknowledge that you have received the TOR and let us know when to expect review feedback.

Kind regards,

Dumitru Liubeznii, EIT
Traffic Operations and Safety Analyst
IBI Group Inc.

From: Dumitru Liubeznii
Sent: Thursday, September 16, 2021 4:35 PM
To: Jillian.Britto@caledon.ca; rosalie.shan@peelregion.ca; Mark.j.white@ontario.ca
Cc: Rao Marthi <rao.marthi@ibigroup.com>
Subject: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region
Importance: High

Hello Engineering Staff at Township of Caledon, Peel Region, and MTO,

IBI Group is pleased to provide this Terms of Reference for Traffic Impact Study (TIS) in support of a new warehouse development at 12304 Heart Lake Road on the west side of Heart Lake Road, just north of Highway

410 in the Town of Caledon (the "Town"), within the Peel Region (the "Region"). The subject site is currently occupied by vacant lands. The conceptual site plan dated May 4, 2021 (see attached) shows three buildings, Buildings 1 and 2 on the south side of the proposed extension of Abbotside Way to the intersection of Heart lake Road. While Building 3 is proposed on the north side of the proposed extension of Abbotside Way. Two full move accesses onto the proposed extension of Abbotside Way and one full move access on Heart Lake Road are planned for Buildings 1 and 2. While Building 3 is proposed to have two full move accesses on to the proposed extension of Abbotside Way and one full move access on Heart Lake Road. Note, that the attached site plan is conceptual and site statistics are subject to change.

We ask the City/Region/MTO to kindly review the following information and provide feedback, otherwise, forward this request to appropriate staff member for review. Kindly review the highlighted sections in detail as they are of most importance.

The scope of TIS Study includes the following activities:

Existing conditions assessment includes following tasks:

- IBI proposes to include the following intersections in the traffic analysis:
  - Kennedy Road North and Abbotside Way (signalized) - **Township**;
  - Abbotside Way and Learmont Avenue (unsignalized) - **Township**;
  - Abbotside Way and Bonnieglen Farm Boulevard (unsignalized) - **Township**;
  - Heart Lake Road and Mayfield Road (signalized) – **Region**;
  - Mayfield Road and Highway 410 Southbound Off-Ramp (signalized) – **Region / MTO**; and,
  - Mayfield Road and Highway 410 Northbound Off-Ramp (signalized) – **Region / MTO**.
- Obtain / undertake weekday morning (7:00 AM – 9:00 AM) and afternoon (4:00PM – 6:00 PM) peak hours traffic turning movement counts at the above intersections;
- Assess traffic operations and queuing analyses using Synchro 11.0 analysis package;
- Identify and document any additional deficiencies or operational problems.

1. ***We ask the Township/Region/MTO to advise, whether it will be acceptable to conduct new traffic surveys to collect the traffic volume data that reflects existing typical traffic operations. Otherwise, IBI will check for latest turning movement counts (TMC) data at the noted intersections in City's/Region's/MTO's database for purchase.***

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

Future Background conditions assessment includes following tasks:

- Develop future background traffic volumes for development site opening year, five (5)-year, and 10-year horizon using the traffic growth rate factors and additional traffic from the planned/approved developments in the proximity of the proposed development.
- Calculate traffic growth rate from regression analysis of historic AADT / ATR / TMC counts, or calibrated travel demand forecasting, or other area transportation studies, whichever is available;
- Complete queuing analysis using Synchro 11.0 software under future background traffic conditions;
- Identify and document any additional deficiencies or operational problems;

  It is important to note, that the future extension of Abbotside Way from Bonnieglen Farm Boulevard to Heart Lake Road may change the travel pattern in the study area.

3. ***We ask the Township to provide traffic studies done in the area to determine the future traffic diversion associated with extension of Abbotside Way. If such studies were not conducted, we can set up a meeting with the City to discuss appropriate methodology.***

4. ***We ask the Township/Region to provide contact information of appropriate staff member to acquire historic AADT / ATR / TMC data, or calibrated travel demand forecasting, or other area transportation studies that we can use for future background traffic growth projection.***

5. ***We ask the Township/Region/MTO to provide the background development information (Site Plans, Transportation Studies, Units, GFA/GLA, Planned Completion Year/Construction Phases etc.) that needs to be accounted for in our study. Please review and provide feedback, otherwise, forward this request to appropriate staff member for review.***

Site Traffic Generation, Distribution, and Assignment includes following tasks:

- Determine site generated trips during the weekday morning and afternoon peak hours using data from the Trip Generation Manual, 10th Edition published by the Institute of Transportation Engineers (ITE), adjusted (reduced) by a transit mode split factor determined from the TTS analyses.
- Provide supporting documentation for the proposed modal split reductions for all horizon years.
- Develop a site traffic distribution using the 2016 Transportation Tomorrow Survey (TTS) data and existing traffic patterns.
- Assign site traffic to the network based on logical travel routes and available traffic capacity.

Future Total conditions assessment includes following tasks:

- Develop and plot the future total traffic volumes for development site opening year, five (5)-year, and 10-year horizon;
- Assess the future total traffic operations at the study area intersections and identify the operational issues;
- Complete queuing analysis using Synchro 11.0 software under future total traffic conditions.
- Identify and document any additional deficiencies or operational problems.

Design Vehicle Maneuverability Review includes following tasks:

- Confirm that WB-20 (53' truck), waste collection vehicle, emergency response vehicle, and delivery vehicle using AutoTURN can enter/exit the site in a forward motion, and that access to the loading areas is functional.
- Confirm that access to critical parking areas by passenger vehicles are functional.

Site Access Review includes following tasks:

- Check left-turn lane and right-turn lane warrant analysis will be conducted for the proposed site accesses, based on the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (June 2017) and the MTO Design Supplement document.
- Compare the proposed subdivision road geometry, width, clear throat length, and curb radius with the Town's Development Standard Manual.
- Check compliance and variance with the standards and guidelines.

Site Access Sightline Assessment includes following tasks:

- Complete a desktop review of the sightline assessment at the proposed site access driveways on Heart lake Road and Abbotside Way;
- Compare the available sightlines against the applicable standards, i.e., the 2017 Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (June 2017) Manual.

Parking Review includes following tasks:

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

We trust this Terms of Reference is to your satisfaction and should you have any questions or comments, please do not hesitate to contact the undersigned. We thank you for your assistance.

Kind regards,

Dumitru Liubeznii, EIT

Traffic Operations and Safety Analyst

WE HAVE MOVED: Our new address is 8133 Warden Ave, Unit 300, Markham, ON L6G 1B3. Our phone and fax number remain the same.

IBI GROUP
8133 Warden Ave, Unit 300
Markham ON L6G 1B3 Canada
tel +1 905 763 2322 ext 63523

Dumitru Liubeznii

Subject: FW: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

From: Shan, Rosalie <rosalie.shan@peelregion.ca>
Sent: Tuesday, September 28, 2021 2:16 PM
To: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>; Jillian Britto <Jillian.Britto@caledon.ca>
Cc: Rao Marthi <rao.marthi@ibigroup.com>
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

Hi Dumitru,

Thank you for the following up on this circulation.

The site does not directly abutting Regional Road, The Region has no comments to the terms of reference at this time.

Please find the link here for the contact information for background traffic on Regional Roads (growth rate, AADT, signal timing, etc.). Let me know if you have any questions or concerns.

Regards,
Rosalie Shan, P.Eng., MScE
Technical Analyst
Traffic Development & Permits
Region of Peel
10 Peel Centre Drive Suite B, 4th Floor
Brampton, ON L6T 4B9
905 791-7800 Ext. 7999

Region of Peel
working with you

Dumitru Liubeznii

Subject: FW: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

---

From: White, Mark J. (MTO) <Mark.J.White@ontario.ca>
Sent: Friday, September 24, 2021 3:31 PM
To: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Subject: FW: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

Good afternoon Dumitru,

Good news, the review was much quicker than anticipated. Our traffic office has reviewed the TOR for proposed development at 12304 Heart Lake Rd in Town of Caledon, see the comments below:

1. Proponent to reference and shall follow attached ministry's latest general guidelines (Feb 2021) for the preparation of TIS.
2. Attached ministry's latest TMCs at Mayfield IC from 2016, proponent may conduct new TMCs if deemed necessary.
3. Attached signal timing plans at Mayfield IC

Please let me know if you have any questions.

Regards,

Mark White
Corridor Management Planner
Ministry of Transportation | Central Region
159 Sir William Hearst Ave. 7th Floor,
Toronto, ON M3M 0B7
Mark.j.white@ontario.ca

Appendix B

Turning Movement Counts (TMC) Data

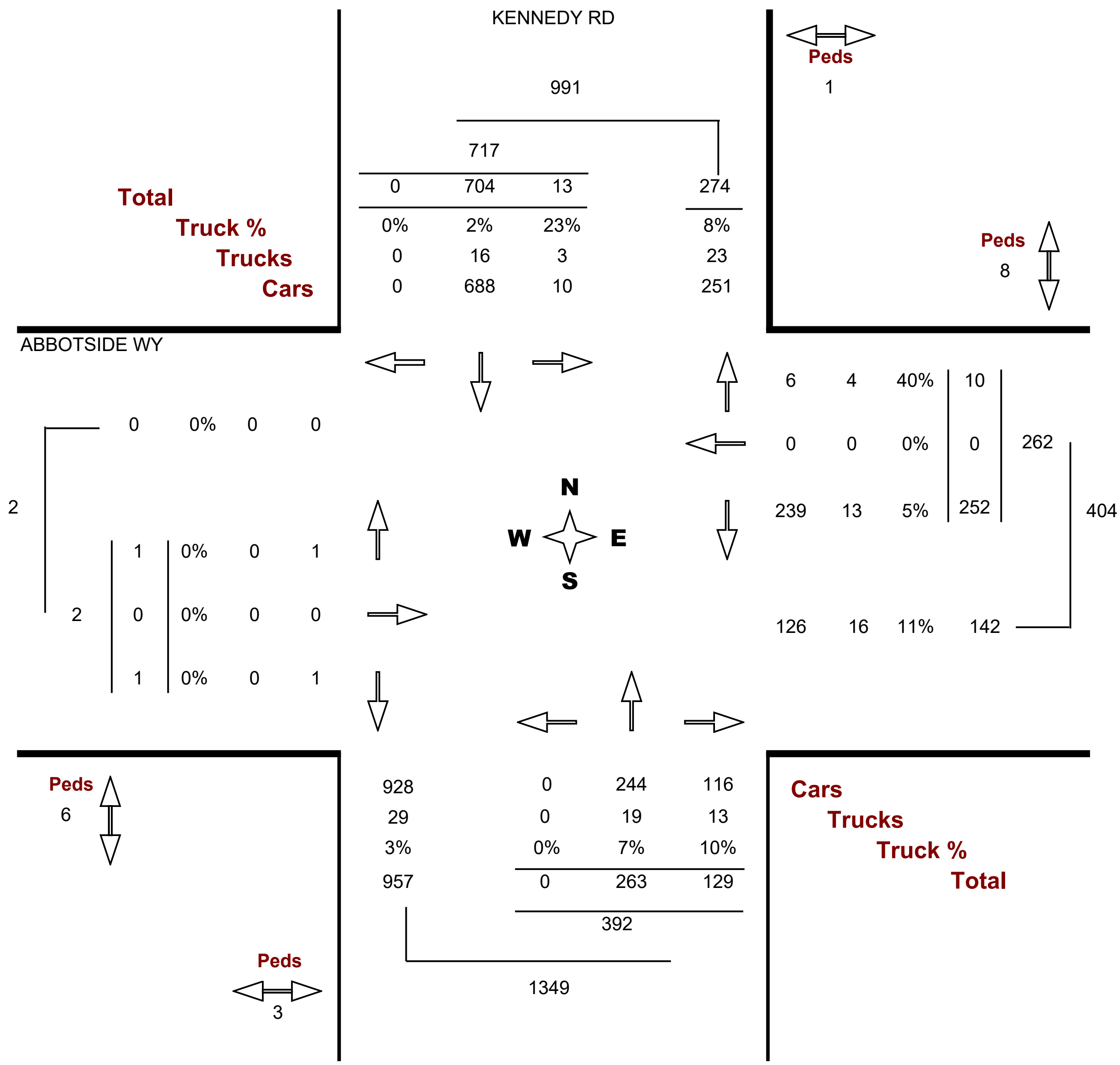
Turning Movements Report - AM Period

Location............. ABBOTSIDE WY @ KENNEDY RD

Municipality....... Caledon

GeoID....... 28853

Count Date....... Wednesday, 12 April, 2017 **Peak Hour......** 07:30 AM — 08:30 AM



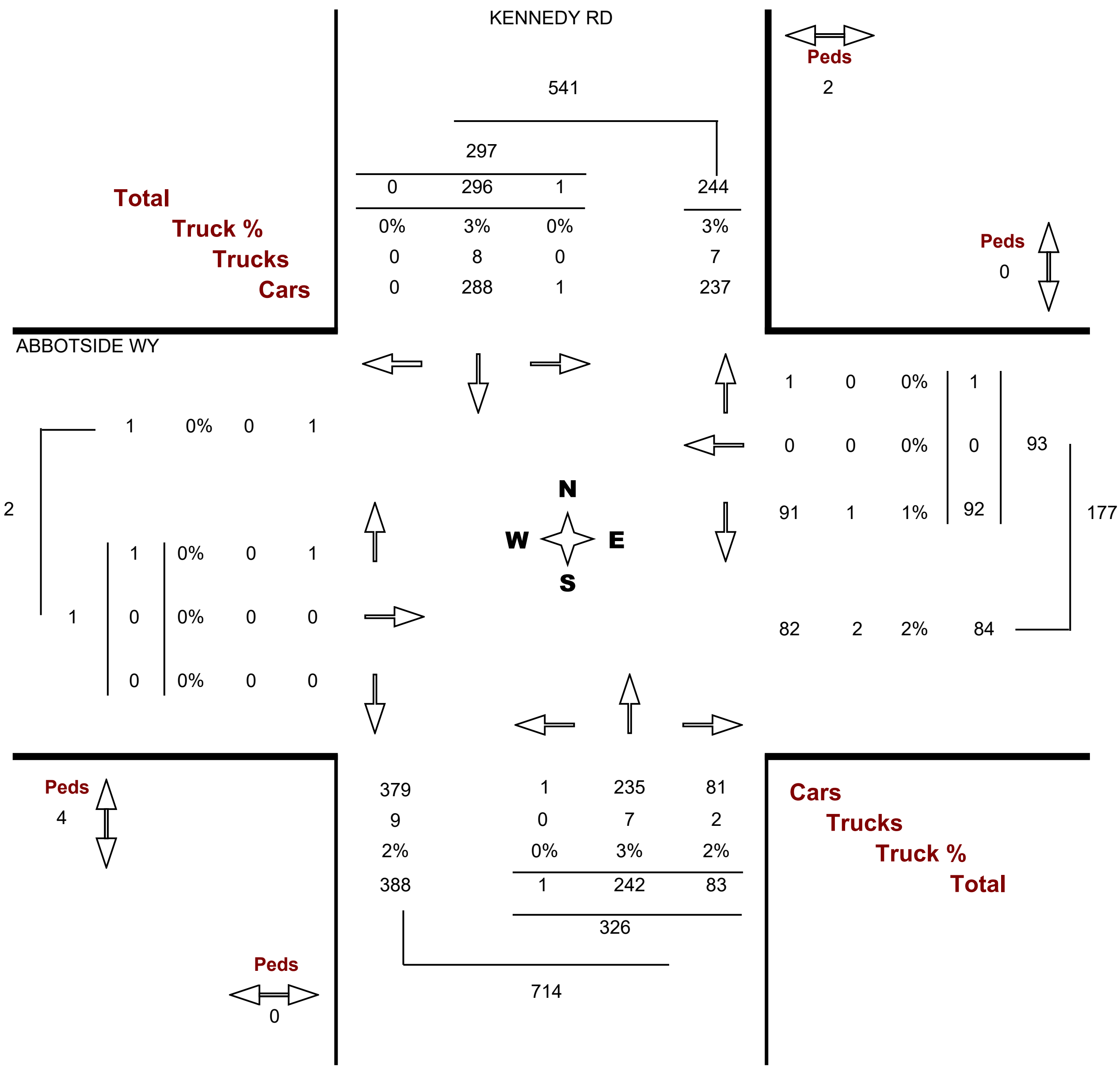
Turning Movements Report - MD Period

Location............ ABBOTSIDE WY @ KENNEDY RD

Municipality....... Caledon

GeoID....... 28853

Count Date....... Wednesday, 12 April, 2017 **Peak Hour......** 11:30 AM — 12:30 PM



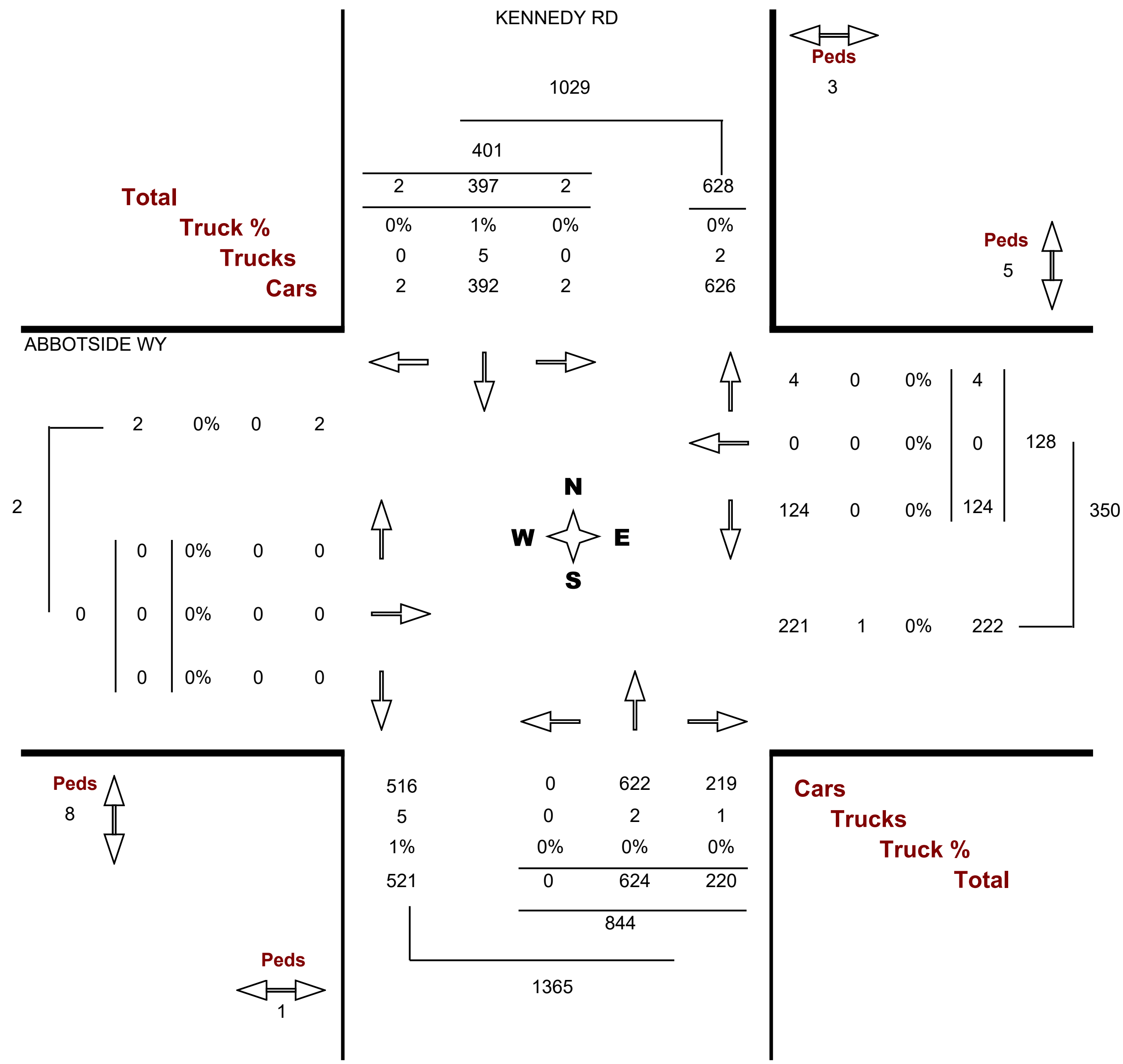
Turning Movements Report - PM Period

Location............. ABBOTSIDE WY @ KENNEDY RD

Municipality....... Caledon

GeoID....... 28853

Count Date....... Wednesday, 12 April, 2017 **Peak Hour......** 05:00 PM — 06:00 PM



Turning Movements Report - AM Period

Location............. ABBOTSIDE WY @ LEARMONT AV

Municipality....... Caledon

GeoID....... 28854

Count Date....... Thursday, 13 September, 2018 **Peak Hour......** 07:45 AM — 08:45 AM

LEARMONT AV

418

303

Total	298	0	5	115
Truck %	3%	0%	0%	3%
Trucks	9	0	0	4
Cars	289	0	5	111

Peds 7

Peds 0

ABBOTSIDE WY

461

311	4%	13	298

150

109	4%	4	105
41	5%	2	39
0	0%	0	0

N

W E

S

6	0	0%	6
9	4	31%	13
0	0	0%	0

19

65

44	2	4%	46

Peds 0

	0	0	0	0
	0	0	0	0
	0%	0%	0%	0%
	0	0	0	0

0

0

Cars
Trucks
Truck %
Total

Peds 0

Turning Movements Report - MD Period

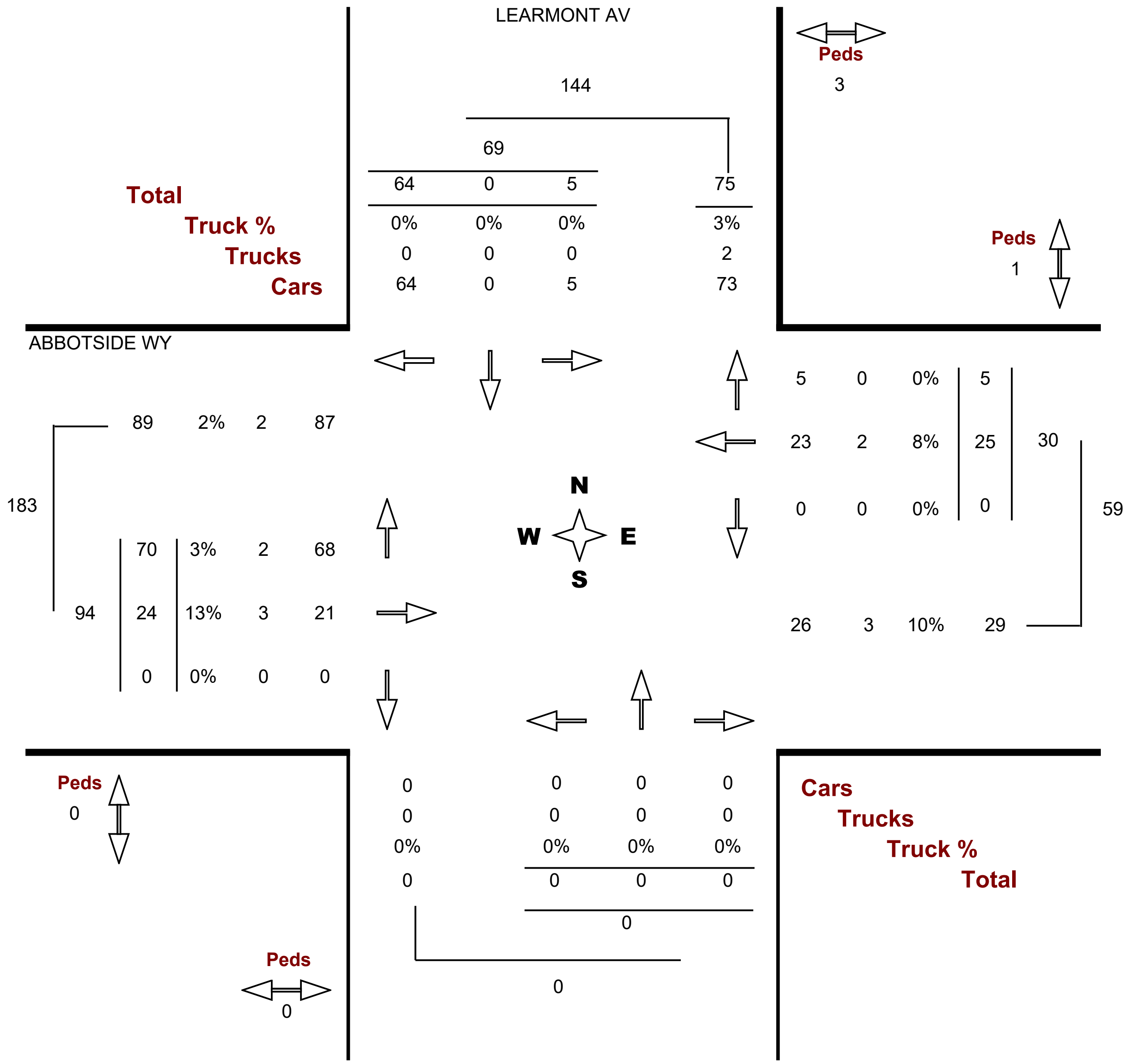
Location............. ABBOTSIDE WY @ LEARMONT AV

Municipality....... Caledon

GeoID....... 28854

Count Date....... Thursday, 13 September, 2018

Peak Hour...... 12:00 PM —— 01:00 PM



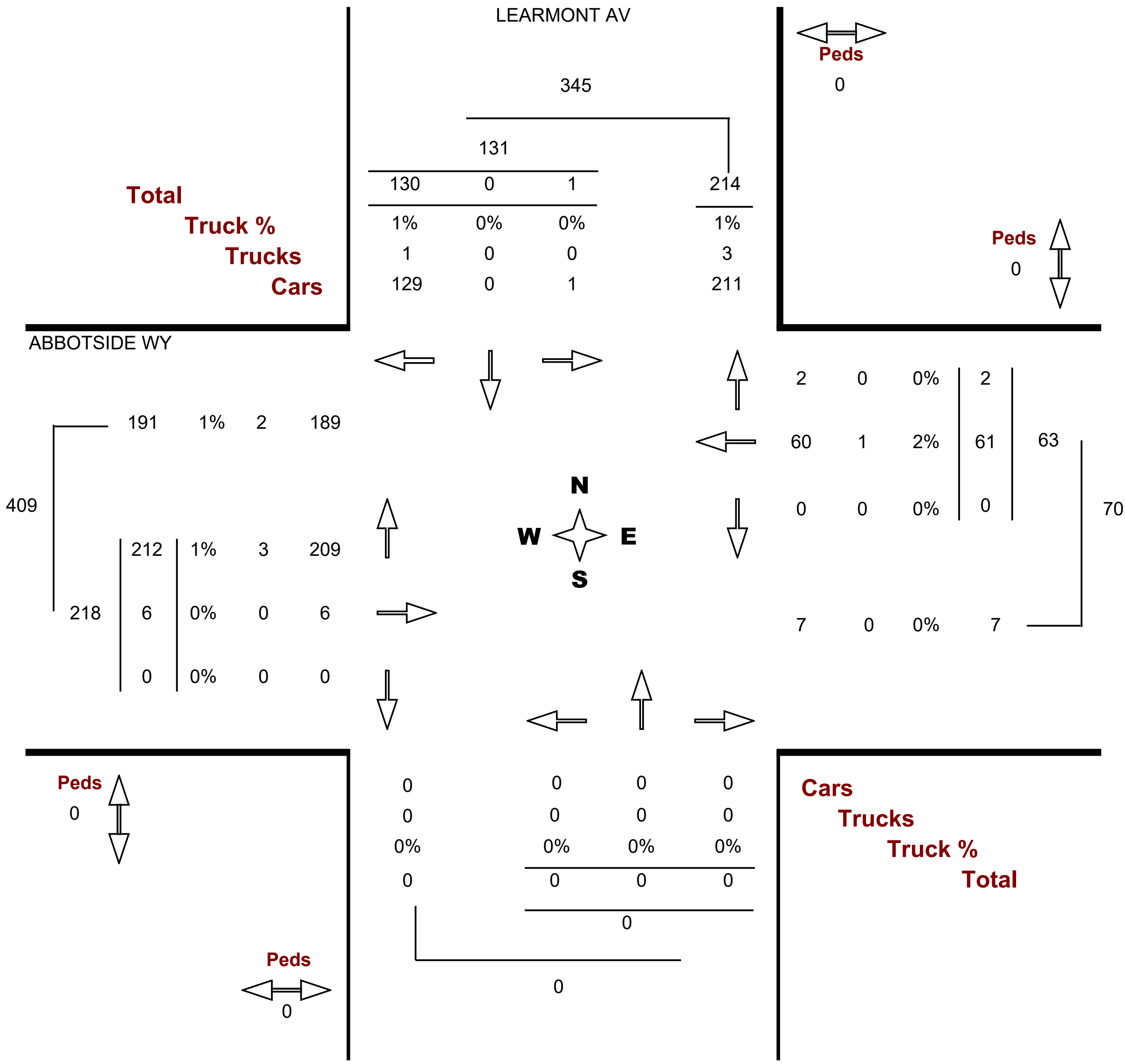
Turning Movements Report - PM Period

Location............. ABBOTSIDE WY @ LEARMONT AV

Municipality....... Caledon

GeoID....... 28854

Count Date....... Thursday, 13 September, 2018 **Peak Hour......** 04:15 PM —— 05:15 PM



Spectrum

Turning Movement Count
Location Name: MAYFIELD RD & HEART LAKE RD
Date: Tue, Nov 29, 2016   Deployment Lead: Chris Koukaras

Peel Region
10 Peel Centre Drive
Suite B - 4th Floor
Brampton ON, Canada, L6T 4B9

Turning Movement Count (7 . MAYFIELD RD & HEART LAKE RD) CustID: 01413759 MioID: 369877

Start Time	Southbound HEART LAKE ROAD						Westbound MAYFIELD RD						Northbound HEART LAKE ROAD						Eastbound MAYFIELD RD						Int. Total (15 min)	Int. Total (1 hr)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total		
07:00:00	15	13	3	0	0	31	2	150	1	0	0	153	14	4	1	0	0	19	2	279	74	0	0	355	558	
07:15:00	16	11	3	0	0	30	13	145	7	0	0	165	19	2	5	0	0	26	4	267	94	0	0	365	586	
07:30:00	8	23	8	0	0	39	24	179	4	0	0	207	22	4	6	0	0	32	8	302	131	0	0	441	719	
07:45:00	6	28	12	0	0	46	37	196	2	0	0	235	25	2	6	0	0	33	6	300	132	0	0	438	752	2615
08:00:00	12	16	7	0	0	35	42	186	1	0	0	229	25	4	2	0	0	31	4	276	144	0	0	424	719	2776
08:15:00	7	11	15	0	0	33	13	167	7	0	0	187	31	2	4	0	0	37	3	240	98	1	0	342	599	2789
08:30:00	5	13	8	0	0	26	9	153	3	0	0	165	40	3	4	0	0	47	2	270	71	0	0	343	581	2651
08:45:00	11	9	4	0	0	24	11	120	4	0	0	135	21	2	5	0	0	28	8	223	56	0	0	287	474	2373
BREAK																										
11:00:00	6	1	4	0	0	11	0	109	9	0	0	118	18	6	3	0	0	27	5	142	19	0	0	166	322	
11:15:00	5	3	3	0	0	11	1	117	2	0	0	120	8	2	1	0	0	11	1	129	18	0	0	148	290	
11:30:00	9	3	2	0	0	14	1	90	7	0	0	98	12	2	3	0	0	17	2	148	16	0	0	166	295	
11:45:00	3	4	6	0	0	13	5	128	3	0	0	136	13	2	2	0	0	17	4	157	16	0	0	177	343	1250
12:00:00	4	2	4	0	0	10	3	123	6	0	0	132	8	4	6	0	0	18	1	108	30	0	0	139	299	1227
12:15:00	4	0	2	0	0	6	2	109	6	0	0	117	20	3	1	0	0	24	3	149	11	0	0	163	310	1247
12:30:00	5	3	3	0	0	11	2	113	1	0	0	116	18	4	4	0	0	26	0	162	19	0	0	181	334	1286
12:45:00	11	1	2	0	0	14	4	135	6	0	0	145	18	2	5	0	0	25	6	141	18	0	0	165	349	1292
13:00:00	9	9	0	0	0	18	7	129	1	0	0	137	21	3	1	0	0	25	3	141	16	0	0	160	340	1333
13:15:00	5	4	4	0	0	13	3	111	4	0	0	118	16	3	4	0	0	23	0	145	13	0	0	158	312	1335
13:30:00	5	3	3	0	0	11	3	122	4	0	0	129	19	2	4	0	0	25	0	116	24	0	0	140	305	1306
13:45:00	7	3	2	0	0	12	5	139	4	0	0	148	14	8	7	0	0	29	2	140	15	0	0	157	346	1303
BREAK																										
15:00:00	7	2	7	0	0	16	5	234	10	0	0	249	47	5	7	0	0	59	7	168	37	0	0	212	536	
15:15:00	2	6	3	0	0	11	8	221	8	0	0	237	77	10	4	0	0	91	5	148	22	0	0	175	514	
15:30:00	7	8	3	0	0	18	4	271	9	0	0	284	64	3	6	0	0	73	10	168	36	0	0	214	589	
15:45:00	13	7	5	0	0	25	6	209	18	0	0	233	64	4	6	0	0	74	12	176	38	0	0	226	558	2197
16:00:00	6	8	6	0	0	20	7	291	10	0	0	308	62	8	3	0	0	73	10	212	25	0	0	247	648	2309
16:15:00	5	8	3	0	0	16	8	267	7	2	0	284	76	10	3	0	0	89	6	193	29	0	0	228	617	2412
16:30:00	9	4	5	0	0	18	13	306	13	0	0	332	84	10	2	0	0	96	7	173	24	0	0	204	650	2473
16:45:00	7	6	7	0	0	20	9	285	12	0	0	306	77	14	3	0	0	94	8	218	36	0	0	262	682	2597
17:00:00	7	2	4	0	0	13	6	138	2	0	0	146	42	8	4	0	0	54	1	226	31	0	0	258	471	2420
17:15:00	12	6	8	0	0	26	2	314	8	0	0	324	80	3	6	0	0	89	8	197	36	0	0	241	680	2483

Spectrum

Peel Region
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17:30:00	10	12	8	0	0	30	4	350	9	0	0	363	78	3	3	0	0	84	5	201	30	0	0	236	713	2546
17:45:00	5	3	8	0	0	16	4	317	16	0	0	337	74	1	4	0	0	79	3	157	34	0	0	194	626	2490
Grand Total	243	232	162	0	0	637	263	5924	204	2	0	6393	1207	143	125	0	0	1475	146	6072	1393	1	0	7612	**16117**	-
Approach%	38.1%	36.4%	25.4%	0%		-	4.1%	92.7%	3.2%	0%		-	81.8%	9.7%	8.5%	0%		-	1.9%	79.8%	18.3%	0%		-	**-**	-
Totals %	1.5%	1.4%	1%	0%		4%	1.6%	36.8%	1.3%	0%		39.7%	7.5%	0.9%	0.8%	0%		9.2%	0.9%	37.7%	8.6%	0%		47.2%	**-**	-
Heavy	14	4	10	0		-	8	475	12	0		-	28	3	6	0		-	8	431	31	0		-	**-**	-
Heavy %	5.8%	1.7%	6.2%	0%		-	3%	8%	5.9%	0%		-	2.3%	2.1%	4.8%	0%		-	5.5%	7.1%	2.2%	0%		-	**-**	-
Bicycles	0	0	0	0		-	0	0	0	0		-	1	0	1	0		-	0	0	1	0		-	**-**	-
Bicycle %	0%	0%	0%	0%		-	0%	0%	0%	0%		-	0.1%	0%	0.8%	0%		-	0%	0%	0.1%	0%		-	**-**	-

Spectrum

Turning Movement Count
Location Name: MAYFIELD RD & HEART LAKE RD
Date: Tue, Nov 29, 2016 Deployment Lead: Chris Koukaras

Peel Region
10 Peel Centre Drive
Suite B - 4th Floor
Brampton ON, Canada, L6T 4B9

Peak Hour: 07:30 AM - 08:30 AM Weather:

Start Time	Southbound HEART LAKE ROAD						Westbound MAYFIELD RD					
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total
07:30:00	8	23	8	0	0	39	24	179	4	0	0	207
07:45:00	6	28	12	0	0	46	37	196	2	0	0	235
08:00:00	12	16	7	0	0	35	42	186	1	0	0	229
08:15:00	7	11	15	0	0	33	13	167	7	0	0	187
Grand Total	33	78	42	0	0	153	116	728	14	0	0	858
Approach%	21.6%	51%	27.5%	0%		-	13.5%	84.8%	1.6%	0%		-
Totals %	1.2%	2.8%	1.5%	0%		5.5%	4.2%	26.1%	0.5%	0%		30.8%
PHF	0.69	0.7	0.7	0		0.83	0.69	0.93	0.5	0		0.91
Heavy	0	1	0	0		1	3	87	4	0		94
Heavy %	0%	1.3%	0%	0%		0.7%	2.6%	12%	28.6%	0%		11%
Lights	33	77	42	0		152	113	641	10	0		764
Lights %	100%	98.7%	100%	0%		99.3%	97.4%	88%	71.4%	0%		89%
Single-Unit Trucks	0	0	0	0		0	0	51	3	0		54
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	7%	21.4%	0%		6.3%
Buses	0	0	0	0		0	2	21	1	0		24
Buses %	0%	0%	0%	0%		0%	1.7%	2.9%	7.1%	0%		2.8%
Articulated Trucks	0	1	0	0		1	1	15	0	0		16
Articulated Trucks %	0%	1.3%	0%	0%		0.7%	0.9%	2.1%	0%	0%		1.9%
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-
Bicycles on Road%	-	-	-	-	%		-	-	-	-	%	

Start Time	Northbound HEART LAKE ROAD						Eastbound MAYFIELD RD						Int. Total (15 min)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	
07:30:00	22	4	6	0	0	32	8	302	131	0	0	441	719
07:45:00	25	2	6	0	0	33	6	300	132	0	0	438	752
08:00:00	25	4	2	0	0	31	4	276	144	0	0	424	719
08:15:00	31	2	4	0	0	37	3	240	98	1	0	342	599
Grand Total	103	12	18	0	0	133	21	1118	505	1	0	1645	**2789**
Approach%	77.4%	9%	13.5%	0%		-	1.3%	68%	30.7%	0.1%		-	-
Totals %	3.7%	0.4%	0.6%	0%		4.8%	0.8%	40.1%	18.1%	0%		59%	-
PHF	0.83	0.75	0.75	0		0.9	0.66	0.93	0.88	0.25		0.93	-
Heavy	5	0	0	0		5	1	63	11	0		75	-
Heavy %	4.9%	0%	0%	0%		3.8%	4.8%	5.6%	2.2%	0%		4.6%	-
Lights	98	12	18	0		128	20	1055	494	1		1570	-
Lights %	95.1%	100%	100%	0%		96.2%	95.2%	94.4%	97.8%	100%		95.4%	-
Single-Unit Trucks	0	0	0	0		0	0	32	1	0		33	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	2.9%	0.2%	0%		2%	-
Buses	5	0	0	0		5	1	27	10	0		38	-
Buses %	4.9%	0%	0%	0%		3.8%	4.8%	2.4%	2%	0%		2.3%	-
Articulated Trucks	0	0	0	0		0	0	4	0	0		4	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.2%	-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	%		-	-	-	-	%		-

Spectrum

Turning Movement Count
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Peel Region
10 Peel Centre Drive
Suite B - 4th Floor
Brampton ON, Canada, L6T 4B9

Peak Hour: 12:30 PM - 01:30 PM Weather:

Start Time	Southbound HEART LAKE ROAD						Westbound MAYFIELD RD						Northbound HEART LAKE ROAD						Eastbound MAYFIELD RD						Int. Total (15 min)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	
12:30:00	5	3	3	0	0	11	2	113	1	0	0	116	18	4	4	0	0	26	0	162	19	0	0	181	334
12:45:00	11	1	2	0	0	14	4	135	6	0	0	145	18	2	5	0	0	25	6	141	18	0	0	165	349
13:00:00	9	9	0	0	0	18	7	129	1	0	0	137	21	3	1	0	0	25	3	141	16	0	0	160	340
13:15:00	5	4	4	0	0	13	3	111	4	0	0	118	16	3	4	0	0	23	0	145	13	0	0	158	312
Grand Total	30	17	9	0	0	56	16	488	12	0	0	516	73	12	14	0	0	99	9	589	66	0	0	664	1335
Approach%	53.6%	30.4%	16.1%	0%		-	3.1%	94.6%	2.3%	0%		-	73.7%	12.1%	14.1%	0%		-	1.4%	88.7%	9.9%	0%		-	-
Totals %	2.2%	1.3%	0.7%	0%		4.2%	1.2%	36.6%	0.9%	0%		38.7%	5.5%	0.9%	1%	0%		7.4%	0.7%	44.1%	4.9%	0%		49.7%	-
PHF	0.68	0.47	0.56	0		0.78	0.57	0.9	0.5	0		0.89	0.87	0.75	0.7	0		0.95	0.38	0.91	0.87	0		0.92	-
Heavy	2	2	1	0		5	1	69	0	0		70	1	0	0	0		1	0	45	1	0		46	-
Heavy %	6.7%	11.8%	11.1%	0%		8.9%	6.3%	14.1%	0%	0%		13.6%	1.4%	0%	0%	0%		1%	0%	7.6%	1.5%	0%		6.9%	-
Lights	28	15	8	0		51	15	419	12	0		446	72	12	14	0		98	9	544	65	0		618	-
Lights %	93.3%	88.2%	88.9%	0%		91.1%	93.8%	85.9%	100%	0%		86.4%	98.6%	100%	100%	0%		99%	100%	92.4%	98.5%	0%		93.1%	-
Single-Unit Trucks	2	1	1	0		4	0	55	0	0		55	1	0	0	0		1	0	36	1	0		37	-
Single-Unit Trucks %	6.7%	5.9%	11.1%	0%		7.1%	0%	11.3%	0%	0%		10.7%	1.4%	0%	0%	0%		1%	0%	6.1%	1.5%	0%		5.6%	-
Buses	0	1	0	0		1	0	2	0	0		2	0	0	0	0		0	0	2	0	0		2	-
Buses %	0%	5.9%	0%	0%		1.8%	0%	0.4%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.3%	-
Articulated Trucks	0	0	0	0		0	1	12	0	0		13	0	0	0	0		0	0	7	0	0		7	-
Articulated Trucks %	0%	0%	0%	0%		0%	6.3%	2.5%	0%	0%		2.5%	0%	0%	0%	0%		0%	0%	1.2%	0%	0%		1.1%	-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	%		-	-	-	-	%		-	-	-	-	%		-	-	-	-	%		-

TOWN OF CALEDON
PLANNING
RECEIVED
Nov 26, 2021

Spectrum

Turning Movement Count
Location Name: MAYFIELD RD & HEART LAKE RD
Date: Tue, Nov 29, 2016 Deployment Lead: Chris Koukaras

Peel Region
10 Peel Centre Drive
Suite B - 4th Floor
Brampton ON, Canada, L6T 4B9

Peak Hour: 04:00 PM - 05:00 PM Weather:

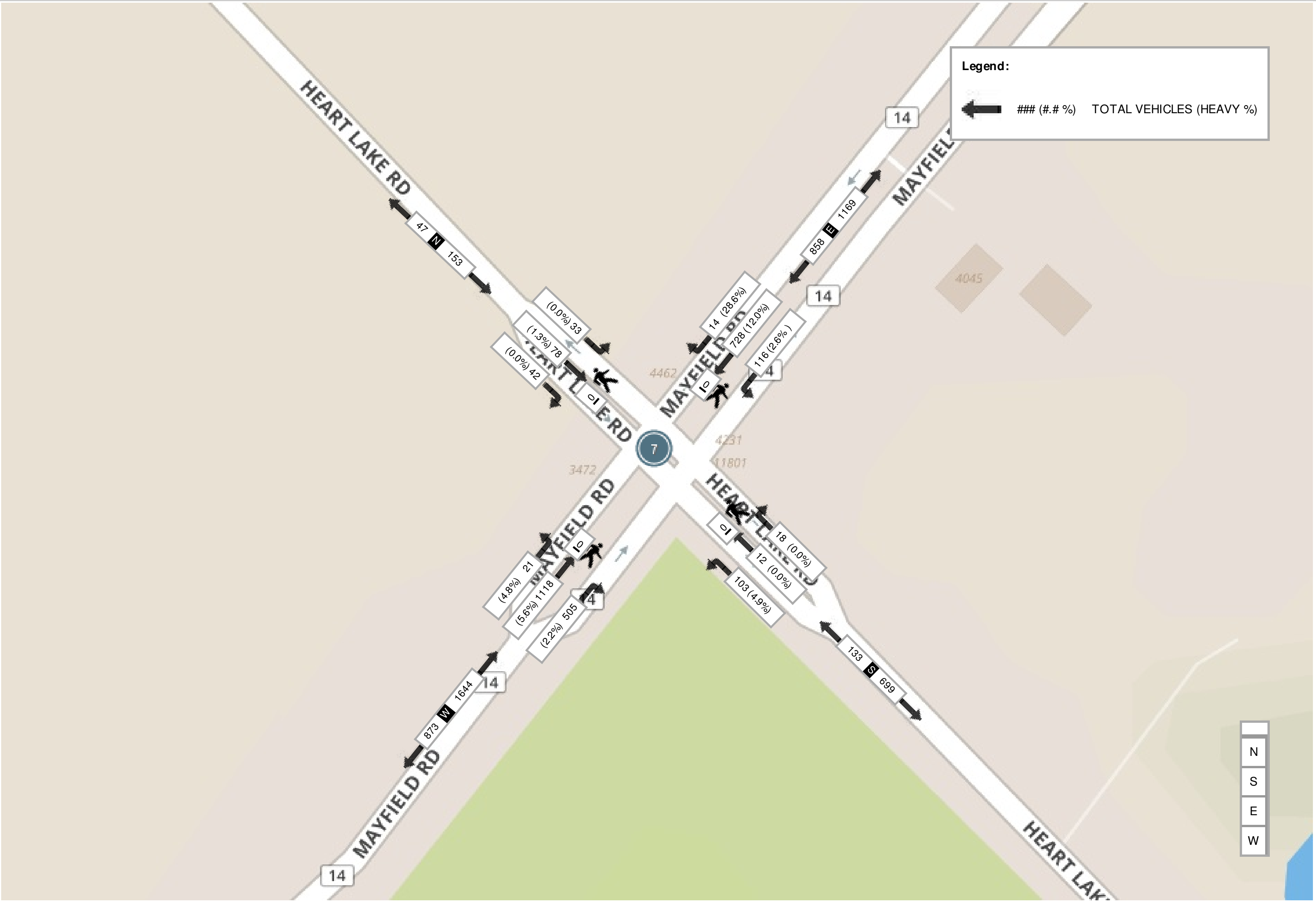
Start Time	Southbound HEART LAKE ROAD						Westbound MAYFIELD RD						Northbound HEART LAKE ROAD						Eastbound MAYFIELD RD						Int. Total (15 min)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	
16:00:00	6	8	6	0	0	20	7	291	10	0	0	308	62	8	3	0	0	73	10	212	25	0	0	247	648
16:15:00	5	8	3	0	0	16	8	267	7	2	0	284	76	10	3	0	0	89	6	193	29	0	0	228	617
16:30:00	9	4	5	0	0	18	13	306	13	0	0	332	84	10	2	0	0	96	7	173	24	0	0	204	650
16:45:00	7	6	7	0	0	20	9	285	12	0	0	306	77	14	3	0	0	94	8	218	36	0	0	262	682
Grand Total	27	26	21	0	0	74	37	1149	42	2	0	1230	299	42	11	0	0	352	31	796	114	0	0	941	2597
Approach%	36.5%	35.1%	28.4%	0%		-	3%	93.4%	3.4%	0.2%		-	84.9%	11.9%	3.1%	0%		-	3.3%	84.6%	12.1%	0%		-	-
Totals %	1%	1%	0.8%	0%		2.8%	1.4%	44.2%	1.6%	0.1%		47.4%	11.5%	1.6%	0.4%	0%		13.6%	1.2%	30.7%	4.4%	0%		36.2%	-
PHF	0.75	0.81	0.75	0		0.93	0.71	0.94	0.81	0.25		0.93	0.89	0.75	0.92	0		0.92	0.78	0.91	0.79	0		0.9	-
Heavy	2	1	1	0		4	2	37	1	0		40	4	0	1	0		5	1	72	7	0		80	-
Heavy %	7.4%	3.8%	4.8%	0%		5.4%	5.4%	3.2%	2.4%	0%		3.3%	1.3%	0%	9.1%	0%		1.4%	3.2%	9%	6.1%	0%		8.5%	-
Lights	25	25	20	0		70	35	1112	41	2		1190	295	42	10	0		347	30	724	107	0		861	-
Lights %	92.6%	96.2%	95.2%	0%		94.6%	94.6%	96.8%	97.6%	100%		96.7%	98.7%	100%	90.9%	0%		98.6%	96.8%	91%	93.9%	0%		91.5%	-
Single-Unit Trucks	2	0	0	0		2	1	23	0	0		24	1	0	0	0		1	0	35	2	0		37	-
Single-Unit Trucks %	7.4%	0%	0%	0%		2.7%	2.7%	2%	0%	0%		2%	0.3%	0%	0%	0%		0.3%	0%	4.4%	1.8%	0%		3.9%	-
Buses	0	1	1	0		2	1	7	1	0		9	3	0	1	0		4	1	15	5	0		21	-
Buses %	0%	3.8%	4.8%	0%		2.7%	2.7%	0.6%	2.4%	0%		0.7%	1%	0%	9.1%	0%		1.1%	3.2%	1.9%	4.4%	0%		2.2%	-
Articulated Trucks	0	0	0	0		0	0	7	0	0		7	0	0	0	0		0	0	22	0	0		22	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.6%	0%	0%		0.6%	0%	0%	0%	0%		0%	0%	2.8%	0%	0%		2.3%	-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	%		-	-	-	-	%		-	-	-	-	%		-	-	-	-	%		-

Spectrum

Turning Movement Count
Location Name: MAYFIELD RD & HEART LAKE RD
Date: Tue, Nov 29, 2016   Deployment Lead: Chris Koukaras

Peel Region
10 Peel Centre Drive
Suite B - 4th Floor
Brampton ON, Canada, L6T 4B9

Peak Hour: 07:30 AM - 08:30 AM   Weather:



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10 Peel Centre Drive
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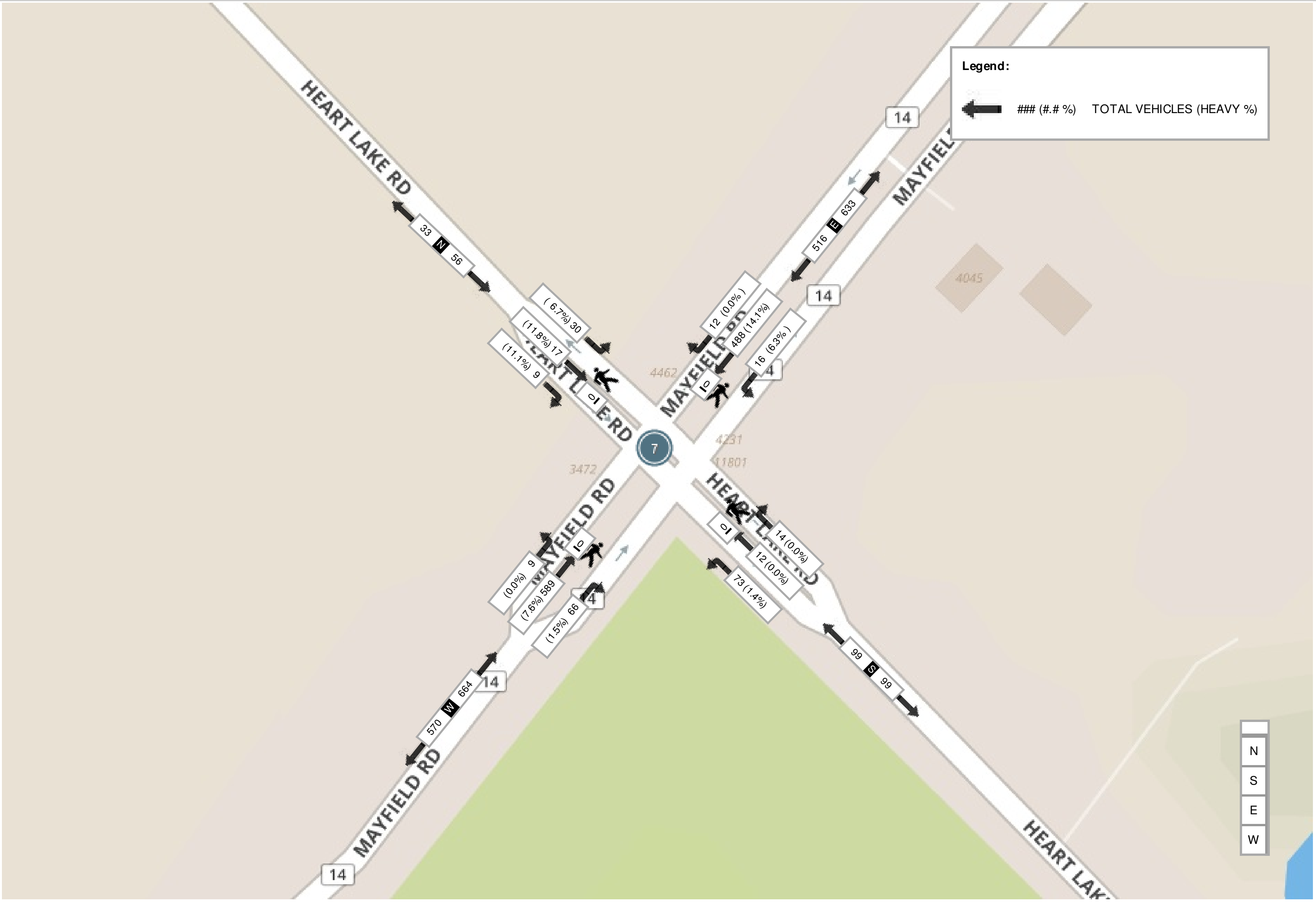
Peak Hour: 12:30 PM - 01:30 PM Weather:



Spectrum

Peel Region
10 Peel Centre Drive
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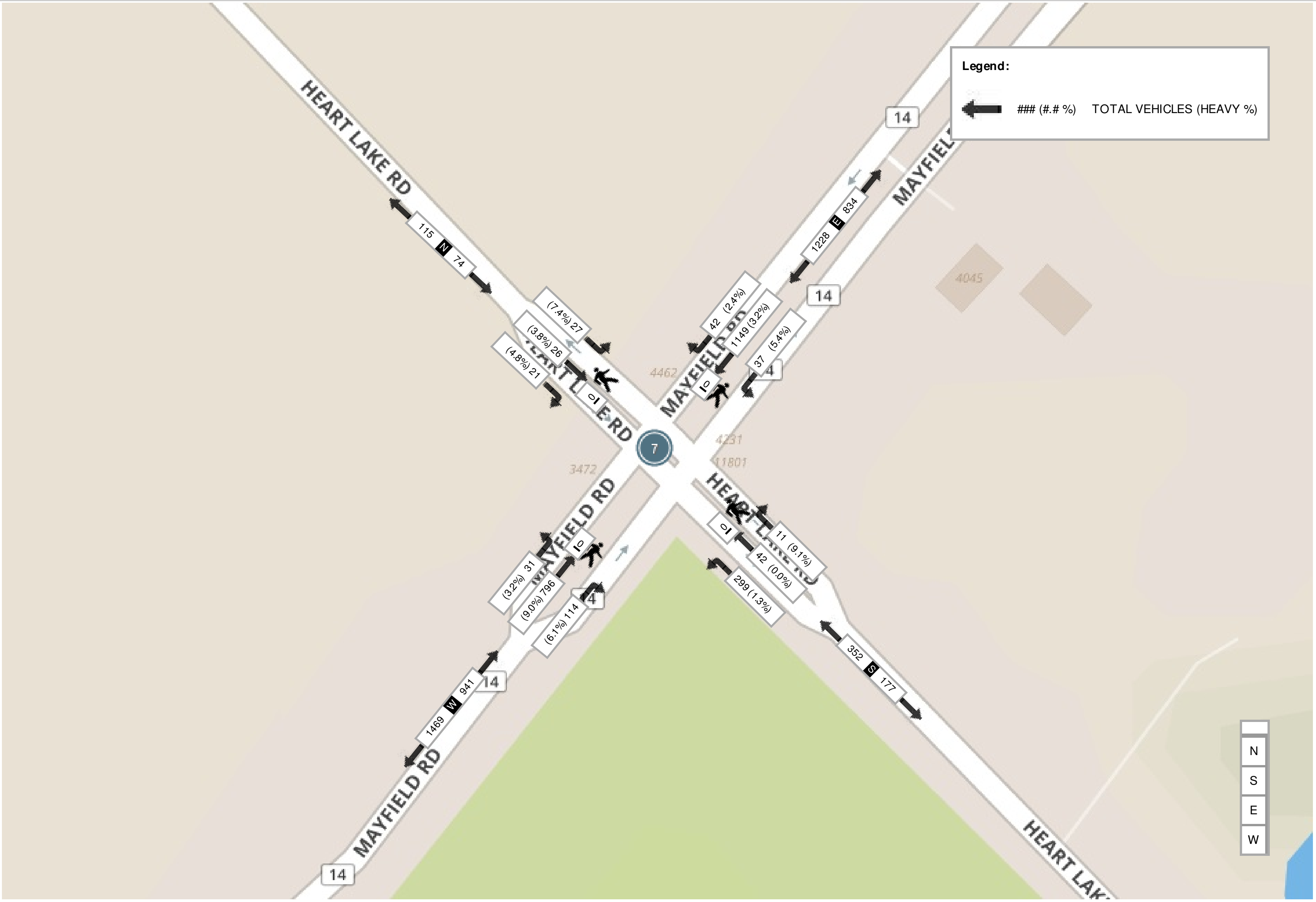
Brampton ON, Canada, L6T 4B9

Peak Hour: 04:00 PM - 05:00 PM Weather:



Ministry of Transportation
Ministère des Transports

2016

Intersection Layout Sheet

Version: 1.0 Feb 1, 2016

Contract # 9015-E-0009
Work Order # 654

Date: May 26, Day: Thu Hrs: 15 – 19 + 6 – 10 + –

Location: HWY 410 @ Mayfield Rd 14 IC Ramps: ERT / 24

Reg/Mun: CR Town/City: Kleinburg Area:

File Name: 3490850000 Device: Gretch / Jamar Unit # 12 / Interval 1: AM / NN / PM

Observer: Brandon Woolfson Weather: Clear / Clear Road Condition: Good /

LHRS & O/S: 49085 0

GPS: G - Star IV
Datum: WGS 84 Y / N
Lat: 43.75820
Long: -79.79700

Comments:

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

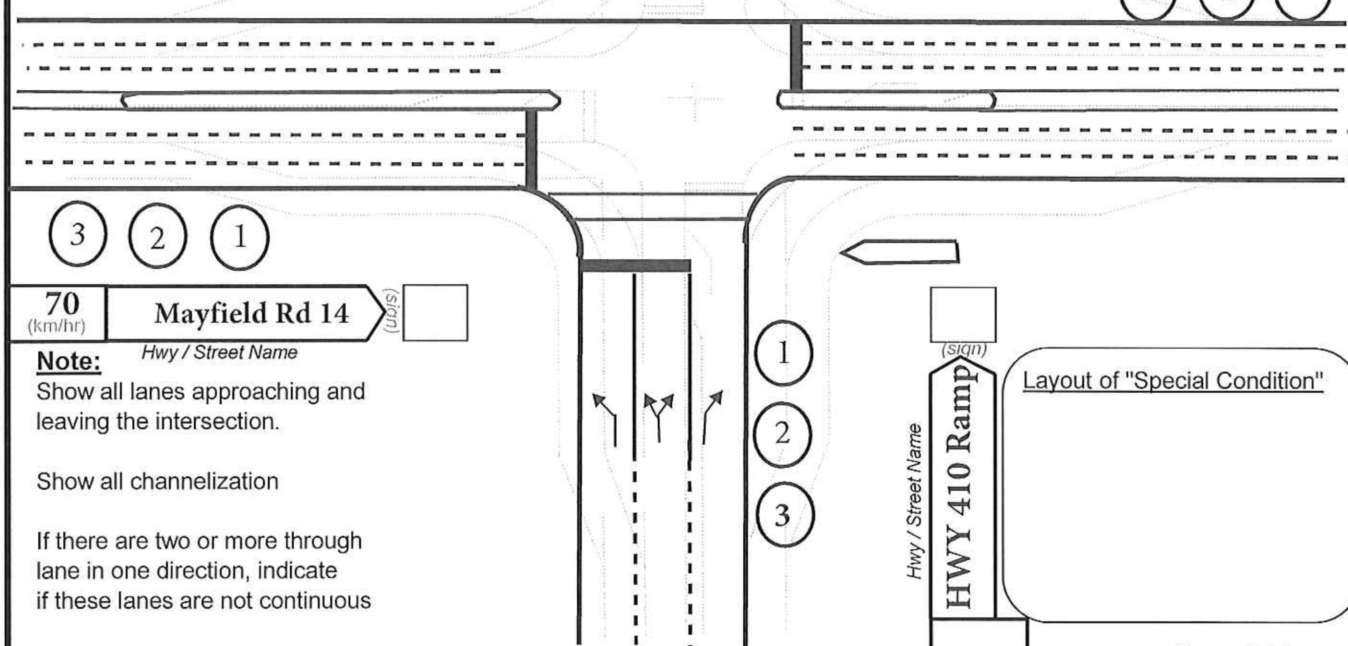
(km/hr)
Hwy / Street Name
(sign)

N

INDICATE LOCATION & DIRECTION OF VEHICLE

Vehicle N S E W

Hwy / Street Name
(sign) Mayfield Rd 14 70 (km/hr)
1 2 3



3 2 1
70 (km/hr) Mayfield Rd 14 (sign)
Hwy / Street Name

1 2 3

(sign)
Hwy / Street Name HWY 410 Ramp
(km/hr)

Note:
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"

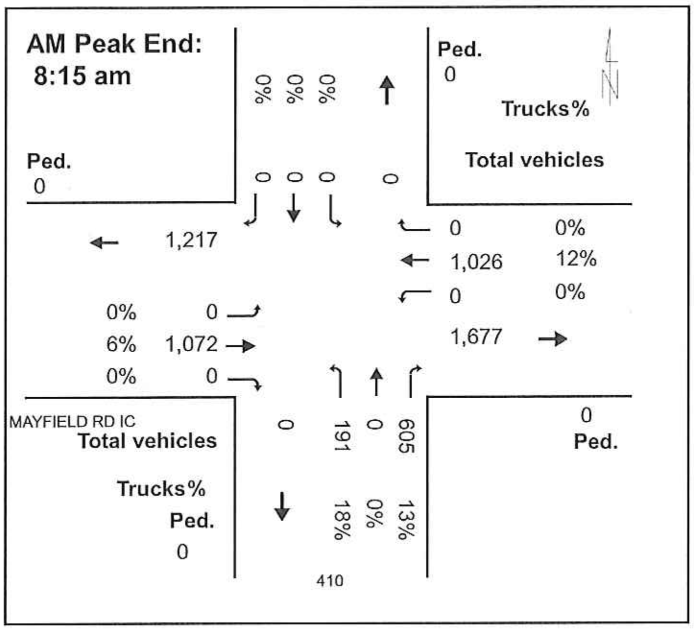
Page 1 / 1

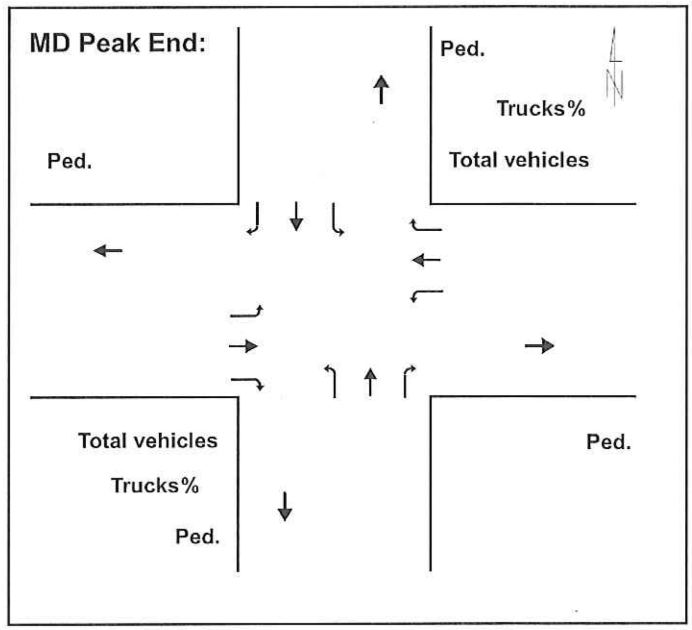
Ontario

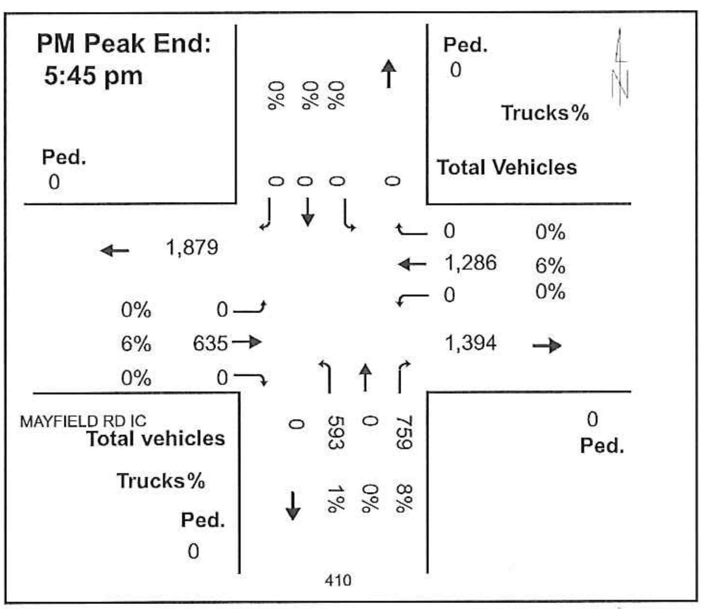
HWY 410 @ MAYFIELD RD IC

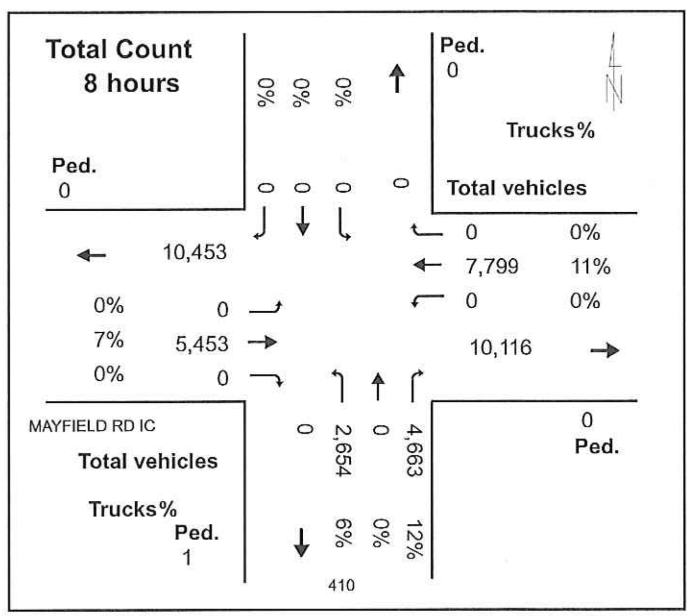
Central

Intersection ID:490850000(--E--) **Count Day:Thursday** **Count Date: 26-May-2016**









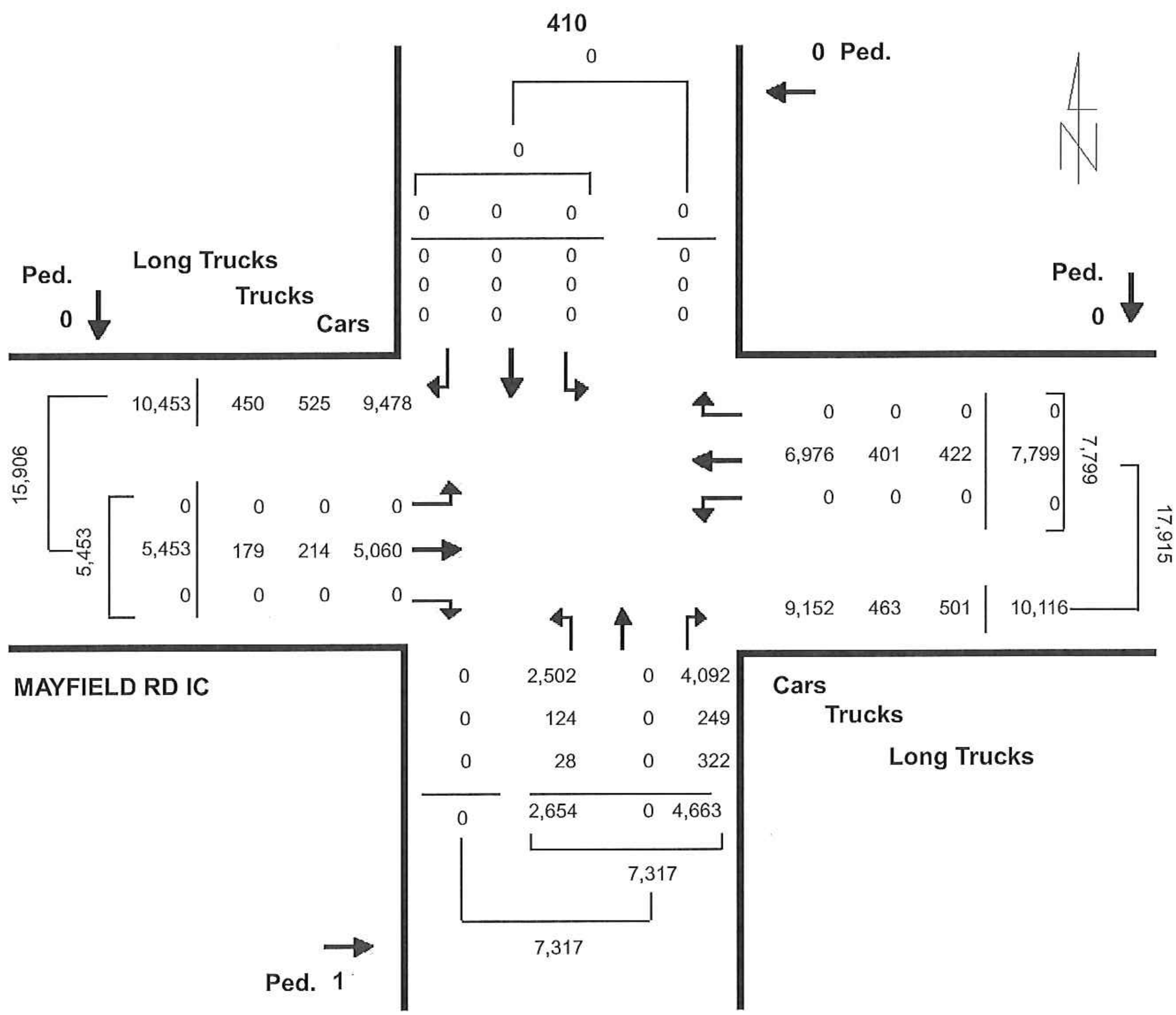
Traffic
Engineering
Software

COUNT TOTAL

HWY 410 @ MAYFIELD RD IC

Central

Intersection ID:490850000(--E--) **Date: 26-May-2016**



15 MIN REPORT

Intersection ID:490850000(--E--) **HWY 410 @ MAYFIELD RD IC** **Municipality: Central** **Date: 26-May-2016**

Time	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										Total
	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period1																																									
15:15	0	0	0	0	0	0	0	0	0	0	0	243	0	0	8	0	0	17	0	0	86	0	124	5	0	17	0	0	13	0	0	115	0	0	8	0	0	8	0	0	644
15:30	0	0	0	0	0	0	0	0	0	0	0	198	0	0	18	0	0	13	0	0	96	0	131	3	0	7	0	0	8	0	0	107	0	0	9	0	0	3	0	0	593
15:45	0	0	0	0	0	0	0	0	0	0	0	233	0	0	15	0	0	15	0	0	93	0	158	3	0	16	0	0	12	0	0	139	0	0	13	0	0	6	0	0	703
16:00	0	0	0	0	0	0	0	0	0	0	0	267	0	0	22	0	0	12	0	0	106	0	165	3	0	4	2	0	9	0	0	140	0	0	4	0	0	10	0	0	744
16:15	0	0	0	0	0	0	0	0	0	0	0	255	0	0	14	0	0	7	0	0	110	0	150	0	0	10	0	0	12	0	0	114	0	0	7	0	0	11	0	0	690
16:30	0	0	0	0	0	0	0	0	0	0	0	243	0	0	8	0	0	10	0	0	86	0	132	0	0	5	0	0	11	0	0	136	0	0	7	0	0	15	0	0	653
16:45	0	0	0	0	0	0	0	0	0	0	0	252	0	0	14	0	0	6	0	0	104	0	169	4	0	3	0	0	12	0	0	157	0	0	5	0	0	3	0	0	729
17:00	0	0	0	0	0	0	0	0	0	0	0	257	0	0	5	0	0	10	0	0	124	0	166	2	0	7	0	0	10	0	0	155	0	0	9	0	0	7	0	0	752
17:15	0	0	0	0	0	0	0	0	0	0	0	299	0	0	14	0	0	16	0	0	144	0	177	1	0	7	0	0	9	0	0	130	0	0	3	0	0	5	0	0	805
17:30	0	0	0	0	0	0	0	0	0	0	0	340	0	0	4	0	0	10	0	0	152	0	173	1	0	4	1	0	11	0	0	147	0	0	5	0	0	3	0	0	851
17:45	0	0	0	0	0	0	0	0	0	0	0	309	0	0	11	0	0	11	0	0	168	0	180	0	0	5	0	0	10	0	0	163	0	0	5	0	0	3	0	0	865
18:00	0	0	0	0	0	0	0	0	0	0	0	269	0	0	7	0	0	5	0	0	127	0	154	0	0	4	0	0	6	0	0	172	0	0	6	0	0	2	0	0	752
18:15	0	0	0	0	0	0	0	0	0	0	0	254	0	0	12	0	0	7	0	0	118	0	146	0	0	4	0	0	6	0	0	153	0	0	5	0	0	1	0	0	706
18:30	0	0	0	0	0	0	0	0	0	0	0	224	0	0	7	0	0	4	0	0	113	0	152	0	0	2	0	0	10	0	0	149	0	0	1	0	0	3	0	0	665
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19:00	0	0	0	0	0	0	0	0	0	0	0	231	0	0	4	0	0	3	0	0	118	0	144	1	0	4	0	0	9	0	0	132	0	0	2	0	0	4	0	0	652
Period2																																									
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6:30	0	0	0	0	0	0	0	0	0	0	0	157	0	0	22	0	0	11	0	0	31	0	116	3	0	6	0	0	6	0	0	137	0	0	8	0	0	6	0	0	503
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7:00	0	0	0	0	0	0	0	0	0	0	0	157	0	0	12	0	0	13	0	0	60	0	146	9	0	8	2	0	8	0	0	159	0	0	6	0	0	3	0	0	583
7:15	0	0	0	0	0	0	0	0	0	0	0	190	0	0	14	0	0	24	0	0	44	0	90	7	0	11	1	0	13	0	0	217	0	0	11	0	0	1	0	0	623
7:30	0	0	0	0	0	0	0	0	0	0	0	219	0	0	14	0	0	24	0	0	45	0	112	9	0	10	6	0	12	0	0	212	0	0	10	0	0	5	0	0	678
7:45	0	0	0	0	0	0	0	0	0	0	0	200	0	0	13	0	0	22	0	0	44	0	144	4	0	8	1	0	10	0	0	259	0	0	4	0	0	18	0	0	727
8:00	0	0	0	0	0	0	0	0	0	0	0	221	0	0	14	0	0	15	0	0	30	0	155	4	0	7	1	0	11	0	0	289	0	0	9	0	0	3	0	0	759
8:15	0	0	0	0	0	0	0	0	0	0	0	258	0	0	13	0	0	13	0	0	38	0	118	9	0	10	0	0	8	0	0	253	0	0	7	0	0	3	0	0	730
8:30	0	0	0	0	0	0	0	0	0	0	0	202	0	0	16	0	0	24	0	0	49	0	76	7	0	8	2	0	8	0	0	199	0	0	10	0	0	3	0	0	604
8:45	0	0	0	0	0	0	0	0	0	0	0	163	0	0	13	0	0	15	0	0	32	0	90	15	0	11	0	0	12	0	0	187	0	0	14	0	0	8	0	0	560
9:00	0	0	0	0	0	0	0	0	0	0	0	159	0	0	19	0	0	17	0	0	45	0	105	8	0	6	0	0	9	0	0	156	0	0	7	0	0	9	0	0	540
9:15	0	0	0	0	0	0	0	0	0	0	0	181	0	0	16	0	0	17	0	0	29	0	88	4	0	17	2	0	12	0	0	115	0	0	5	0	0	7	0	0	493
9:30	0	0	0	0	0	0	0	0	0	0	0	162	0	0	18	0	0	17	0	0	35	0	77	5	0	8	1	0	8	0	0	151	0	0	7	0	0	13	0	0	502
9:45	0	0	0	0	0	0	0	0	0	0	0	176	0	0	18	0	0	18	0	0	39	0	63	6	0	11	3	0	13	1	0	108	0	0	6	0	0	5	0	0	467
10:00	0	0	0	0	0	0	0	0	0	0	0	158	0	0	9	0	0	19	0	0	27	0	52	4	0	8	2	0	13	0	0	95	0	0	8	0	0	1	0	0	396

Ministry of Transportation
Ministère des Transports

Version: 1.0 Feb 1, 2016

Intersection Layout Sheet

Contract # 9015-E-0009
Work Order # 655

2016

Date: May 26, Day: Thu Hrs: 15 – 19 + 6 – 10 + –

Location: HWY 410 @ Mayfield Rd 14 Ramps: WRT / 34

Reg/Mun: CR Town/City: Kleinburg Area:

File Name: 4490850000 Device: Gretch / Jamar Unit # 8 / Interval 1: AM / NN / PM

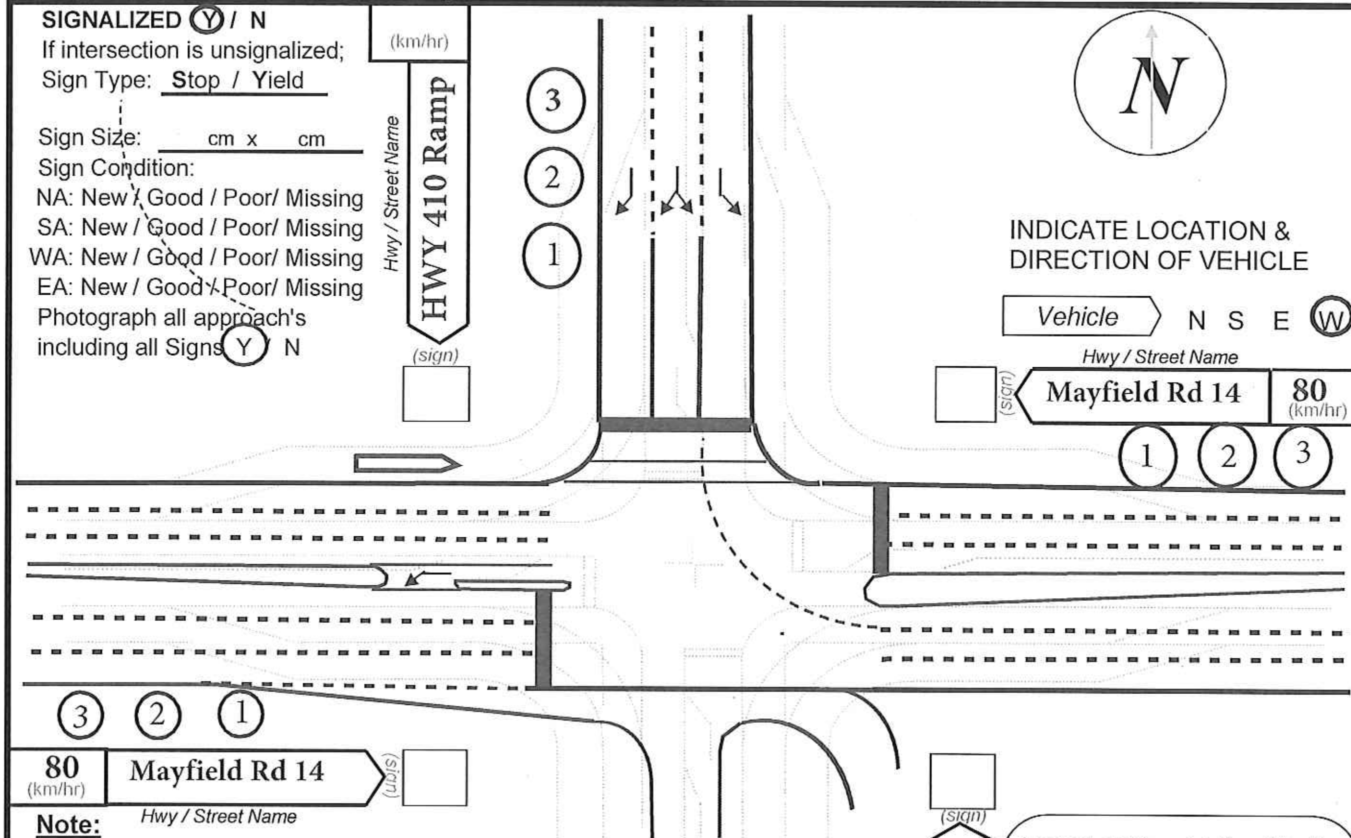
Observer: Brandon Woolfson Weather: Clear / Clear Road Condition: Good /

LHRS & O/S: 49085 0

GPS: G - Star IV
Datum: WGS 84 Y / N
Lat: 43.75527
Long: -79.80064

Comments:

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



Hwy / Street Name

Note:
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

(sign)
Hwy / Street Name
(km/hr)

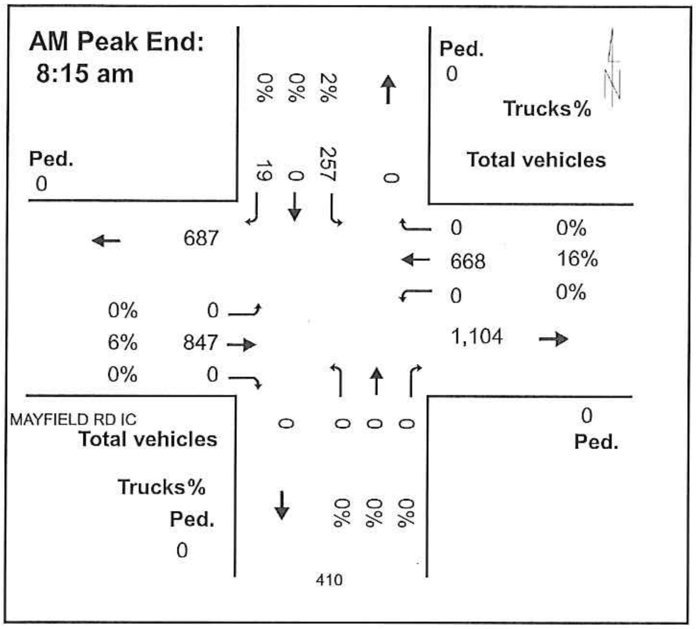
Layout of "Special Condition"

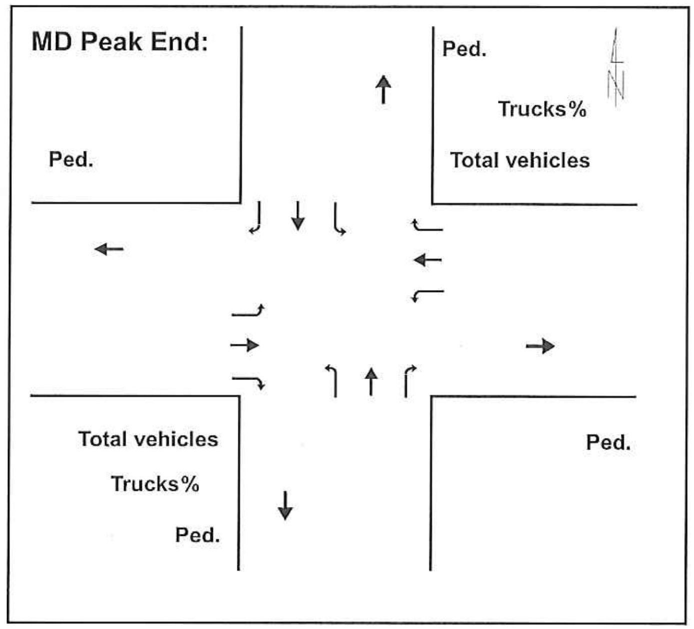
Ontario

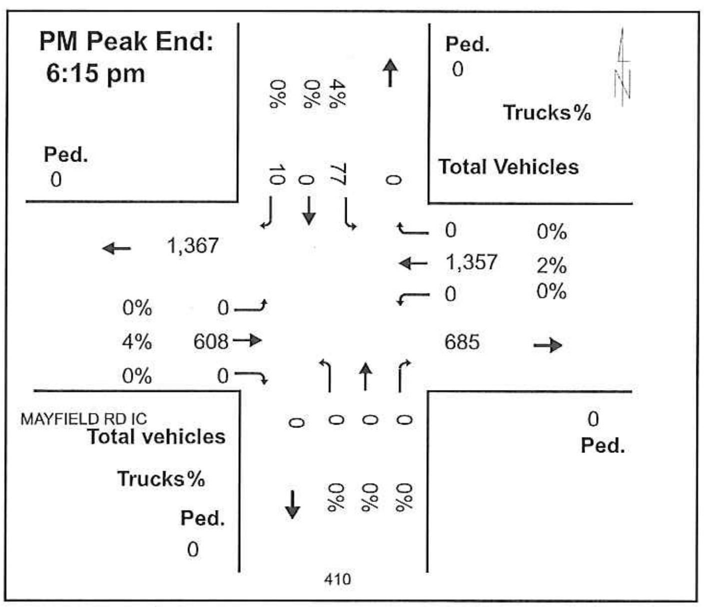
HWY 410 @ MAYFIELD RD IC

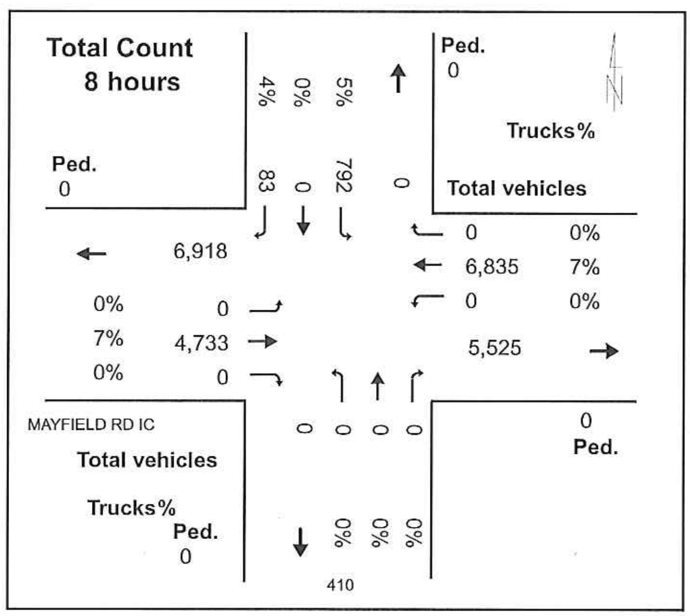
Central

Intersection ID:490850000(--W--) **Count Day: Thursday** **Count Date: 26-May-2016**









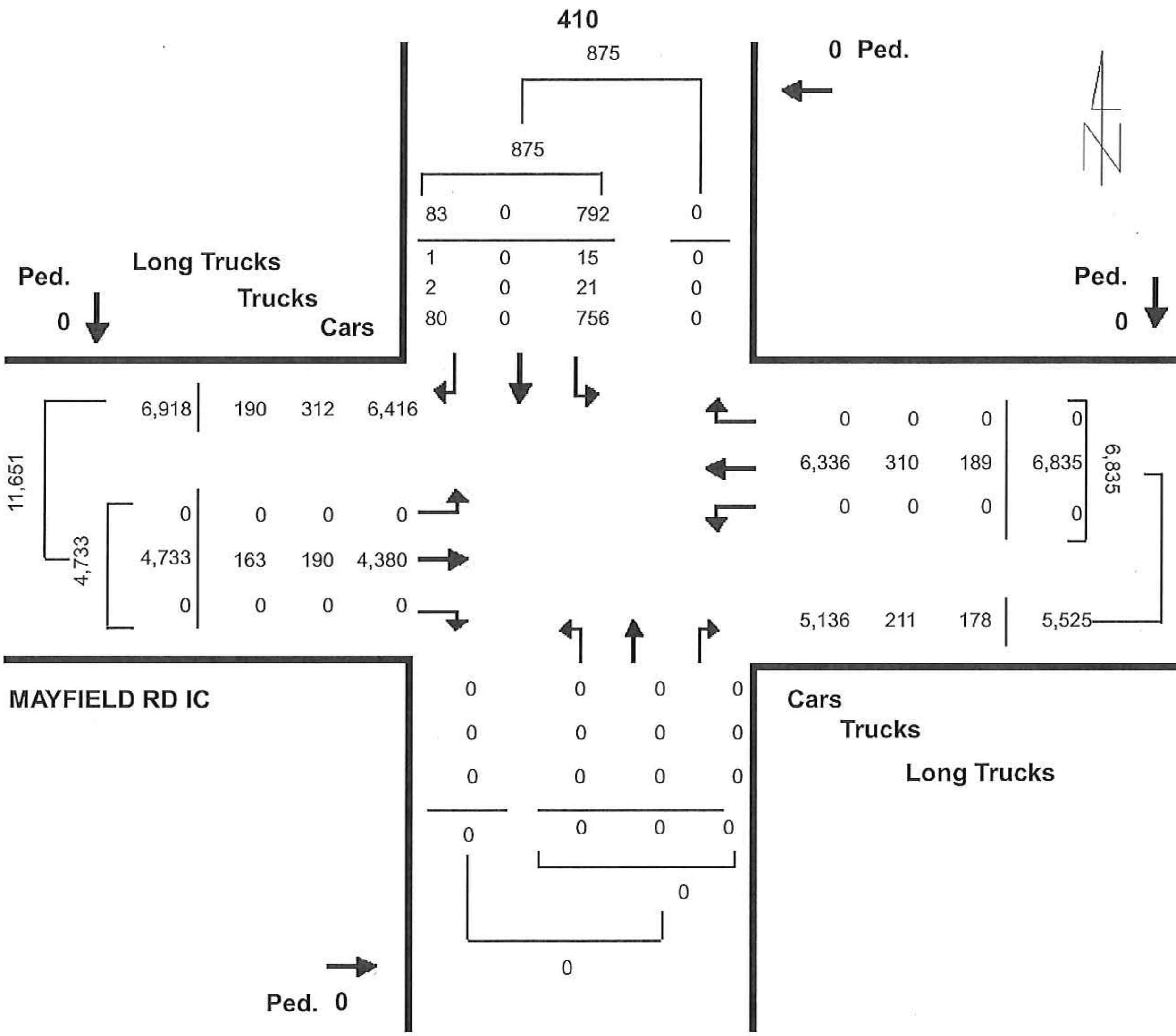
Traffic
Engineering
Software

COUNT TOTAL

HWY 410 @ MAYFIELD RD IC

Central

Intersection ID:490850000(--W--) **Date: 26-May-2016**



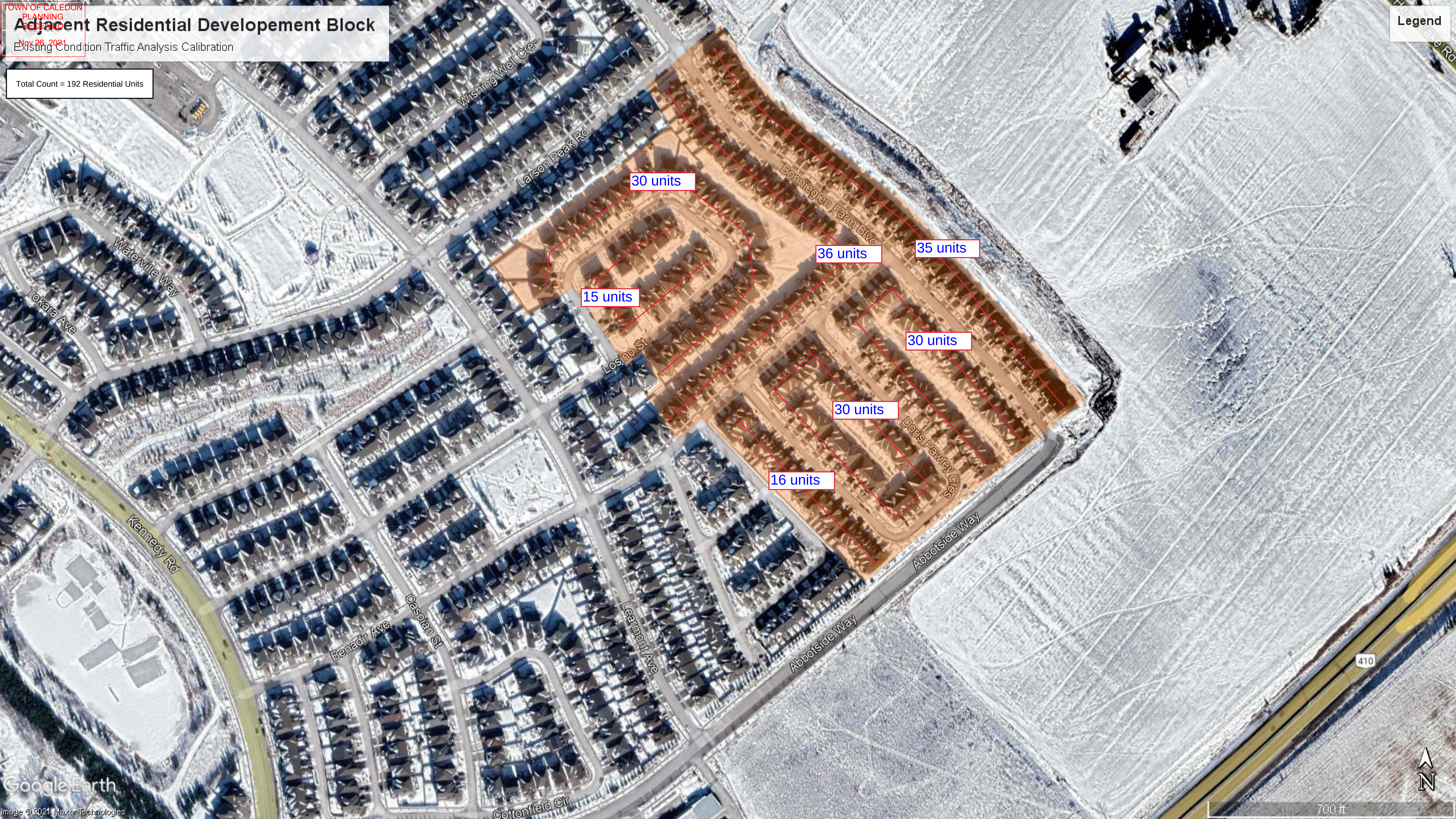
15 MIN REPORT

Intersection ID:490850000(--W--) HWY 410 @ MAYFIELD RD IC **Municipality: Central** **Date: 26-May-2016**

Time	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										Total
	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period1																																									
15:15	8	0	4	1	0	0	0	0	0	0	0	248	0	0	5	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	109	0	0	6	0	0	6	0	0	395
15:30	14	0	6	2	0	0	0	0	0	0	0	211	0	0	11	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	96	0	0	6	0	0	4	0	0	352
15:45	19	0	3	0	0	0	1	0	0	0	0	234	0	0	7	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	138	0	0	13	0	0	4	0	0	423
16:00	16	0	2	0	0	0	2	0	0	0	0	259	0	0	12	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	115	0	0	5	0	0	7	0	0	425
16:15	12	0	4	1	0	0	4	0	0	0	0	265	0	0	1	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	118	0	0	8	0	0	13	0	0	432
16:30	19	0	1	1	0	0	1	0	0	0	0	223	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	124	0	0	5	0	0	10	0	0	387
16:45	23	0	4	0	0	0	0	0	0	0	0	269	0	0	9	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	116	0	0	2	0	0	3	0	0	431
17:00	14	0	3	0	0	0	0	0	0	0	0	295	0	0	5	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	147	0	0	9	0	0	6	0	0	481
17:15	13	0	2	0	0	0	0	0	0	0	0	338	0	0	6	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	115	0	0	3	0	0	5	0	0	484
17:30	11	0	3	0	0	0	0	0	0	0	0	374	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	130	0	0	7	0	0	3	0	0	532
17:45	23	0	2	0	0	0	1	0	0	0	0	366	0	0	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0	0	3	0	0	2	0	0	554
18:00	20	0	4	1	0	0	0	0	0	0	0	287	0	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	148	0	0	4	0	0	2	0	0	471
18:15	20	0	1	1	0	0	0	0	0	0	0	303	0	0	7	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	154	0	0	4	0	0	1	0	0	495
18:30	15	0	1	0	0	0	0	0	0	0	0	271	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	125	0	0	2	0	0	5	0	0	423
18:45	11	0	3	0	0	1	0	0	0	0	0	278	0	0	1	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	109	0	0	4	0	0	2	0	0	414
19:00	10	0	2	0	0	0	0	0	0	0	0	257	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	122	0	0	0	0	0	4	0	0	398
Period2																																									
6:15	18	0	0	0	0	0	0	0	0	0	0	53	0	0	7	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	108	0	0	2	0	0	2	0	0	194
6:30	20	0	0	1	0	0	1	0	0	0	0	86	0	0	10	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	139	0	0	7	0	0	5	0	0	272
6:45	18	0	0	2	0	0	0	0	1	0	0	131	0	0	13	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	143	0	0	3	0	0	4	0	0	317
7:00	23	0	1	1	0	0	1	0	0	0	0	133	0	0	18	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	145	0	0	4	0	0	4	0	0	337
7:15	37	0	1	2	0	0	0	0	0	0	0	144	0	0	13	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	169	0	0	10	0	0	1	0	0	393
7:30	53	0	1	2	0	0	1	0	0	0	0	139	0	0	22	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	186	0	0	5	0	0	6	0	0	428
7:45	75	0	4	0	0	0	0	0	0	0	0	113	0	0	11	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	186	0	0	4	0	0	16	0	0	421
8:00	70	0	9	1	0	0	0	0	0	0	0	128	0	0	12	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	224	0	0	9	0	0	3	0	0	470
8:15	54	0	5	0	0	0	1	0	0	0	0	180	0	0	19	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0	0	5	0	0	3	0	0	472
8:30	24	0	3	1	0	0	0	0	0	0	0	137	0	0	18	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	182	0	0	12	0	0	2	0	0	390
8:45	27	0	3	1	0	1	0	0	0	0	0	117	0	0	18	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	146	0	0	11	0	0	7	0	0	339
9:00	30	0	2	1	0	0	0	0	0	0	0	124	0	0	19	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	125	0	0	9	0	0	10	0	0	329
9:15	13	0	1	0	0	0	0	0	0	0	0	93	0	0	15	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	102	0	0	3	0	0	10	0	0	241
9:30	18	0	2	1	0	0	1	0	0	0	0	90	0	0	13	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	140	0	0	7	0	0	8	0	0	287
9:45	16	0	2	1	0	0	1	0	0	0	0	101	0	0	13	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	92	0	0	7	0	0	4	0	0	246
10:00	12	0	1	0	0	0	0	0	0	0	0	89	0	0	9	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	77	0	0	11	0	0	1	0	0	210

Appendix C

Data Calibration – Additional Traffic from Adjacent Residential Block


Adjacent Residential Developement Block
Existing Condition Traffic Analysis Calibration
Total Count = 192 Residential Units
Legend
30 units
15 units
36 units
35 units
30 units
30 units
16 units
Wishing Well Cres
Larson Peak Rd
Bonnieglen Farm Blvd
Waterville Way
Tokara Ave
Losino St
Doris Pawley Cres
Abbotside Way
Abbotside Way
Kennedy Rd
Caspian St
Benadir Ave
Learmont Ave
Cottonfield Cir
410
N
700 ft
Google Earth
Image © 2021 Maxar Technologies

AM

Land Use	Residential	Single Detached	Equation Type (L or E)	L
Units	192	Units	Equation Multiplier	0.71
		Weekday	Equation Y-Int	4.8
Land Use	210	PeakHour_AdjacentTraffic_AM	Avg. Rate	0.74
In	25%			
Out	75%			
Internal Capture	0%			
Passby	0%			

Source ITE	IN	OUT	TOTAL	Avg	Eqn	Consider Equation or Weighted Average?
Gross	35	106	141	142	141	Equation
Gross Rate	0.18	0.55	0.73			
Modal Split Reduction %						
Modal Split Reduction	0	0	0			
Internal	0	0	0			
Net Trips	35	106	141			
Pass-by trips	0	0	0			
New trips	35	106	141			
	0.18	0.55	0.73			

To	Total %	Road Name	Proportions Inbound	Proportions Outbound	Trips In	Trips Out	Trips Total
North	2%	Kennedy Road	1.0%	1.0%	1	2	3
		Heart Lake Road	1.0%	1.0%	0	2	2
		0	0.0%	0.0%	0	0	0
		0	0.0%	0.0%	0	0	0
South	11%	Kennedy Road	3.0%	3.0%	1	3	4
		Heart Lake Road	3.0%	3.0%	1	3	4
		Highway 410	5.0%	5.0%	2	5	7
		0	0.0%	0.0%	0	0	0
West	24%	Kennedy Road	7.0%	7.0%	2	7	9
		Mayfield	7.0%	7.0%	2	7	9
		Highway 410	10.0%	10.0%	4	11	15
		0	0.0%	0.0%	0	0	0
East	63%	Mayfield	23.0%	23.0%	8	24	32
		Highway 410	40.0%	40.0%	14	42	56
		0	0.0%	0.0%	0	0	0
		0	0.0%	0.0%	0	0	0
	100%	Total	100%	100%	**35**	**106**	**141**

Outside Study Area

Check	ok	ok
Rounding Error Adjustment	1	1
	0	1
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0

PM

Land Use	Residential	Single Detached	Equation Type (L or E)	E
Units	192	Units	Equation Multiplier	0.96
		Weekday	Equation Y-Int	0.2
Land Use	210	PeakHour_AdjacentTraffic_PM	Avg. Rate	0.99
In	63%			
Out	37%			
Internal Capture	0%			
Passby	0%			

Source ITE	IN	OUT	TOTAL	Avg	Eqn	Consider Equation or Weighted Average?
Gross	120	70	190	190	190	Equation
Gross Rate	0.62	0.37	0.99			
Modal Split Reduction %						
Modal Split Reduction	0	0	0			
Internal	0	0	0			
Net Trips	120	70	190			
Pass-by trips	0	0	0			
New trips	120	70	190			
	0.62	0.36	0.98			

To	Total %	Road Name	Proportions Inbound	Proportions Outbound	Trips In	Trips Out	Trips Total
North	12%	Kennedy Road	6%	6%	6	4	10
		Heart Lake Road	6%	6%	7	4	11
		0	0%	0%	0	0	0
		0	0%	0%	0	0	0
South	11%	Kennedy Road	3%	3%	4	2	6
		Heart Lake Road	3%	3%	4	2	6
		Highway 410	5%	5%	6	4	10
		0	0%	0%	0	0	0
West	12%	Kennedy Road	3%	3%	4	2	6
		Mayfield	3%	3%	4	2	6
		Highway 410	6%	6%	7	4	11
		0	0%	0%	0	0	0
East	65%	Mayfield	25%	25%	30	18	48
		Highway 410	40%	40%	48	28	76
		0	0%	0%	0	0	0
		0	0%	0%	0	0	0
	100%	Total	100%	100%	**120**	**70**	**190**

Outside Study Area

Check	ok	ok
Rounding Error Adjustment	-1	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0

Appendix D

Signal Timing Plan (STP) Data

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	January 8, 2020	Prepared Date	October 12, 2021
Database Rev	1	Completed By	BL
Timing Card / Field Rev	1	Checked By	RC

Region of Peel
working with you

Location: Kennedy Road @ Abbotside Way

Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) SPLITS = Green+Amber+All Red MAX = Green only		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	Not in use	-	-	-	-	-	-	-	-
2	Kennedy Road - SB	8	-	-	4	2.5	50	35	60
3	Not in use	-	-	-	-	-	-	-	-
4	Abbotside Way - WB	8	8	14	4	2.4	30	35	30
5	Not in use	-	-	-	-	-	-	-	-
6	Kennedy Road - NB	8	8	11	4	2.5	50	35	60
7	Not in use	-	-	-	-	-	-	-	-
8	Abbotside Way - EB	8	8	14	4	2.4	30	35	30

System Control
Yes

Semi-Actuated Mode
Yes

TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
06:00 - 09:00	AM	80	0
09:00 - 15:00	OFF	70	0
15:00 - 20:00	PM	90	0

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	**October 6, 2021**	**Prepared Date**	**October 12, 2021**
Database Rev	**MaxView**	**Completed By**	**BL**
Timing Card / Field Rev	**-**	**Checked By**	**RC**

Region of Peel
working with you

Location: **Mayfield Road at Heart Lake Road**

Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) SPLITS = Green+Amber+All Red MAX = Green only		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	WBLT - Mayfield Road	5	0	0	3	0	9	9	9
2	Mayfield Road - EB	12	12	21	4.6	2.1	77	67	72
3	Not in use	-	-	-	-	-	-	-	-
4	Heart Lake Road - NB	8	12	25	4	2.9	54	54	54
5	Not in use	-	-	-	-	-	-	-	-
6	Mayfield Road - WB	12	12	21	4.6	2.1	86	76	81
7	NBLT - Heart Lake Road	5	0	0	3	0	9	9	9
8	Heart Lake Road - SB	8	12	25	4	2.9	45	45	45

System Control
Yes

Semi-Actuated Mode
Yes

TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
06:00 - 09:30	AM	140	78
09:30 - 16:00 20:00 - 00:00	OFF	130	66
16:00 - 20:00	PM	135	26

Region of Peel
Working for you

BRAMPTON SYSTEM DATABASE
OFFICE COPY

Intersection Name	Road Code	Sys NO.
Mayfield Rd. @ Hwy 410 S/B Off Ramp	MTO	696

Controller Make	Model	Firmware Rev. No.
Eagle	380 M52	3.33

*- Start From Main Menu

Type of Operation Semi-Actuated

Revision

NO	Date Y	Date M	Date D	Description	Field Chg by	Checked by	Approved by
2	13	04	18	These timings were confirmed in the field as per MTO's request.	AP / NS	AP	

*- Start From Main Menu

PHASE DESCRIPTION

Ph1		Ph5	
Ph2	Mayfield Rd. - E/B	PH6	Mayfield Rd. - W/B
Ph3		Ph7	
Ph4	Hwy 410 S/B Off Ramp	Ph8	NIU

UTILITIES - ACCESS *-2-1

Code........................ : 9400 Codes: Four Digits (0000 - 9999)

UTILITIES - CONFIGURE PORTS *-2-8-3

Communications Setup For Port 3
Baud Rate................. : 5

PHASE DATA - VEHICLE TIMINGS *-3-1

Basic Timings — Phase:	1	2	3	4	5	6	7	8
Minimum Green........ :	0	16	0	8	0	16	0	0
Passage Time /10.... :	0	30	0	30	0	30	0	0
Maximum No 1......... :	0	40	0	35	0	40	0	0
Maximum No 2......... :	0	40	0	35	0	40	0	0
Yellow Change /10.... :	0	40	0	40	0	40	0	0
Red Clearance /10..... :	0	20	0	20	0	20	0	0

PHASE DATA - DENSITY TIMINGS *-3-2 N/A

PHASE DATA - PEDESTRIAN TIMINGS & CONTROL *-3-3

Pedestrian Times — Phase:	1	2	3	4	5	6	7	8
Walk..................... :	0	10	0	20	0	10	0	0
Pedestrian Clearance. :	0	6	0	6	0	6	0	0
Act Rest In Walk....... :	0	0	0	0	0	0	0	0

Pedestrian Control Entry "1" = Yes & "0" = No

PHASE DATA - GENERAL CONTROL *-3-4

General Control — Phase:	1	2	3	4	5	6	7	8
Initialization.............. :	0	3	0	1	0	3	0	0
Non-Act Response..... :	0	1	0	0	0	1	0	0

PHASE DATA - VEHICLE AND PEDESTRIAN RECALLS *-3-5

Phase:	1	2	3	4	5	6	7	8
Vehicle Recall.......... :	0	3	0	0	0	3	0	0
Pedestrian Recall...... :	0	4	0	0	0	4	0	0
Recall Delay (SEC).... :	0	0	0	0	0	0	0	0

Codes.......................... :	0	1	2	3	4
Initialization.............. :	NONE	INACTIVE	RED	YELLOW	GREEN
Non-Act Response..... :	NONE	TO NA I	TO NA II	TO BOTH	---
Vehicle Recall.......... :	NONE	1 CALL	MINIMUM	MAXIMUM	SOFT
Pedestrian Recall...... :	NONE	1 CALL	PED	NA	NA+

TOWN OF CALEDON
PLANNING
RECEIVED

Nov 26, 2021

Intersection Name	Road Code	Sys N0.
Mayfield Rd. @ Hwy 410 S/B Off Ramp	MTO	696

Controller Make	Model	Firmware Rev. No.
Eagle	380 M52	3.33

PHASE DATA - VEHICLE CONTROLS * - 3 - 6

Vehicle Control	Phase:	1	2	3	4	5	6	7	8
Non-Lock Memory.....	:	0	0	0	1	0	0	0	1
Dual Entry................	:	0	1	0	1	0	1	0	1

Vehicle Control Entry: "1"=Yes & "0"=No

PHASE DATA - SEQUENCE CONTROL * - 3 - 7

	Phase:	1	2	3	4	5	6	7	8
Phase Omit............	:	2	0	4	0	6	0	8	0
Phase - Yellow..........	:	0	0	0	0	0	0	0	0

PHASE DATA - VEHICLE DETECTOR CONTROL * - 3 - 8 N/A

PHASE DATA - PED DETECTOR CONTROL N/A

PHASE DATA - SPECIAL DETECTOR CONTROL DATA * - 3 - 8 - 0 N/A

UNIT DATA - START UP & MISC. * - 4 - 1

Startup Time............	:	9.0	Time in Seconds
Startup State...........	:	0	0-Flash 1-Red
Red Revert /10...........	:	20	Time In Tenth Second
Auto Pedestrian Clear	:	1	0-No 1-Yes
Stop Time Reset.......	:	0	0-No 1-Yes
Alternate Sequence...	:	0	00-15 Alt Sequence ##

UNIT DATA - AUTOMATIC FLASH N/A

UNIT DATA - OVERLAP * - 4 - 3

Control	Phase	:	1	2	3	4	5	6	7	8
OL A Phase(s)..........		:	0	0	0	0	0	0	0	0
OL B Phase(s)..........		:	0	0	0	0	0	0	0	0
OL C Phase(s)..........		:	0	0	0	0	0	0	0	0
OL D Phase(s)..........		:	0	0	0	0	0	0	0	0

UNIT DATA - RING STRUCTURE N/A

UNIT DATA - ALTERNATE SEQUENCE N/A

COORD DATA - MODE * - 5 - 1

Control	:		Codes:	0	1	2	3	4	5
Operation................	:	1		FRE	AUT	MAN	---	---	---
Mode......................	:	1		PRM	YLD	PYL	POM	SOM	FAC
Maximum................	:	0		INH	MX1	MX2	---	---	---
Correction...............	:	2		DW	MDW	SWY	SW+	---	---
Offset (?? Of Green)..	:	0		BEGIN	END OF GREEN				
Force......................	:	1		PLAN	CYCLE TIME				
Max Dwell Time........	:	0		Time In Seconds					
Yield Period.............	:	0		Time In Seconds					
Manual Dial (dial/split/offset)		1/ 1/ 1							

COORD DATA - TIMING PLANS * - 5 - 3

Control	Timing Plan	:	D1/S1	D1/S2	D1/S3	D1/S4	D2/S1	D2/S2	D2/S3	D2/S4
Cycle Length............		:	—	—	—	—	—	—	—	—
Phase 01 Time/Mode		:	—	—	—	—	—	—	—	—
Phase 02 Time/Mode		:	—	—	—	—	—	—	—	—
Phase 03 Time/Mode		:	—	—	—	—	—	—	—	—
Phase 04 Time/Mode		:	—	—	—	—	—	—	—	—
Phase 05 Time/Mode		:	—	—	—	—	—	—	—	—
Phase 06 Time/Mode		:	—	—	—	—	—	—	—	—
Phase 07 Time/Mode		:	—	—	—	—	—	—	—	—
Phase 08 Time/Mode		:	—	—	—	—	—	—	—	—
Offset 1...................		:	—	—	—	—	—	—	—	—
Offset 1 Pattern Mode		:	—	—	—	—	—	—	—	—
Offset 2...................		:	—	—	—	—	—	—	—	—
Offset 2 Pattern Mode		:	—	—	—	—	—	—	—	—
Offset 3...................		:	—	—	—	—	—	—	—	—
Offset 3 Pattern Mode		:	—	—	—	—	—	—	—	—

Codes .... :

Phase Mode.............	:	0-Actuated	1-Coord Phase	2-Min Rec	3-Max Rec
		4-Ped Rec	5-Max+Ped Recall	6-Phase Omitted	7-Dual Coord Phase

Pattern Mode............ : 0-Normal/ 1-Perm/ 2-Yield/ 3-Perm Yield/ 4-Perm Omit/ 5-Seq Omit /6-Full Act

Alternate Sequence Values To Be Set To Zero "0"

R# LAG N/A

TOWN OF CALEDON
PLANNING
RECEIVED

Nov 26, 2021

Intersection Name		Road Code	Sys NO.
Mayfield Rd. @ Hwy 410 S/B Off Ramp		MTO	696
Controller Make	Model	Firmware Rev. No.	
Eagle	380 M52	3.33	

TIME BASE DATA - MISCELLANEOUS *-6-2 *-6-6

DST:BEGIN: MONTH 3 WEEK 2
DST:END : MONTH 11 WEEK 1

DST: Daylight Savings TIME
Month = 01 to 12 (begin < End)
Week = 1 to 5 (5=Last Week)

COORD CYCLE ZERO 24:00

EQUATED DAY: (DEFINED DAY = DAY)

02 = 03 04 05 06
___ = ___
___ = ___
___ = ___
___ = ___

CYCLE ZERO: Time (HH:MM) Sets
Reference For Coord Sync
00:00 = Event Time / Other = That HH:MM

DAY EQUATES: Care Must be Used to insure
days are not equated to undefined days
or days that are equated to other days.
Results will be a day without events to run

TIME BASE DATA - TRAFFIC EVENTS *-6-2

Refer to phase function mapping.

DAY PDAY	TIME HH:MM	PATTERN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
01	00:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	00:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	07:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	09:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	15:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	18:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07	00:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

REFERENCE DATA:
PDAY - 01-99 Program Day
HH:MM -24 Hour Clock
A.123 - Auxiliary Output
D.123 - Detector
1 - Det Diag Value

2 - Enables Report
3 - Rep Multiplier
DIM - Dimming Enable
S.1> - Special Function Output
ALL - 0 - OFF / 1-ON

PATTERN: (D/S/O)
Flash - 5/5/0
Free - 0/0/4
Phase Functions: Call Free
Set Pattern to 0/0/0

TIME BASE DATA - AUXILIARY EVENTS *-6-4 N/A

TIME BASE DATA - TIME OF YEAR EVENTS *-6-5

DATE MM/DD/YY	SPECIAL DAY	SPECIAL WEEK	DATE MM/DD/YY	SPECIAL DAY	SPECIAL WEEK
New Year's Day	01				
Good Friday	01				
Victoria Day	01				
Canada Day	01				
Civic Day	01				
Labour Day	01				
Thanksgiving	01				
Christmas Day	01				
Boxing Day	01				

Reference Data:
Special Day -
Any Program Day 00-99
Special Week -
Week 0 = Program Day 01-07
Week 1 = Program Day 11-17
Week 2 = Program Day 21-27
| |
Week 9 = Program Day 91-97

*Annual Holiday Schedule as per File: TRT 4.3.1 and
K:\Public_Works\Programs\Roads\Traffic\TSS\System\Database\Brampton

TIME BASE DATA - PHASE FUNCTION MAPPING *-6-9

Refer To Traffic Events

Function Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHS 01 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 02 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 03 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 04 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 05 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 06 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 07 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 08 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CODES: 0 - OFF / 1 - ON

Intersection Name		Road Code	Sys N0.
Mayfield Rd. @ Hwy 410 S/B Off Ramp		MTO	696
Controller Make	Model	Firmware Rev. No.	
Eagle	380 M52	3.33	

TIME BASE DATA - PHASE FUNCTION MAPPING * - 6 - 9

Function Name — Refer To Traffic Events

Function Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHS 01 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 02 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 03 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 04 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 05 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 06 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 07 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 08 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CODES: 0 - OFF / 1 - ON

TIME BASE DATA - SPECIAL FUNCTION MAPPING * - 6 - 0 N/A

PREEMPT DATA - PREEMPT 1 * - 7 - 2

CONTROL LINK PE# 1 0-6 Preempt * - 7 - 2 - 1 * - 7 - 2 - 6

Non - Lock.........	:	0	0-No / 1-Yes
Skip..................	:	2	0-No / 1-Yes / 2-Semi / 3-Semi minus walk
Delay...............	:	0	0-999 Seconds
Extend..............	:	0	0-999 Seconds
Duration............	:	0	0-999 Seconds
Dwell................	:	0	0-999 Seconds
Max Call............	:	0	0-999 Seconds
Lock Out...........	:	0	0-999 Seconds

- When no Dwell Phases are set, this routine is disabled
- Skip (YES) will allow phases to be skipped to service the Dwell Phases
- Set max call = 0 to disable
- Lock out duration will be dependent on calls if = 0
- call (YES) will place a ped call on exit from routine

Phase:	1	2	3	4	5	6	7	8
Dwell Phase(s)	0	1	0	0	0	1	0	0
Exit Call(s)	0	0	0	0	0	0	0	0

Dwell Phase(s) & Exit Call(s) Control Entry:"1" = Yes & "0" No

High Priority Routine (1-6) N/A

PREEMPT DATA - PREEMPT 2 * - 7 - 3

CONTROL LINK PE# 2 0-6 Preempt * - 7 - 3 - 1 * - 7 - 3 - 6

Non - Lock.........	:	0	0-No / 1-Yes
Skip..................	:	2	0-No / 1-Yes / 2-Semi / 3-Semi minus walk
Delay...............	:	0	0-999 Seconds
Extend..............	:	0	0-999 Seconds
Duration............	:	0	0-999 Seconds
Dwell................	:	0	0-999 Seconds
Max Call............	:	0	0-999 Seconds
Lock Out...........	:	0	0-999 Seconds

- When no Dwell Phases are set, this routine is disabled
- Skip (YES) will allow phases to be skipped to service the Dwell Phases
- Set max call = 0 to disable
- Lock out duration will be dependent on calls if = 0
- call (YES) will place a ped call on exit from routine

Phase:	1	2	3	4	5	6	7	8
Dwell Phase(s)	0	1	0	0	0	1	0	0
Exit Call(s)	0	0	0	0	0	0	0	0

Dwell Phase(s) & Exit Call(s) Control Entry:"1" = Yes & "0" No

High Priority Routine (1-6) N/A

PREEMPT DATA - PREEMPT 3 * - 7 - 4

CONTROL LINK PE# 0 0-6 Preempt * - 7 - 4 - 1 * - 7 - 4 - 6

Non - Lock.........	:	0	0-No / 1-Yes
Skip..................	:	2	0-No / 1-Yes / 2-Semi / 3-Semi minus walk
Delay...............	:	0	0-999 Seconds
Extend..............	:	0	0-999 Seconds
Duration............	:	0	0-999 Seconds
Dwell................	:	0	0-999 Seconds
Max Call............	:	0	0-999 Seconds
Lock Out...........	:	0	0-999 Seconds

- When no Dwell Phases are set, this routine is disabled
- Skip (YES) will allow phases to be skipped to service the Dwell Phases
- Set max call = 0 to disable
- Lock out duration will be dependent on calls if = 0
- call (YES) will place a ped call on exit from routine

Phase:	1	2	3	4	5	6	7	8
Dwell Phase(s)	0	0	0	1	0	0	0	1
Exit Call(s)	0	0	0	0	0	0	0	0

Dwell Phase(s) & Exit Call(s) Control Entry:"1" = Yes & "0" No

High Priority Routine (1-6) N/A

Intersection Name		Road Code	Sys N0.
Mayfield Rd. @ Hwy 410 S/B Off Ramp		MTO	696
Controller Make	Model	Firmware Rev. No.	
Eagle	380 M52	3.33	

SYSTEM DATA - GENERAL *-8-1

Local Address	008	Three Digits (000-32)	*-8-1-1
Revert To Backup	005	Time In Minutes (000-255)	*-8-1-2

1) An address other than "000" Transfers local "D" connector I/O to it's system definition
2) On loss of communications, the local will revert to it's time base events after the revert to backup time

SYSTEM DATA - SYSTEM DETECTORS *-8-2 N/A

SYSTEM DATA - VEH DETECTOR DIAGNOSTICS *-8-3-1-1

VALUE 0

Detector :	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Max Presence.......... :	0	0	0	255	0	0	0	0	0	0	0	0	0	0	0	0
No Activity................ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erratic Counts......... :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VALUE 1

Detector :	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Max Presence.......... :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No Activity................ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erratic Counts......... :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SYSTEM DATA - PED DETECTOR DIAGNOSTICS *-8-3-1-9

VALUE 0

Ped Detector :	1	2	3	4	5	6	7	8
Max Presence.......... :	0	0	0	255	0	0	0	0
No Activity................ :	0	0	0	0	0	0	0	0
Erratic Counts......... :	0	0	0	0	0	0	0	0

VALUE 1

Ped Detector	1	2	3	4	5	6	7	8
Max Presence.......... :	0	0	0	0	0	0	0	255
No Activity................ :	0	0	0	0	0	0	0	0
Erratic Counts......... :	0	0	0	0	0	0	0	0

SYSTEM DATA - SPC DETECTOR DIAGNOSTICS *-8-3-1 0 N/A

NOTES:
1. For actuated loop failure, remove the detector amplifier's fuse.
2. For pedestrian button failures, switch recall to pedestrian.
3. With ped enhanced recall, true max. 1+ ped clearance settings.

comments: ____________________

Authorized Signature: ____________________ Date: ____________________

Region of Peel
Working for you

BRAMPTON SYSTEM DATABASE
OFFICE COPY

Intersection Name		Road Code	Sys NO.
Mayfield Rd. @ Hwy 410 N/B Off Ramp		MTO	697
Controller Make	Model	Firmware Rev. No.	
Eagle	3208 M34	3.32	

*- Start From Main Menu

Type of Operation Semi-Actuated

Revision							
NO	Date Y	M	D	Description	Field Chg by	Checked by	Approved by
5	13	7	3	These timings were confirmed in the field as per MTO's request.	MF	AP	

*- Start From Main Menu

PHASE DESCRIPTION

Ph1		Ph5	
Ph2	Mayfield Rd. - E/B	PH6	Mayfield Rd. - W/B
Ph3		Ph7	
Ph4	Computer Phase	Ph8	Hwy. 410 N-B Off Ramp

UTILITIES - ACCESS *-2-1

Code...................... : 9400 Codes: Four Digits (0000 - 9999)

UTILITIES - CONFIGURE PORTS *-2-8-3

Communications Setup For Port 3

Baud Rate............... : 5

PHASE DATA - VEHICLE TIMINGS *-3-1

Basic Timings Phase:	1	2	3	4	5	6	7	8
Minimum Green........ :	0	26	0	10	0	26	0	10
Passage Time /10.... :	0	50	0	40	0	50	0	40
Maximum No 1......... :	0	45	0	35	0	45	0	35
Maximum No 2......... :	0	45	0	35	0	45	0	35
Yellow Change /10.... :	0	40	0	40	0	40	0	40
Red Clearance /10..... :	0	20	0	20	0	20	0	20

PHASE DATA - DENSITY TIMINGS *-3-2 N/A

PHASE DATA - PEDESTRIAN TIMINGS & CONTROL *-3-3

Pedestrian Times Phase:	1	2	3	4	5	6	7	8
Walk...................... :	0	20	0	0	0	20	0	10
Pedestrian Clearance. :	0	6	0	0	0	6	0	6
Act Rest In Walk....... :	0	0	0	0	0	0	0	0

Pedestrian Control Entry "1" = Yes & "0" = No

PHASE DATA - GENERAL CONTROL *-3-4

General Control Phase:	1	2	3	4	5	6	7	8
Initialization.............. :	0	2	0	1	0	2	0	0
Non-Act Response..... :	0	1	0	0	0	1	0	0

PHASE DATA - VEHICLE AND PEDESTRIAN RECALLS *-3-5

Phase:	1	2	3	4	5	6	7	8
Vehicle Recall.......... :	0	3	0	0	0	3	0	0
Pedestrian Recall...... :	0	2	0	1	0	2	0	1
Recall Delay (SEC).... :	0	0	0	0	0	0	0	0

Codes.......................... :	0	1	2	3	4
Initialization.............. :	NONE	INACTIVE	RED	YELLOW	GREEN
Non-Act Response..... :	NONE	TO NA I	TO NA II	TO BOTH	---
Vehicle Recall.......... :	NONE	1 CALL	MINIMUM	MAXIMUM	SOFT
Pedestrian Recall...... :	NONE	1 CALL	PED	NA	NA+

Intersection Name		Road Code	Sys N0.
Mayfield Rd. @ Hwy 410 N/B Off Ramp		MTO	697
Controller Make	Model	Firmware Rev. No.	
Eagle	3208 M34	3.32	

PHASE DATA - VEHICLE CONTROLS *-3-6

Vehicle Control	Phase: 1	2	3	4	5	6	7	8
Non-Lock Memory..... :	0	0	0	1	0	0	0	0
Dual Entry................ :	0	1	0	1	0	1	0	1

Vehicle Control Entry: "1"=Yes & "0"=No

PHASE DATA - SEQUENCE CONTROL *-3-7

Phase:	1	2	3	4	5	6	7	8
Phase Omit............ :	2	0	4	0	6	0	8	0
Phase - Yellow.......... :	0	0	0	0	0	0	0	0

PHASE DATA - VEHICLE DETECTOR CONTROL *-3-8 N/A

PHASE DATA - PED DETECTOR CONTROL N/A

PHASE DATA - SPECIAL DETECTOR CONTROL DATA *-3-8-0 N/A

UNIT DATA - START UP & MISC. *-4-1

Startup Time........... :	9.0	Time in Seconds
Startup State........... :	1	0-Flash 1-Red
Red Revert /10........... :	20	Time In Tenth Second
Auto Pedestrian Clear :	1	0-No 1-Yes
Stop Time Reset....... :	0	0-No 1-Yes
Alternate Sequence... :	0	00-15 Alt Sequence ##

UNIT DATA - AUTOMATIC FLASH N/A

UNIT DATA - OVERLAP *-4-3

Control	Phase : 1	2	3	4	5	6	7	8
OL A Phase(s).......... :	0	0	0	0	0	0	0	0
OL B Phase(s).......... :	0	0	0	0	0	0	0	0
OL C Phase(s).......... :	0	0	0	0	0	0	0	0
OL D Phase(s).......... :	0	0	0	0	0	0	0	0

UNIT DATA - RING STRUCTURE N/A

UNIT DATA - ALTERNATE SEQUENCE N/A

COORD DATA - MODE *-5-1

Control		Codes: 0	1	2	3	4	5
Operation............... :	1	FRE	AUT	MAN	---	---	---
Mode...................... :	1	PRM	YLD	PYL	POM	SOM	FAC
Maximum................ :	0	INH	MX1	MX2	---	---	---
Correction............... :	2	DW	MDW	SWY	SW+	---	---
Offset (?? Of Green).. :	0	BEGIN	END OF GREEN				
Force..................... :	1	PLAN	CYCLE TIME				
Max Dwell Time......... :	0	Time In Seconds					
Yield Period............. :	0	Time In Seconds					
Manual Dial (dial/split/offset)	1/ 1/ 1						

COORD DATA - TIMING PLANS *-5-3

Control	Timing Plan : D1/S1	D1/S2	D1/S3	D1/S4	D2/S1	D2/S2	D2/S3	D2/S4
Cycle Length............ :								
Phase 01 Time/Mode :								
Phase 02 Time/Mode :								
Phase 03 Time/Mode :								
Phase 04 Time/Mode :								
Phase 05 Time/Mode :								
Phase 06 Time/Mode :								
Phase 07 Time/Mode :								
Phase 08 Time/Mode :								
Offset 1................... :								
Offset 1 Pattern Mode :								
Offset 2................... :								
Offset 2 Pattern Mode :								
Offset 3................... :								
Offset 3 Pattern Mode :								

Codes .... :				
Phase Mode............ :	0-Actuated	1-Coord Phase	2-Min Rec	3-Max Rec
	4-Ped Rec	5-Max+Ped Recall	6-Phase Omitted	7-Dual Coord Phase
Pattern Mode............ :	0-Normal/ 1-Perm/ 2-Yield/ 3-Perm Yield/ 4-Perm Omit/ 5-Seq Omit /6-Full Act			
Alternate Sequence	Values To Be Set To Zero "0"			
R# LAG	N/A			

Intersection Name		Road Code	Sys NO.
Mayfield Rd. @ Hwy 410 N/B Off Ramp		**MTO**	**697**
Controller Make	Model	Firmware Rev. No.	
Eagle	**3208 M34**	**3.32**	

TIME BASE DATA - MISCELLANEOUS *-6-2 *-6-6

DST:BEGIN: MONTH **3** WEEK **2**
DST:END : MONTH **11** WEEK **1**

DST: Daylight Savings TIME
Month = 01 to 12 (begin < End)
Week = 1 to 5 (5=Last Week)

COORD CYCLE ZERO 24:00

EQUATED DAY: (DEFINED DAY = DAY)
02 = 03 04 05 06
=
=
=
=

CYCLE ZERO: Time (HH:MM) Sets
Reference For Coord Sync
00:00 = Event Time / Other = That HH:MM
DAY EQUATES: Care Must be Used to insure
days are not equated to undefined days
or days that are equated to other days.
Results will be a day without events to run

TIME BASE DATA - TRAFFIC EVENTS *-6-2

Refer to phase function mapping.

DAY PDAY	TIME HH:MM	PATTERN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
01	00:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	00:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	07:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	09:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	15:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	18:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07	00:00	0/0/4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	/	/ /	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

REFERENCE DATA:
PDAY - 01-99 Program Day
HH:MM -24 Hour Clock
A.123 - Auxiliary Output
D.123 - Detector
1 - Det Diag Value

2 - Enables Report
3 - Rep Multiplier
DIM - Dimming Enable
S.1> - Special Function Output
ALL - 0 - OFF / 1-ON

PATTERN: (D/S/O)
Flash - 5/5/0
Free - 0/0/4
Phase Functions: Call Free
Set Pattern to 0/0/0

TIME BASE DATA - AUXILIARY EVENTS *-6-4 N/A

TIME BASE DATA - TIME OF YEAR EVENTS *-6-5

DATE MM/DD/YY	SPECIAL DAY	SPECIAL WEEK	DATE MM/DD/YY	SPECIAL DAY	SPECIAL WEEK
New Year's Day	01				
Good Friday	01				
Victoria Day	01				
Canada Day	01				
Civic Day	01				
Labour Day	01				
Thanksgiving	01				
Christmas Day	01				
Boxing Day	01				

Reference Data:
Special Day -
Any Program Day 00-99
Special Week -
Week 0 = Program Day 01-07
Week 1 = Program Day 11-17
Week 2 = Program Day 21-27
| | |
Week 9 = Program Day 91-97

*Annual Holiday Schedule as per File: TRT 4.3.1 and
K:\Public_Works\Programs\Roads\Traffic\TSS\System\Database\Brampton

TIME BASE DATA - PHASE FUNCTION MAPPING *-6-9

Refer To Traffic Events

Function Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHS 01 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 02 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 03 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 04 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 05 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 06 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 07 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 08 MAX #2........ :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CODES: 0 - OFF / 1 - ON

Intersection Name		Road Code	Sys N0.
Mayfield Rd. @ Hwy 410 N/B Off Ramp		MTO	697
Controller Make	Model	Firmware Rev. No.	
Eagle	3208 M34	3.32	

TIME BASE DATA - PHASE FUNCTION MAPPING *-6-9

Function Name — Refer To Traffic Events

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHS 01 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 02 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 03 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 04 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 05 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 06 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 07 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHS 08 PHS OMIT....	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CODES: 0 - OFF / 1 - ON

TIME BASE DATA - SPECIAL FUNCTION MAPPING *-6-0 N/A

PREEMPT DATA - PREEMPT 1 *-7-2

CONTROL LINK PE# 1 0-6 Preempt *-7-2-1 *-7-2-6

Non - Lock.........	:	0	0-No / 1-Yes
Skip..................	:	2	0-No / 1-Yes / 2-Semi / 3-Semi minus walk
Delay................	:	0	0-999 Seconds
Extend..............	:	0	0-999 Seconds
Duration............	:	0	0-999 Seconds
Dwell.................	:	0	0-999 Seconds
Max Call............	:	0	0-999 Seconds
Lock Out...........	:	0	0-999 Seconds

- When no Dwell Phases are set, this routine is disabled
- Skip (YES) will allow phases to be skipped to service the Dwell Phases
- Set max call = 0 to disable
- Lock out duration will be dependent on calls if = 0
- call (YES) will place a ped call on exit from routine

Phase:	1	2	3	4	5	6	7	8
Dwell Phase(s)	0	1	0	0	0	1	0	0
Exit Call(s)	0	0	0	0	0	0	0	0

Dwell Phase(s) & Exit Call(s) Control Entry:"1" = Yes & "0" No

High Priority Routine (1-6) N/A

PREEMPT DATA - PREEMPT 2 *-7-3

CONTROL LINK PE# 2 0-6 Preempt *-7-3-1 *-7-3-6

Non - Lock.........	:	0	0-No / 1-Yes
Skip..................	:	2	0-No / 1-Yes / 2-Semi / 3-Semi minus walk
Delay................	:	0	0-999 Seconds
Extend..............	:	0	0-999 Seconds
Duration............	:	0	0-999 Seconds
Dwell.................	:	0	0-999 Seconds
Max Call............	:	0	0-999 Seconds
Lock Out...........	:	0	0-999 Seconds

- When no Dwell Phases are set, this routine is disabled
- Skip (YES) will allow phases to be skipped to service the Dwell Phases
- Set max call = 0 to disable
- Lock out duration will be dependent on calls if = 0
- call (YES) will place a ped call on exit from routine

Phase:	1	2	3	4	5	6	7	8
Dwell Phase(s)	0	1	0	0	0	1	0	0
Exit Call(s)	0	0	0	0	0	0	0	0

Dwell Phase(s) & Exit Call(s) Control Entry:"1" = Yes & "0" No

High Priority Routine (1-6) N/A

PREEMPT DATA - PREEMPT 3 *-7-4

CONTROL LINK PE# 0 0-6 Preempt *-7-4-1 *-7-4-6

Non - Lock.........	:	0	0-No / 1-Yes
Skip..................	:	2	0-No / 1-Yes / 2-Semi / 3-Semi minus walk
Delay................	:	0	0-999 Seconds
Extend..............	:	0	0-999 Seconds
Duration............	:	0	0-999 Seconds
Dwell.................	:	0	0-999 Seconds
Max Call............	:	0	0-999 Seconds
Lock Out...........	:	0	0-999 Seconds

- When no Dwell Phases are set, this routine is disabled
- Skip (YES) will allow phases to be skipped to service the Dwell Phases
- Set max call = 0 to disable
- Lock out duration will be dependent on calls if = 0
- call (YES) will place a ped call on exit from routine

Phase:	1	2	3	4	5	6	7	8
Dwell Phase(s)	0	0	0	1	0	0	0	1
Exit Call(s)	0	0	0	0	0	0	0	0

Dwell Phase(s) & Exit Call(s) Control Entry:"1" = Yes & "0" No

High Priority Routine (1-6) N/A

Intersection Name		Road Code	Sys NO.
Mayfield Rd. @ Hwy 410 N/B Off Ramp		MTO	697
Controller Make	Model	Firmware Rev. No.	
Eagle	3208 M34	3.32	

SYSTEM DATA - GENERAL * - 8 - 1

Local Address	008	Three Digits (000-32)	* - 8 - 1 - 1
Revert To Backup	005	Time In Minutes (000-255)	* - 8 - 1 - 2

1) An address other than "000" Transfers local "D" connector I/O to it's system definition
2) On loss of communications, the local will revert to it's time base events after the revert to backup time

SYSTEM DATA - SYSTEM DETECTORS * - 8 - 2 N/A

SYSTEM DATA - VEH DETECTOR DIAGNOSTICS * - 8 - 3 - 1 -1

VALUE 0

Detector	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Max Presence..........	0	0	0	0	0	0	0	255	0	0	0	0	0	0	0	0
No Activity................	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erratic Counts.........	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VALUE 1

Detector	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Max Presence..........	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No Activity................	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erratic Counts.........	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SYSTEM DATA - PED DETECTOR DIAGNOSTICS * - 8 - 3 -1 - 9

VALUE 0

Ped Detector	1	2	3	4	5	6	7	8
Max Presence..........	0	0	0	0	0	0	0	255
No Activity................	0	0	0	0	0	0	0	0
Erratic Counts.........	0	0	0	0	0	0	0	0

VALUE 1

Ped Detector	1	2	3	4	5	6	7	8
Max Presence..........	0	0	0	0	0	0	0	0
No Activity................	0	0	0	0	0	0	0	0
Erratic Counts.........	0	0	0	0	0	0	0	0

SYSTEM DATA - SPC DETECTOR DIAGNOSTICS * - 8 - 3 - 1 0 N/A

NOTES:
1. For actuated loop failure, remove the detector amplifier's fuse.
2. For pedestrian button failures, switch recall to pedestrian.
3. With ped enhanced recall, true max. 1+ ped clearance settings.

comments: ______________________

Authorized Signature: ______________________ Date: ______________

Appendix E

2021 Existing Conditions – Synchro Analysis Results

Lane Group	EBT	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	2	354	10	284	163	773
v/c Ratio	0.00	0.90	0.03	0.15	0.18	0.41
Control Delay	0.0	54.8	0.1	9.1	2.2	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	54.8	0.1	9.1	2.2	11.3
Queue Length 50th (m)	0.0	50.5	0.0	10.5	0.0	33.9
Queue Length 95th (m)	0.0	#96.5	0.0	16.3	7.7	46.2
Internal Link Dist (m)	87.7	374.1		556.6		106.5
Turn Bay Length (m)					50.0	
Base Capacity (vph)	502	418	378	1886	890	1869
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	0.00	0.85	0.03	0.15	0.18	0.41

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	1	354	0	10	0	284	163	13	760	0
Future Volume (vph)	1	0	1	354	0	10	0	284	163	13	760	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes		0.99			1.00	0.99		1.00	0.98		1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.93			1.00	0.85		1.00	0.85		1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1734			1749	1151		3411	1479		3563	
Flt Permitted		0.88			0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)		1565			1393	1151		3411	1479		3381	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	0	1	354	0	10	0	284	163	13	760	0
RTOR Reduction (vph)	0	1	0	0	0	7	0	0	73	0	0	0
Lane Group Flow (vph)	0	1	0	0	354	3	0	284	90	0	773	0
Confl. Peds. (#/hr)	1		3	3		1	6		8	8		6
Heavy Vehicles (%)	0%	0%	0%	4%	0%	40%	0%	7%	8%	23%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)		22.3			22.3	22.3		43.5	43.5		43.5	
Effective Green, g (s)		22.3			22.3	22.3		43.5	43.5		43.5	
Actuated g/C Ratio		0.28			0.28	0.28		0.55	0.55		0.55	
Clearance Time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		443			394	326		1885	817		1868	
v/s Ratio Prot								0.08				
v/s Ratio Perm		0.00			c0.25	0.00			0.06		c0.23	
v/c Ratio		0.00			0.90	0.01		0.15	0.11		0.41	
Uniform Delay, d1		20.2			27.1	20.3		8.6	8.4		10.2	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			22.4	0.0		0.2	0.3		0.7	
Delay (s)		20.2			49.5	20.3		8.8	8.7		10.9	
Level of Service		C			D	C		A	A		B	
Approach Delay (s)		20.2			48.7			8.7			10.9	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	78.7	Sum of lost time (s)	12.9
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	119	65	90	6	5	323
Future Volume (vph)	119	65	90	6	5	323
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	119	65	90	6	5	323

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	141	43	60	36	328
Volume Left (vph)	119	0	0	0	5
Volume Right (vph)	0	0	0	6	323
Hadj (s)	0.47	0.05	0.07	-0.06	-0.54
Departure Headway (s)	5.8	5.4	5.5	5.4	4.1
Degree Utilization, x	0.23	0.07	0.09	0.05	0.37
Capacity (veh/h)	582	627	604	619	840
Control Delay (s)	9.4	7.6	7.9	7.5	9.5
Approach Delay (s)	8.9		7.8		9.5
Approach LOS	A		A		A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	23	1555	546	125	985	15	112	14	19	35	92	45
v/c Ratio	0.07	0.50	0.45	0.51	0.29	0.02	0.45	0.04	0.06	0.25	0.50	0.20
Control Delay	9.9	12.5	2.1	12.0	6.7	0.0	43.7	38.4	0.3	51.4	57.8	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.9	12.5	2.1	12.0	6.7	0.0	43.7	38.4	0.3	51.4	57.8	5.3
Queue Length 50th (m)	1.9	63.2	0.0	6.7	26.2	0.0	21.0	2.6	0.0	7.3	19.6	0.0
Queue Length 95th (m)	5.8	81.3	12.8	13.4	36.3	0.0	36.9	8.1	0.2	17.2	35.9	3.9
Internal Link Dist (m)		693.5			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	317	3141	1203	245	3381	905	251	801	711	485	642	601
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.50	0.45	0.51	0.29	0.02	0.45	0.02	0.03	0.07	0.14	0.07

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	1446	508	116	916	14	104	13	18	33	86	42
Future Volume (vph)	21	1446	508	116	916	14	104	13	18	33	86	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1738	5043	1601	1772	4812	1266	1738	1921	1633	1825	1902	1633
Flt Permitted	0.28	1.00	1.00	0.12	1.00	1.00	0.55	1.00	1.00	0.75	1.00	1.00
Satd. Flow (perm)	510	5043	1601	223	4812	1266	1003	1921	1633	1438	1902	1633
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	23	1555	546	125	985	15	112	14	19	35	92	45
RTOR Reduction (vph)	0	0	206	0	0	4	0	0	16	0	0	41
Lane Group Flow (vph)	23	1555	340	125	985	11	112	14	3	35	92	4
Heavy Vehicles (%)	5%	4%	2%	3%	9%	29%	5%	0%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	70.3	70.3	70.3	79.3	79.3	79.3	20.0	20.0	20.0	11.0	11.0	11.0
Effective Green, g (s)	70.3	70.3	70.3	79.3	79.3	79.3	20.0	20.0	20.0	11.0	11.0	11.0
Actuated g/C Ratio	0.62	0.62	0.62	0.70	0.70	0.70	0.18	0.18	0.18	0.10	0.10	0.10
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	317	3140	996	238	3379	889	216	340	289	140	185	159
v/s Ratio Prot		0.31		c0.03	0.20		c0.03	0.01			0.05	
v/s Ratio Perm	0.05		0.21	c0.34		0.01	c0.06		0.00	0.02		0.00
v/c Ratio	0.07	0.50	0.34	0.53	0.29	0.01	0.52	0.04	0.01	0.25	0.50	0.03
Uniform Delay, d1	8.4	11.6	10.2	7.4	6.3	5.0	41.1	38.5	38.3	47.1	48.3	46.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.6	0.9	2.1	0.2	0.0	2.1	0.1	0.0	0.9	2.1	0.1
Delay (s)	8.9	12.2	11.1	9.5	6.5	5.1	43.2	38.6	38.3	48.1	50.4	46.2
Level of Service	A	B	B	A	A	A	D	D	D	D	D	D
Approach Delay (s)		11.9			6.8			42.1			48.8	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	112.9	Sum of lost time (s)	19.6
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1113	1107	295	20
v/c Ratio	0.63	0.66	0.18	0.03
Control Delay	19.4	19.9	11.9	6.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.4	19.9	11.9	6.2
Queue Length 50th (m)	41.0	41.3	10.3	0.0
Queue Length 95th (m)	52.6	53.1	20.9	4.0
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2550	2434	1619	702
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	0.44	0.45	0.18	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1057	1052	0	278	21
Future Volume (vph)	0	1057	1052	0	278	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		4995	4768		3478	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		4995	4768		3478	1486
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1113	1107	0	293	22
RTOR Reduction (vph)	0	0	0	0	1	11
Lane Group Flow (vph)	0	1113	1107	0	294	9
Heavy Vehicles (%)	0%	5%	10%	0%	2%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		23.7	23.7		31.2	31.2
Effective Green, g (s)		23.7	23.7		31.2	31.2
Actuated g/C Ratio		0.35	0.35		0.47	0.47
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1769	1689		1622	693
v/s Ratio Prot		0.22	c0.23		c0.08	
v/s Ratio Perm						0.01
v/c Ratio		0.63	0.66		0.18	0.01
Uniform Delay, d1		17.9	18.2		10.4	9.6
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.7	0.9		0.2	0.0
Delay (s)		18.7	19.1		10.7	9.6
Level of Service		B	B		B	A
Approach Delay (s)		18.7	19.1		10.6	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	66.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1402	1545	582	343
v/c Ratio	0.58	0.66	0.53	0.69
Control Delay	15.9	17.2	21.4	28.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.9	17.2	21.4	28.7
Queue Length 50th (m)	52.7	61.3	34.0	44.8
Queue Length 95th (m)	65.7	76.0	48.8	77.5
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	2455	2387	1088	499
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	0.57	0.65	0.53	0.69

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1332	0	0	1468	226	653
Future Volume (vph)	1332	0	0	1468	226	653
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.91	0.85
Flt Protected	1.00			1.00	0.98	1.00
Satd. Flow (prot)	4995			4856	2940	1327
Flt Permitted	1.00			1.00	0.98	1.00
Satd. Flow (perm)	4995			4856	2940	1327
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1402	0	0	1545	238	687
RTOR Reduction (vph)	0	0	0	0	14	14
Lane Group Flow (vph)	1402	0	0	1545	568	329
Heavy Vehicles (%)	5%	0%	0%	8%	15%	12%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	38.3			38.3	29.0	29.0
Effective Green, g (s)	38.3			38.3	29.0	29.0
Actuated g/C Ratio	0.48			0.48	0.37	0.37
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	2412			2345	1075	485
v/s Ratio Prot	0.28			c0.32	0.19	
v/s Ratio Perm						c0.25
v/c Ratio	0.58			0.66	0.53	0.68
Uniform Delay, d1	14.7			15.5	19.8	21.2
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.6			0.9	1.9	7.4
Delay (s)	15.3			16.5	21.6	28.7
Level of Service	B			B	C	C
Approach Delay (s)	15.3			16.5	24.2	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	186	4	674	327	433
v/c Ratio	0.68	0.01	0.28	0.28	0.19
Control Delay	44.7	0.0	7.0	1.6	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	0.0	7.0	1.6	6.5
Queue Length 50th (m)	27.2	0.0	20.7	0.0	12.3
Queue Length 95th (m)	47.3	0.0	37.1	9.5	23.5
Internal Link Dist (m)	374.1		556.6		106.5
Turn Bay Length (m)				50.0	
Base Capacity (vph)	400	474	2414	1170	2276
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.01	0.28	0.28	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	186	0	4	0	674	327	2	429	2
Future Volume (vph)	0	0	0	186	0	4	0	674	327	2	429	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor					1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes					1.00	0.98		1.00	0.98		1.00	
Flpb, ped/bikes					1.00	1.00		1.00	1.00		1.00	
Frt					1.00	0.85		1.00	0.85		1.00	
Flt Protected					0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)					1823	1608		3650	1603		3611	
Flt Permitted					0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)					1453	1608		3650	1603		3442	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	186	0	4	0	674	327	2	429	2
RTOR Reduction (vph)	0	0	0	0	0	3	0	0	111	0	0	0
Lane Group Flow (vph)	0	0	0	0	186	1	0	674	216	0	433	0
Confl. Peds. (#/hr)	3		1	1		3	2		5	5		2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)					16.1	16.1		56.7	56.7		56.7	
Effective Green, g (s)					16.1	16.1		56.7	56.7		56.7	
Actuated g/C Ratio					0.19	0.19		0.66	0.66		0.66	
Clearance Time (s)					6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)					272	302		2414	1060		2277	
v/s Ratio Prot								c0.18				
v/s Ratio Perm					c0.13	0.00			0.14		0.13	
v/c Ratio					0.68	0.00		0.28	0.20		0.19	
Uniform Delay, d1					32.4	28.3		6.0	5.7		5.6	
Progression Factor					1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2					6.9	0.0		0.3	0.4		0.2	
Delay (s)					39.4	28.3		6.3	6.1		5.8	
Level of Service					D	C		A	A		A	
Approach Delay (s)		0.0			39.1			6.2			5.8	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	85.7	Sum of lost time (s)	12.9
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	222	103	98	2	1	155
Future Volume (vph)	222	103	98	2	1	155
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	222	103	98	2	1	155

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	256	69	65	35	156
Volume Left (vph)	222	0	0	0	1
Volume Right (vph)	0	0	0	2	155
Hadj (s)	0.45	0.00	0.02	-0.02	-0.58
Departure Headway (s)	5.4	5.0	5.2	5.2	4.3
Degree Utilization, x	0.39	0.09	0.09	0.05	0.19
Capacity (veh/h)	642	701	656	663	771
Control Delay (s)	10.6	7.3	7.6	7.2	8.3
Approach Delay (s)	9.9		7.4		8.3
Approach LOS	A		A		A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	33	1079	122	39	1749	44	319	48	12	28	31	22
v/c Ratio	0.23	0.33	0.11	0.10	0.47	0.04	1.31	0.16	0.04	0.26	0.20	0.11
Control Delay	14.2	8.7	1.8	4.4	7.1	1.1	202.2	39.0	0.3	51.6	48.3	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.2	8.7	1.8	4.4	7.1	1.1	202.2	39.0	0.3	51.6	48.3	1.1
Queue Length 50th (m)	2.8	35.9	0.0	1.8	50.4	0.0	~84.3	8.5	0.0	5.5	6.1	0.0
Queue Length 95th (m)	9.5	47.0	6.6	4.6	64.9	2.3	#135.5	18.8	0.0	14.2	15.2	0.0
Internal Link Dist (m)		693.5			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	145	3266	1067	391	3688	1164	243	873	710	479	685	621
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.33	0.11	0.10	0.47	0.04	1.31	0.05	0.02	0.06	0.05	0.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	1025	116	37	1662	42	303	46	11	27	29	21
Future Volume (vph)	31	1025	116	37	1662	42	303	46	11	27	29	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4902	1541	1738	5142	1601	1807	1921	1498	1706	1865	1555
Flt Permitted	0.12	1.00	1.00	0.23	1.00	1.00	0.51	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)	219	4902	1541	419	5142	1601	977	1921	1498	1303	1865	1555
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	33	1079	122	39	1749	44	319	48	12	28	31	22
RTOR Reduction (vph)	0	0	43	0	0	13	0	0	10	0	0	21
Lane Group Flow (vph)	33	1079	79	39	1749	31	319	48	2	28	31	1
Heavy Vehicles (%)	3%	7%	6%	5%	2%	2%	1%	0%	9%	7%	3%	5%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	69.1	69.1	69.1	75.6	75.6	75.6	17.2	17.2	17.2	6.9	6.9	6.9
Effective Green, g (s)	69.1	69.1	69.1	75.6	75.6	75.6	17.2	17.2	17.2	6.9	6.9	6.9
Actuated g/C Ratio	0.65	0.65	0.65	0.71	0.71	0.71	0.16	0.16	0.16	0.06	0.06	0.06
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	142	3183	1000	341	3653	1137	214	310	242	84	120	100
v/s Ratio Prot		0.22		0.00	c0.34		c0.10	0.02			0.02	
v/s Ratio Perm	0.15		0.05	0.08		0.02	c0.14		0.00	0.02		0.00
v/c Ratio	0.23	0.34	0.08	0.11	0.48	0.03	1.49	0.15	0.01	0.33	0.26	0.01
Uniform Delay, d1	7.7	8.4	6.9	4.8	6.8	4.5	43.9	38.4	37.4	47.6	47.3	46.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.3	0.2	0.1	0.5	0.0	243.9	0.2	0.0	2.3	1.1	0.1
Delay (s)	11.5	8.7	7.0	4.9	7.2	4.6	287.8	38.6	37.5	49.9	48.5	46.6
Level of Service	B	A	A	A	A	A	F	D	D	D	D	D
Approach Delay (s)		8.6			7.1			248.3			48.5	
Approach LOS		A			A			F			D	

Intersection Summary			
HCM 2000 Control Delay	34.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	106.4	Sum of lost time (s)	19.6
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	817	1878	90	11
v/c Ratio	0.36	0.83	0.07	0.02
Control Delay	14.9	23.0	14.2	12.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.9	23.0	14.2	12.3
Queue Length 50th (m)	27.9	84.7	3.9	0.7
Queue Length 95th (m)	36.7	103.9	8.0	3.8
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2253	2275	1376	601
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	0.83	0.07	0.02

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	760	1747	0	83	11
Future Volume (vph)	0	760	1747	0	83	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5092	5142		3411	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5092	5142		3411	1486
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	817	1878	0	89	12
RTOR Reduction (vph)	0	0	0	0	1	2
Lane Group Flow (vph)	0	817	1878	0	89	9
Heavy Vehicles (%)	0%	3%	2%	0%	4%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		33.8	33.8		31.0	31.0
Effective Green, g (s)		33.8	33.8		31.0	31.0
Actuated g/C Ratio		0.44	0.44		0.40	0.40
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2241	2263		1376	599
v/s Ratio Prot		0.16	c0.37		c0.03	
v/s Ratio Perm						0.01
v/c Ratio		0.36	0.83		0.06	0.02
Uniform Delay, d1		14.3	19.0		14.0	13.7
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	2.7		0.1	0.0
Delay (s)		14.4	21.6		14.1	13.8
Level of Service		B	C		B	B
Approach Delay (s)		14.4	21.6		14.1	
Approach LOS		B	C		B	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	76.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	835	1683	1092	509
v/c Ratio	0.34	0.69	0.85	0.89
Control Delay	13.1	17.7	29.2	38.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.1	17.7	29.2	38.4
Queue Length 50th (m)	27.1	68.7	70.3	62.7
Queue Length 95th (m)	35.4	84.6	#100.3	#126.7
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	2435	2435	1278	575
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	0.34	0.69	0.85	0.89

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	793	0	0	1599	701	820
Future Volume (vph)	793	0	0	1599	701	820
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.95	0.85
Flt Protected	1.00			1.00	0.97	1.00
Satd. Flow (prot)	4995			4995	3332	1389
Flt Permitted	1.00			1.00	0.97	1.00
Satd. Flow (perm)	4995			4995	3332	1389
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	835	0	0	1683	738	863
RTOR Reduction (vph)	0	0	0	0	72	72
Lane Group Flow (vph)	835	0	0	1683	1020	437
Heavy Vehicles (%)	5%	0%	0%	5%	1%	7%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	39.0			39.0	29.0	29.0
Effective Green, g (s)	39.0			39.0	29.0	29.0
Actuated g/C Ratio	0.49			0.49	0.36	0.36
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	2435			2435	1207	503
v/s Ratio Prot	0.17			c0.34	0.31	
v/s Ratio Perm						c0.31
v/c Ratio	0.34			0.69	0.85	0.87
Uniform Delay, d1	12.6			15.8	23.4	23.7
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.2			1.1	7.4	18.1
Delay (s)	12.8			16.9	30.8	41.8
Level of Service	B			B	C	D
Approach Delay (s)	12.8			16.9	34.3	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Appendix F

2021 Existing Conditions with Improvements – Synchro Analysis Results

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	33	1079	122	39	1749	44	319	48	12	28	31	22
v/c Ratio	0.29	0.38	0.13	0.12	0.54	0.04	0.79	0.10	0.03	0.26	0.20	0.11
Control Delay	23.8	14.0	2.9	8.1	12.5	1.9	47.1	29.9	0.2	52.0	48.8	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	14.0	2.9	8.1	12.5	1.9	47.1	29.9	0.2	52.0	48.8	1.1
Queue Length 50th (m)	3.7	47.6	0.0	2.7	72.9	0.0	55.6	7.5	0.0	5.6	6.1	0.0
Queue Length 95th (m)	12.8	61.3	8.6	6.8	91.3	3.3	83.3	16.5	0.0	14.4	15.4	0.0
Internal Link Dist (m)		693.5			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	114	2823	939	338	3221	1024	413	1068	857	471	674	611
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.38	0.13	0.12	0.54	0.04	0.77	0.04	0.01	0.06	0.05	0.04

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	1025	116	37	1662	42	303	46	11	27	29	21
Future Volume (vph)	31	1025	116	37	1662	42	303	46	11	27	29	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4902	1541	1738	5142	1601	1807	1921	1498	1706	1865	1555
Flt Permitted	0.11	1.00	1.00	0.21	1.00	1.00	0.51	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)	197	4902	1541	393	5142	1601	973	1921	1498	1303	1865	1555
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	33	1079	122	39	1749	44	319	48	12	28	31	22
RTOR Reduction (vph)	0	0	54	0	0	17	0	0	9	0	0	21
Lane Group Flow (vph)	33	1079	68	39	1749	27	319	48	3	28	31	1
Heavy Vehicles (%)	3%	7%	6%	5%	2%	2%	1%	0%	9%	7%	3%	5%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	59.4	59.4	59.4	65.9	65.9	65.9	26.4	26.4	26.4	6.8	6.8	6.8
Effective Green, g (s)	59.4	59.4	59.4	65.9	65.9	65.9	26.4	26.4	26.4	6.8	6.8	6.8
Actuated g/C Ratio	0.56	0.56	0.56	0.62	0.62	0.62	0.25	0.25	0.25	0.06	0.06	0.06
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	110	2749	864	289	3199	996	373	478	373	83	119	99
v/s Ratio Prot		0.22		0.00	c0.34		c0.13	0.02			0.02	
v/s Ratio Perm	0.17		0.04	0.08		0.02	c0.08		0.00	0.02		0.00
v/c Ratio	0.30	0.39	0.08	0.13	0.55	0.03	0.86	0.10	0.01	0.34	0.26	0.01
Uniform Delay, d1	12.3	13.1	10.7	8.2	11.4	7.7	36.4	30.6	29.9	47.4	47.2	46.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.9	0.4	0.2	0.2	0.7	0.1	17.2	0.1	0.0	2.4	1.2	0.1
Delay (s)	19.1	13.5	10.9	8.4	12.1	7.7	53.5	30.7	29.9	49.8	48.3	46.5
Level of Service	B	B	B	A	B	A	D	C	C	D	D	D
Approach Delay (s)		13.4			11.9			49.9			48.3	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	105.9	Sum of lost time (s)	19.6
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	835	1683	1092	509
v/c Ratio	0.42	0.84	0.65	0.71
Control Delay	24.6	34.7	21.9	25.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	24.6	34.7	21.9	25.5
Queue Length 50th (m)	46.5	117.8	82.3	79.4
Queue Length 95th (m)	57.7	137.8	104.2	125.0
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	1998	1998	1668	715
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	0.84	0.65	0.71

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱
Traffic Volume (vph)	793	0	0	1599	701	820
Future Volume (vph)	793	0	0	1599	701	820
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.95	0.85
Flt Protected	1.00			1.00	0.97	1.00
Satd. Flow (prot)	4995			4995	3332	1389
Flt Permitted	1.00			1.00	0.97	1.00
Satd. Flow (perm)	4995			4995	3332	1389
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	835	0	0	1683	738	863
RTOR Reduction (vph)	0	0	0	0	34	34
Lane Group Flow (vph)	835	0	0	1683	1058	475
Heavy Vehicles (%)	5%	0%	0%	5%	1%	7%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	44.0			44.0	54.0	54.0
Effective Green, g (s)	44.0			44.0	54.0	54.0
Actuated g/C Ratio	0.40			0.40	0.49	0.49
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	1998			1998	1635	681
v/s Ratio Prot	0.17			c0.34	0.32	
v/s Ratio Perm						c0.34
v/c Ratio	0.42			0.84	0.65	0.70
Uniform Delay, d1	23.8			29.9	20.9	21.7
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			3.8	2.0	5.8
Delay (s)	24.1			33.6	22.9	27.5
Level of Service	C			C	C	C
Approach Delay (s)	24.1			33.6	24.4	
Approach LOS	C			C	C	

Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Appendix G

Supporting Calculation – Future Background Growth

Dumitru Liubeznii

Subject: FW: Request For Information - HWY 410 @Mayfield Road IC; RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

From: White, Mark J. (MTO) <Mark.J.White@ontario.ca>
Sent: Wednesday, October 6, 2021 4:00 PM
To: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Cc: Rao Marthi <rao.marthi@ibigroup.com>
Subject: RE: Request For Information - HWY 410 @Mayfield Road IC; RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

Good afternoon Dumitru,

I passed on your email to our traffic office and they agree that a growth rate of 1.5% is acceptable.

Regards,

Mark White
Corridor Management Planner
Ministry of Transportation | Central Region
159 Sir William Hearst Ave. 7th Floor,
Toronto, ON M3M 0B7
Mark.j.white@ontario.ca

From: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Sent: October 6, 2021 10:47 AM
To: White, Mark J. (MTO) <Mark.J.White@ontario.ca>
Cc: Rao Marthi <rao.marthi@ibigroup.com>
Subject: RE: Request For Information - HWY 410 @Mayfield Road IC; RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region
Importance: High

Good afternoon Mark,

We hope this email finds you well. Just following up on our previous email, IBI has completed preliminary growth rate calculations using highway AADT volumes which led to conspicuous results that are not adequate for future travel demand projections.

For the purposes of this study, IBI plans to use annual growth rate of 1.5% applied to highway off ramps for the 2016-2041 study horizon year period. Note, that in addition to the growth rate, IBI will include area background developments in future travel demand forecast. IBI already have acquired traffic information for a total of five future developments, out of which four future developments are industrial land uses that will generate significant car and truck traffic in the area.

We appreciate if you could provide your concurrence with our approach, otherwise, let us know your availability for a meeting to discuss this matter.

Kind regards,

Dumitru Liubeznii, EIT
Traffic Operations and Safety Analyst
IBI Group Inc.

From: Dumitru Liubeznii
Sent: Thursday, September 30, 2021 1:45 PM
To: White, Mark J. (MTO) <Mark.J.White@ontario.ca>
Cc: Rao Marthi <rao.marthi@ibigroup.com>
Subject: Request For Meeting - HWY 410 @Mayfield Road IC; RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region
Importance: High

Hello Mark,

We have completed preliminary growth rate calculations which led to unusual results. We would like to discuss the methodology with you and ministry's traffic office. It would be beneficial if MTO traffic office could look into Travel Demand Forecasting for HWY 410 interconnection at Mayfield Road (between 2021 and 2041 horizon years).

Please let us know your and representative from traffic office availability to set up meeting to discuss this matter.

Regards,

Dumitru Liubeznii, EIT
Traffic Operations and Safety Analyst
IBI Group Inc.

From: White, Mark J. (MTO) <Mark.J.White@ontario.ca>
Sent: Wednesday, September 29, 2021 3:42 PM
To: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Cc: Rao Marthi <rao.marthi@ibigroup.com>
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

Good afternoon Dumitru,

I passed your question on to our traffic office and they responded with the below.

The suggested methodology is acceptable, also the proponent must account appropriate truck % for the TIS.

Regards,

Mark White
Corridor Management Planner
Ministry of Transportation | Central Region
159 Sir William Hearst Ave. 7th Floor,
Toronto, ON M3M 0B7
Mark.j.white@ontario.ca

From: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Sent: September 29, 2021 11:02 AM
To: White, Mark J. (MTO) <Mark.J.White@ontario.ca>

Cc: Rao Marthi <rao.marthi@ibigroup.com>
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region
Importance: High

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello Mark,

We have reviewed the attached ministry's latest TMCs at Mayfield IC from 2016. In order to simulate current 2021 traffic conditions, we plan to apply growth rate to the traffic volumes at ramp approaches. Such annual growth rates will be calculated from Highway 410 historic AADT data found in MTO database north and south of Mayfield IC.

Note, that annual growth rate along Mayfield Road will be calculated from historic AADTs available in Peel Region's database.

Please confirm, whether this calculation methodology is acceptable to the ministry.

Kind regards,

Dumitru Liubeznii, EIT
Traffic Operations and Safety Analyst
IBI Group Inc.

Dumitru Liubeznii

Subject: FW: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

From: Jillian Britto <Jillian.Britto@caledon.ca>
Sent: Friday, October 1, 2021 1:06 PM
To: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Cc: Rao Marthi <rao.marthi@ibigroup.com>; rosalie.shan@peelregion.ca; Arash Olia <Arash.Olia@caledon.ca>
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

Hi Dumitru,

The proposed approach to growth application is acceptable.

Regards,

Jillian Britto, P.Eng.
Coordinator, Transportation Development
Transportation Engineering
Engineering Services

Office: 905.584.2272 x 4108
Email: Jillian.Britto@caledon.ca

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From: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Sent: Friday, October 1, 2021 12:43 PM
To: Jillian Britto <Jillian.Britto@caledon.ca>
Cc: Rao Marthi <rao.marthi@ibigroup.com>; rosalie.shan@peelregion.ca; Arash Olia <Arash.Olia@caledon.ca>
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region
Importance: High

Hi Jillian,

Thank you for re-sending the link for MW1 Traffic Management Plan, it worked.

Meantime, we seek your advisement regarding growth rate. IBI has completed preliminary growth rate calculations using the ADT information provided. The data shows a negative trend in travel demand for the historic ADT survey years. Preliminary calculation is summarized in table below:

Roadway	% Growth
Heart Lake Road	- 35.97%
Abbotside Way	- 1.03%
Kennedy Road	- 16.20%

For the purposes of our study, IBI will assume a growth rate of 2% for the through traffic along Kennedy Road and Heart Lake. This approach aligns with traffic studies completed in the area, such as TIS for Sikh Place of Worship, May 2017 by GHD and TIS for Industrial Development, August 2021 by LEA. Note, that IBI will not apply growth rate on Abbotside Way, Learmont Ave, and Bonnieglen Farm Blvd.

Kindly advise if you concur with our approach.

Thank you,

Dumitru Liubeznii, EIT
Traffic Operations and Safety Analyst
IBI Group Inc.

From: Jillian Britto <Jillian.Britto@caledon.ca>
Sent: Thursday, September 30, 2021 5:57 PM
To: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Cc: Rao Marthi <rao.marthi@ibigroup.com>; rosalie.shan@peelregion.ca; Arash Olia <Arash.Olia@caledon.ca>
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

Hi Dumitru,

I sent a separate link, let me know if that doesn't work and I'll try something else.

Regards,

Jillian Britto, P.Eng.
Coordinator, Transportation Development
Transportation Engineering
Engineering Services

Office: 905.584.2272 x 4108
Email: Jillian.Britto@caledon.ca

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From: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Sent: Thursday, September 30, 2021 5:37 PM
To: Jillian Britto <Jillian.Britto@caledon.ca>
Cc: Rao Marthi <rao.marthi@ibigroup.com>; rosalie.shan@peelregion.ca; Arash Olia <Arash.Olia@caledon.ca>
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

Good afternoon Jillian,

Thank you for the information you have shared with us. Unfortunately, I am not able to open the sharepoint link you sent to "MW1 Traffic Management Plan", can you try sending that again?

Kind regards,

Dumitru Liubeznii, EIT
Traffic Operations and Safety Analyst
IBI Group Inc.

From: Jillian Britto <Jillian.Britto@caledon.ca>
Sent: Thursday, September 30, 2021 5:25 PM
To: Dumitru Liubeznii <dumitru.liubeznii@ibigroup.com>
Cc: Rao Marthi <rao.marthi@ibigroup.com>; rosalie.shan@peelregion.ca; Arash Olia <Arash.Olia@caledon.ca>
Subject: RE: Terms of Reference - TIS for 12304 Heart Lake Road, Caledon, Peel Region

Good afternoon Dumitru,

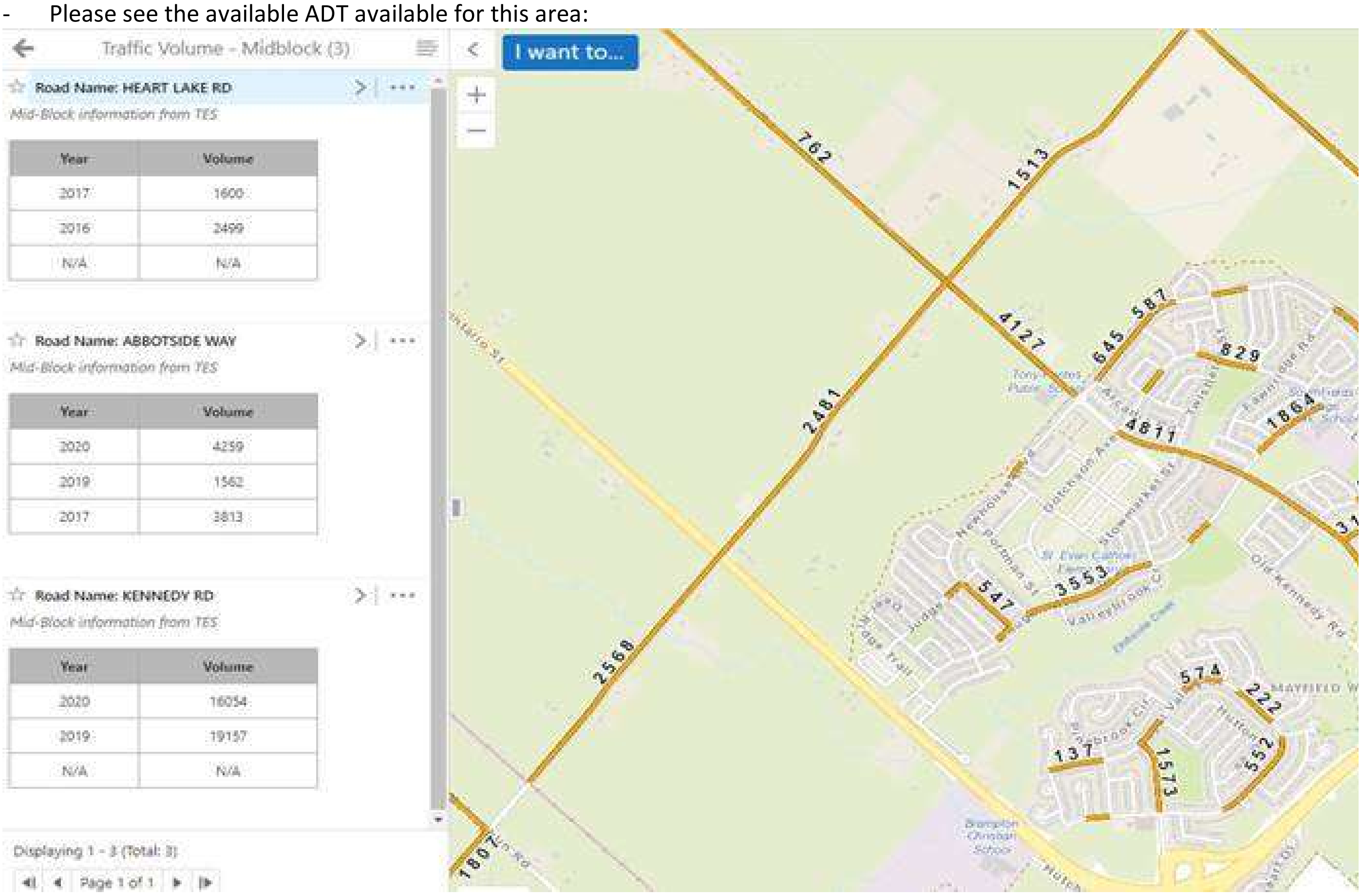
Hope this email finds you well.

Thank you for providing the Town an opportunity to comment on the scope of work for this study. Please see our comments below and the corresponding attached documents:

- All traffic signal timing plans can be obtained from the Region of Peel.
- We have the following counts (see attached):
  - Abbotside @ Kennedy – 2017-04-12
  - Abbotside @ Learmont – 2018-09-13

It would be ideal to use pre-Covid-19 traffic data grown accordingly to 2021. However, we understand that this is not always available. If new counts are needed, please ensure they are balanced with adjacent intersections.

- Please use the MW1 Traffic Management Plan as a starting point to determine future traffic diversion as a result of the Abbotside Way connection to Heart Lake Road. We can schedule a meeting to discuss the methodology if required. https://caledonca-my.sharepoint.com/:f:/g/personal/jillian_britto_caledon_ca/Evo7o2iSoplOkbzbytv94noBNbI4NVgdi-xd7-JNjsCZwA?e=Jc2lDb
- Please see the available ADT available for this area:



- The following developments should be included in the future background analysis (please see attached excerpts):
  - 0 Abbotside Way SPA 21-02
  - 0 Abbotside Way SPA 21-68

  - Buttermill Development at Kennedy and Dougall
  - 12862 Dixie Road
  - 0 & 12305 Dixie Road
- The traffic impact study should also include a review of loading requirements and provisions.

Please let me know if you have any questions.

Thanks,

Jillian Britto, P.Eng.
Coordinator, Transportation Development
Transportation Engineering
Engineering Services

Office: 905.584.2272 x 4108
Email: Jillian.Britto@caledon.ca

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Region of Peel
working with you

Date: October 6, 2021
From: Dumitru Liubeznii, IBI Group
Re: Growth Rates Data Request – Mayfield Road and Heart Lake Road

Dumitru,
Here are the estimated CAGR values for Mayfield Road and Heart Lake Road:

2016 – 2021	2021 – 2031	2031 – 2041
4.0%	2.5%	2.5%

These growth rates are estimated based on multiple sources including Peel Travel Demand forecasting model, ATR and land use/forecasts data. Please note that this area may be further affected by future growth (after 2041 and beyond). Please use your professional judgement when using these values.

If you require further assistance, please contact me at matthew.cambas@peelregion.ca.

Regards,

Matthew Cambas
Principal Planner, Transportation System Planning
Transportation Division, Public Works Services, Region of Peel

Appendix H

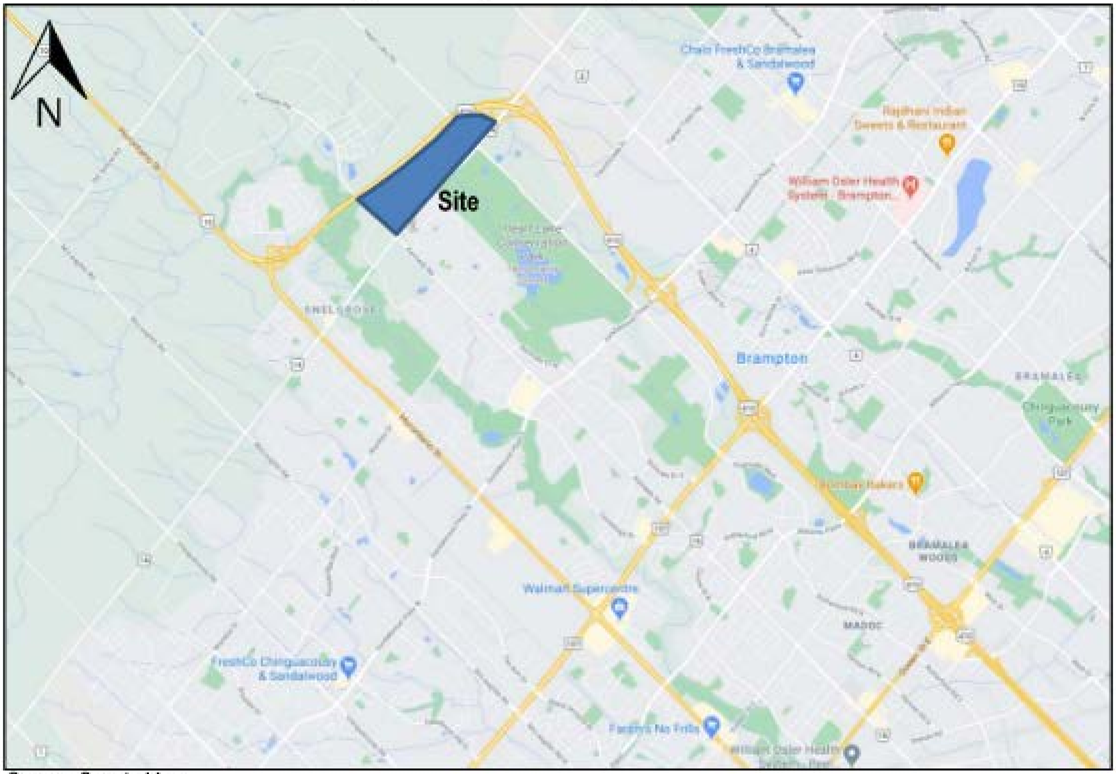
Background Information – Other Background Developments TIS Excerpts

1.0 INTRODUCTION

Nextrans Consulting Engineers (A Division of NextEng Consulting Group Inc.) was retained by Snell's Hollow Developers Group (the 'Client') to undertake a Transportation Impact Study in support of an Official Plan Amendment application for a proposed residential subdivision and a neighbourhood commercial. The subject lands are bounded by Highway 410 to the north, Highway 410 southbound off-ramp to the east, Kennedy Road to the west and Mayfield Road to the south, in the Town of Caledon.

The location of the proposed development is illustrated in **Figure 1**.

Figure 1 – Proposed Development Location



Source: Google Map

Currently the subject site is mostly vacant, with two existing single-detached residential units and two farm houses (one on Kennedy Road and one on Heart Lake Road). The proposed development consists of approximately 1,087 residential dwelling units of mixed types and approximately 1.47 ha of commercial development area.

The following access arrangement will be provided to accommodate each block of the proposed development and the recommended lane configurations and traffic control types based on the findings of this Study:

- One full moves intersection onto Kennedy Road, opposite the existing Snellview Boulevard. This proposed intersection is located approximately 285 m from centreline of the Mayfield Road/Kennedy Road intersection;
- One full moves intersection onto Heart Lake Road is located approximately 215 m from the centreline of Mayfield Road/Heart Lake Road intersection;

- Medium density (townhouses) – 345 dwelling units
- Medium-high density (townhouses and apartments) – 378 dwelling units
- Commercial (63 jobs/ha) – 93 jobs

The 2016 Transportation Tomorrow Survey (TTS), the *Trip Generation Manual, 10th Edition* published by the Institute of Transportation Engineers (ITE) and information was reviewed to estimate the modal split, trip distribution and trip generation for the proposed development.

5.2. Modes of Travel Assessment in the Area

Table 7 summarizes the travel mode split information based on the review of the 2016 Transportation Tomorrow Survey data for Traffic Zones 3007, 3008, 3009 and 3010. The 2016 TTS data extraction is included in **Appendix G**.

Table 7 – Modal Split based on 2016 TTS Data for Traffic Zones

Time	Trips Made by Traffic Zones				
	Auto Driver	Auto Passenger	Transit	Cycle	Walk
AM Peak Period (6:00Am – 9:00AM)	81%	12%	5%	0%	2%
PM Peak Period (4:00PM – 7:00PM)	81%	15%	4%	0%	0%

Based on the information above, as expected, the predominant mode of travel in the area is auto trips, which accounts for 81% during the morning and afternoon peak periods, respectively. The non single-occupant-vehicle mode accounts for approximately 19% during the morning and afternoon peak periods, respectively. Although this is a great trend for a new area, however, the auto driver mode is still very high, which is not sustainable and does not meet the sustainable objective of the Town and the Region's Official Plan policies and directions. In addition, there is none or very little bicycle trips, despite there are existing cycling facilities.

For the purposes of this assessment, a moderate 5% modal split (all non-auto modes) will be utilized for the proposed development. This assessment is reasonable given that the analysis horizon years will be 2028 and 2033.

5.3. Site Trip Generation

The trip generation forecasts were undertaken using the information contained in the *Trip Generation Manual, 10th Edition* published by the Institute of Transportation Engineers (ITE). For the purposes of this assessment, the following ITE Land Use Codes (LUC) will be utilized in this Study:

- LUC 221 "Multifamily Housing Mid-Rise General Urban/Suburban"
- LUC 210 "Single-Family Detached Housing General Urban/Suburban"
- LUC 220 "Multifamily Housing Low-Rise General Urban/Suburban"
- LUC 820 "Shopping Center General Urban/Suburban"

Fitted curve equations or average rates, where appropriate, will be utilized for the respective land use.

Figure 11A below illustrates the estimated the numbers of proposed units, for the purposes of trip generation, trip distribution and assignment.

Figure 61A – Estimated Numbers of Units (Trip Generation, Trip Distribution and Assignment Only)

Block 1:

- Detached/Semi-Detached/Town: ~180 units
- Back-to-back townhouses: ~50 units
- Dual Frontage Town: ~24 units

Block 2:

- Detached/Semi-Detached/Town: ~180 units
- Back-to-back townhouses: ~75 units
- Dual Frontage Town: ~48 units

Block 3:

- Detached/Semi-Detached/Town: ~4 units
- Back-to-back townhouses: ~100 units
- Dual Frontage Town: ~48 units
- Medium-high density: ~189 units

Block 4:

- Number of job: ~ 93

Block 5:

- Medium-high density: ~ 189 units

The site trip generation is summarized in **Tables 8, 9, 10, 11** and **12** for each block, respectively.

Table 8 – Site Trip Generation for Block 1

ITE Land Use	Magnitude (units)	Parameters			Morning Peak Hour			Afternoon Peak Hour		
					In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise) LUC 220 General Urban/Suburban	254 units	Trip Rates AM - Ln(T) = 0.95Ln(X) - 0.51 PM - Ln(T) = 0.89Ln(X) - 0.02			0.11	0.35	0.46	0.33	0.2	0.53
		Total Trips			27	89	116	85	50	135
		Mode	**AM**	**PM**						
		Transit	5%	5%	1	4	5	4	3	7
		New Auto Trips			**26**	**85**	**111**	**81**	**47**	**128**

Table 9 – Site Trip Generation for Block 2

ITE Land Use	Magnitude (units)	Parameters			Morning Peak Hour			Afternoon Peak Hour		
					In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise) LUC 220 General Urban/Suburban	303 units	Trip Rates AM - Ln(T) = 0.95Ln(X) - 0.51 PM - Ln(T) = 0.89Ln(X) - 0.02			0.1	0.35	0.45	0.33	0.19	0.52
		Total Trips			32	105	137	100	58	158
		Mode	**AM**	**PM**						
		Transit	5%	5%	2	5	7	5	3	8
		New Auto Trips			**30**	**100**	**130**	**95**	**55**	**150**

Table 10 – Site Trip Generation for Block 3

ITE Land Use	Magnitude (units)	Parameters			Morning Peak Hour			Afternoon Peak Hour		
					In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) LUC 221 General Urban/Suburban	189	Trip Rates AM - Ln(T) = 0.98Ln(X) - 0.98 PM - Ln(T) = 0.96Ln(X) - 0.63			0.09	0.25	0.34	0.26	0.17	0.43
		Total Trips			17	47	64	50	32	82
		Mode	**AM**	**PM**						
		Transit	5%	5%	1	2	3	3	2	5
		New Auto Trips			**16**	**45**	**61**	**47**	**30**	**77**
Multifamily Housing (Low-Rise) LUC 220 General Urban/Suburban	152 units	Trip Rates AM - Ln(T) = 0.95Ln(X) - 0.51 PM - Ln(T) = 0.89Ln(X) - 0.02			0.11	0.36	0.47	0.36	0.21	0.57
		Total Trips			16	55	71	54	32	86
		Mode	**AM**	**PM**						
		Transit	5%	5%	1	3	4	3	2	5
		New Auto Trips			**15**	**52**	**67**	**51**	**30**	**81**
Total Trips					***33***	***102***	***135***	***104***	***64***	***168***
Transit Modal Split (10%)					**2**	**5**	**7**	**6**	**4**	**10**
Total New Auto Trips					**31**	**97**	**128**	**98**	**60**	**158**

Table 11 – Site Trip Generation for Block 4

ITE Land Use	Magnitude (employees)	Parameters	Morning Peak Hour			Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
Shopping Centre LUC (820) General Urban/Suburban	93	Trip Rates (Average)	0.35	0.20	0.55	0.81	0.81	1.62
		Total New Auto Trips	**33**	**18**	**51**	**75**	**76**	**151**

Table 12 – Site Trip Generation for Block 5

ITE Land Use	Magnitude (units)	Parameters			Morning Peak Hour In	Morning Peak Hour Out	Morning Peak Hour Total	Afternoon Peak Hour In	Afternoon Peak Hour Out	Afternoon Peak Hour Total
Multifamily Housing (Mid-Rise) LUC 221 General Urban/Suburban	189 units	Trip Rates AM - Ln(T) = 0.98Ln(X) - 0.98 PM - Ln(T) = 0.96Ln(X) - 0.63			0.09	0.25	0.34	0.26	0.17	0.43
		Total Trips			17	47	64	50	32	82
		Mode	**AM**	**PM**						
		Transit	5%	5%	1	2	3	3	2	5
		New Auto Trips			**16**	**45**	**61**	**47**	**30**	**77**

Based on the analysis noted above, the proposed development is expected to generate:

- 387 total two-way trips (115 inbound and 272 outbound) and 559 total two-way trips (329 inbound and 230 outbound) during the AM and PM peak hours, respectively;
- 370 two-way auto trips (110 inbound and 260 outbound) and 536 two-way auto trips (315 inbound and 221 outbound) during the AM and PM peak hours, respectively; and
- 17 two-way transit trips (5 inbound and 12 outbound) and 23 two-way transit trips (14 inbound and 9 outbound) during the AM and PM peak hours, respectively.

5.4. Site Trip Distribution and Assignment

The 2016 Transportation Tomorrow Survey (TTS) data was reviewed for Traffic Zones 3007, 3008, 3009 and 3010 in order to estimate the general trip distribution for the proposed development. **Table 13** summarizes the planning district/traffic zones distribution based on the 2016 TTS data, with **Table 14** summarizing the site trip assignment based on the 2016 TTS data and the existing traffic turning movement counts for the existing intersections in the area.

Table 13 – Trip Distribution for Residential Component

Mode	Caledon	Brampton	Mississauga	Toronto	York Region	Halton	Waterloo	Hamilton
Auto	16%	40%	18%	16%	6%	2%	1%	3%
Transit	33%	19%	0%	48%	0%	0%	0%	0%

Table 14 – Site Trip Distribution

General Direction (To/From)	Auto Inbound	Auto Outbound	General Direction (To/From)	Transit Inbound	Transit Outbound
East (via Mayfield Road)	5%	5%	NA	NA	NA
West (via Mayfield Road)	30%	30%	NA	NA	NA
North (via Hwy 410/Kennedy Road/Heart Lake Road/Hurontario Street)	5%	5%	North (via Hurontario Street/Kennedy Road)	0%	0%
South (via Hwy 410/Kennedy Road/Heart Lake Road/Hurontario Street)	60%	60%	South (via Hurontario Street/Kennedy Road)	100%	100%

Figures 11B and **11C** illustrate the proposed development generated traffic volumes. It should be noted that the auto site trip distribution and assignment have been taken into consideration the 2016 TTS information, existing turning movement and intersection operations.

10.0 CONCLUSIONS / FINDINGS

10.1. Study Conclusions

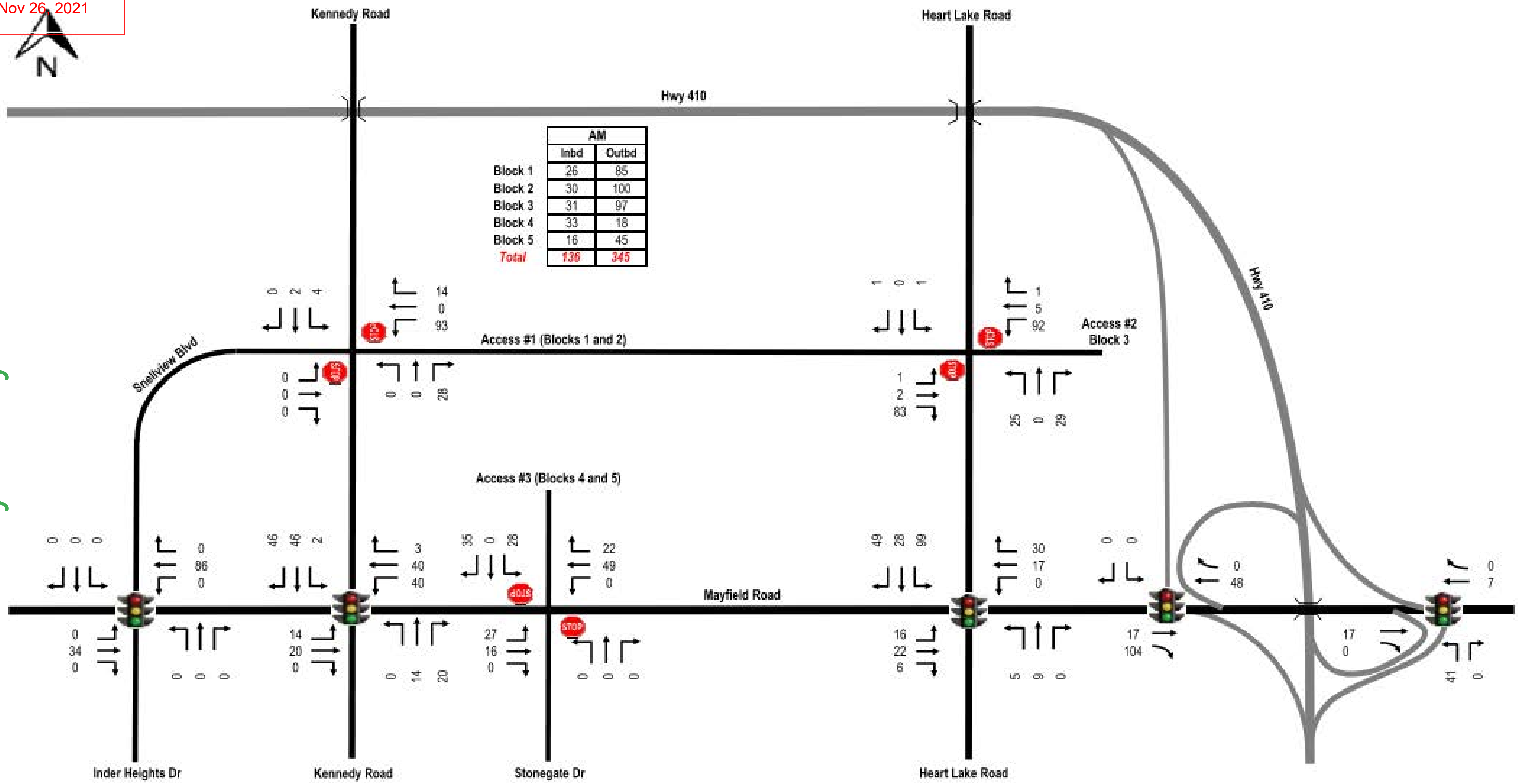
The findings and conclusions of the analysis are as follows:

- The proposed development is expected to generate:
  - 387 total two-way trips (115 inbound and 272 outbound) and 559 total two-way trips (329 inbound and 230 outbound) during the AM and PM peak hours, respectively;
  - 370 two-way auto trips (110 inbound and 260 outbound) and 536 two-way auto trips (315 inbound and 221 outbound) during the AM and PM peak hours, respectively; and
  - 17 two-way transit trips (5 inbound and 12 outbound) and 23 two-way transit trips (14 inbound and 9 outbound) during the AM and PM peak hours, respectively.
- The intersection capacity analysis indicates that under the existing 2021 conditions, all intersections are currently operating at acceptable levels of service, no improvements are required at this time.
- Under the future background conditions with the planned widening of Mayfield Road from its existing 4-lane cross-section west of Heart Lake Road to a 6-lane cross-section, all intersections are expected to operate at acceptable levels of service. However, for the Mayfield Road/Kennedy Road intersection, a westbound exclusive right turn lane and southbound double left turn lanes are required by 2028. It is recommended that these improvements to be included as part of the Mayfield Road improvements.
- Under the future total conditions with the planned widening of Mayfield Road from its existing 4-lane cross-section west of Heart Lake Road to a 6-lane cross-section, the majority of the intersections are expected to operate at acceptable levels of service. However, for the Mayfield Road/Kennedy Road intersection, a westbound exclusive right turn lane and southbound double left turn lanes are required by 2028. For the Mayfield Road/Stonegate Drive/Site Access #3, a traffic signal will be required by 2023 to improve operation and help facilitate pedestrian and cyclist crossing from the south side to the north side of Mayfield Road, although traffic signals are not numerically warranted. It is recommended that all of these improvements to be included as part of the Mayfield Road improvements.
- The analysis indicates that the transit passenger demands generated by the proposed development per transit vehicle is very low due to limited transit opportunities in the area under the existing conditions. However, it is suggested that the Town of Caledon should work with Brampton Transit to extend the existing Kennedy Bus Route 7/7A to service this future area.
- Based the applicable Zoning By-law requirement, the proposed development will require to provide approximately 1,710 vehicle parking spaces are required for the residential components, however, the commercial component parking requirements will be determined at the subsequent stage of the development. It is Nextrans understanding that the proposed development will meet this requirement.
- The Town of Caledon currently does not have bicycle requirements in the current Zoning By-law. In order to support and encourage active transportation use, Nextrans recommends that the proposed development provides at least 10 short-term bicycle parking spaces and 40 long-term bicycle parking spaces (about 10% of the total numbers of units) for the medium-high density component of the proposed development. This provision will encourage the future residents to take sustainable mode of transportation instead of driving single-occupant-vehicles.
- The vehicle turning movement templates will be provided at the subsequent development stages.

10.2 Study Recommendations

Based on the findings of this Study, the following recommendations are provided:

- Intersection improvements:
  - Provide traffic signals at the Kennedy Road/Snellview Boulevard/Site Access #1 intersection by 2033 or the completion of the proposed development. The proposed lane configurations include:
    - One exclusive northbound and southbound left turn lanes with minimum of 30 m storage length
    - One exclusive westbound left turn lane with 15 m storage, a shared through/right and one inbound lane
    - Convert the existing eastbound exclusive right turn lane on Snellview Boulevard to a shared through/right lane
  - Provide a full moves intersection at the Heart Lake Road/Site Access #2 Provide a full moves intersection at the Heart Lake Road/Site Access #2 with stop signs on the east-west direction. The lane configurations include:
    - One southbound and one northbound left turn lane with minimum of 30 m storage length and a shared northbound and southbound through/right lane
    - One westbound and one eastbound exclusive left turn lanes with minimum of 15 m storage and a shared westbound and eastbound through/right lane
  - Provide traffic signals the Mayfield Road/Stonegate Drive/Site Access #3 intersection by 2023 or the completion of the proposed commercial/medium-high density residential blocks. The proposed lane configurations include:
    - One exclusive westbound left turn with minimum of 60 m storage length and one exclusive eastbound left turn with minimum of 30 m storage
    - One exclusive southbound left turn with 15 m storage and a shared through/right, as well as one inbound lane be provided for the proposed Site Access #3
  - Provide westbound exclusive right turn and southbound double left turn lanes at the Mayfield Road/Kennedy Road intersection as part of the Mayfield Road widening project (2026).
- The proposed development implements the TDM measures and incentives identified in this report to support active transportation and transit and to reduce the numbers of single-occupant-vehicle trips to and from the proposed development;
- The proposed development provides at least 10 short-term bicycle parking spaces and 40 long-term bicycle parking spaces (about 10% of the total numbers of units) for the medium-high density component of the proposed development.
- The Town and the Region should provide 3.0 multi-use path on the north side of Mayfield Road from Kennedy Road to Heart Lake Road. This should be included in the detailed design and construction of Mayfield Road.
- The proposed development provides direct shared pedestrian and cycling connections to Mayfield Road and Heart Lake Road for the medium-high density components



	AM	
	Inbd	Outbd
Block 1	26	85
Block 2	30	100
Block 3	31	97
Block 4	33	18
Block 5	16	45
Total	*136*	*345*

Not to Scale

nexTrans CONSULTING ENGINEERS

Legend: XX Peak Hour Traffic Volumes

Stop Sign

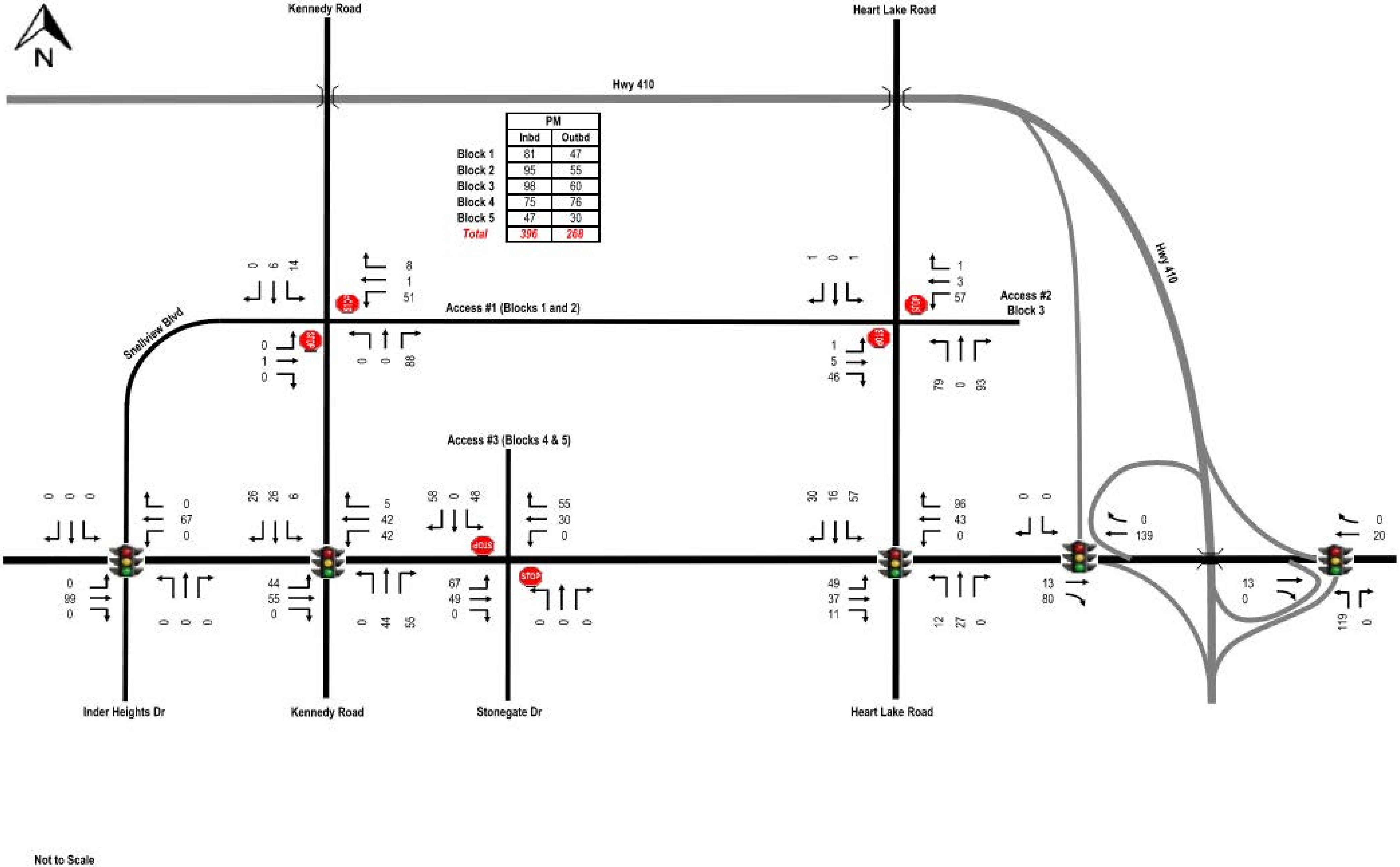
Signalized Intersection

Figure 11B - Site Traffic Volumes
AM Peak Hour

TOWN OF CALEDON
PLANNING
RECEIVED

Nov 26, 2021

BD1- Kennedy & Mayfield TIS



	PM	
	Inbd	Outbd
Block 1	81	47
Block 2	95	55
Block 3	98	60
Block 4	75	76
Block 5	47	30
Total	*396*	*268*

Legend: XX Peak Hour Traffic Volumes

Stop Sign

Signalized Intersection

Figure 11C - Site Traffic Volumes
PM Peak Hour

BD2- 0 & 12305 Dixie Rd - Traffic-11-03-21_Excerpts

Tribal Partners Canada Inc.

TRANSPORTATION IMPACT STUDY

12035 Dixie Road, Town of Caledon Proposed Industrial/Employment Development

March 2021
21185

1 INTRODUCTION

LEA Consulting Ltd. (LEA) has been retained by Tribal Partners Canada Inc. to conduct a Transportation Impact Study (TIS) for a proposed warehouse/employment development located at 12035 Dixie Road in the Town of Caledon (herein referred to as the "subject site"). The subject site is currently agricultural land at the northeast quadrant of Dixie Road & Mayfield Road, as illustrated in Figure 1-1.

Figure 1-1: Subject Site Location

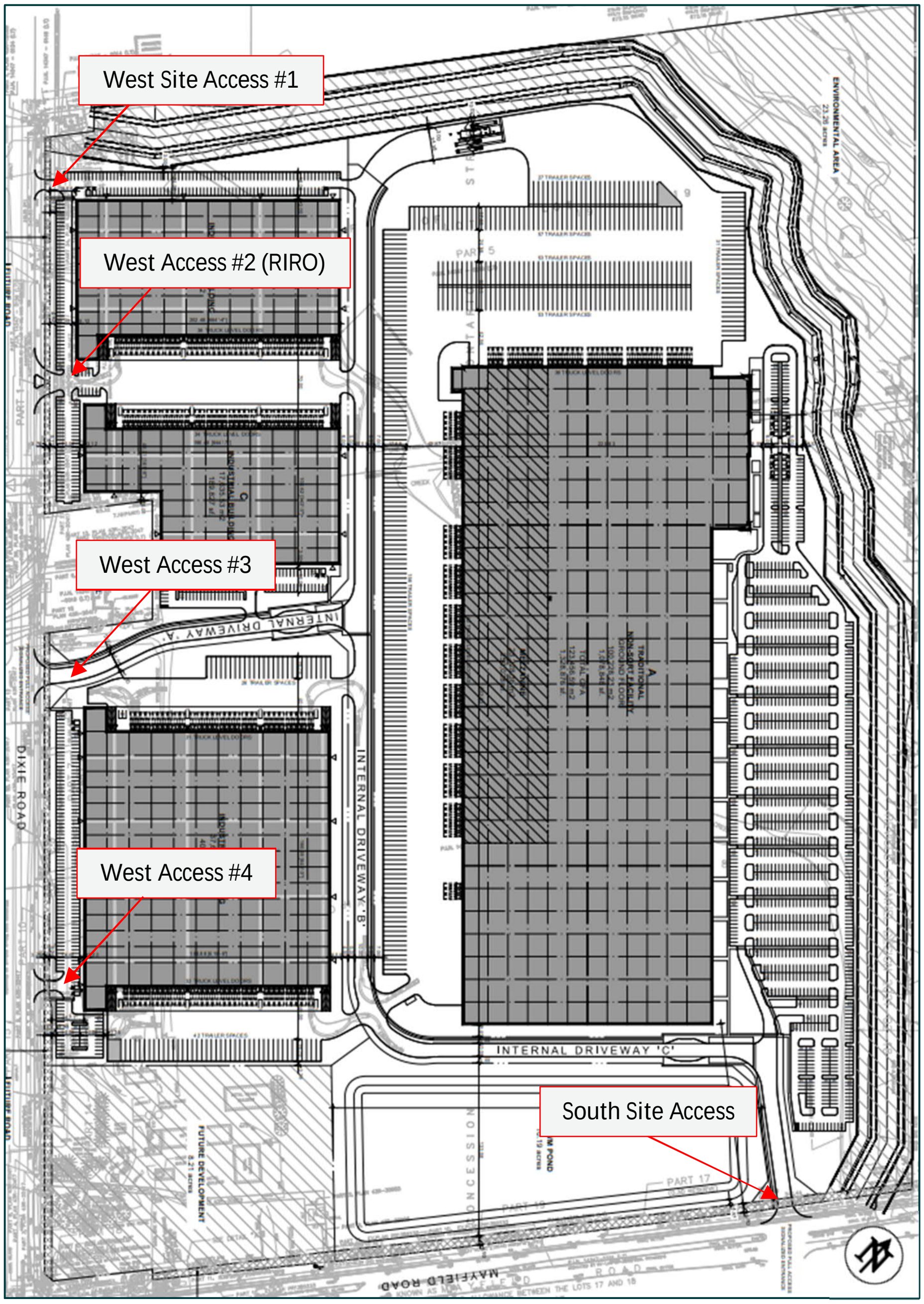
1.1 PROPOSED DEVELOPMENT

The development proposal will introduce four (4) warehouse/distribution buildings with a combined ground floor area (GFA) of approximately 200,292m^2. A total of 2,111 surface parking spaces are proposed for the subject site. The proposed site statistics are presented in Table 1-1, and the proposed site plan is shown in Figure 1-2.

Table 1-1: Proposed Site Statistics

Land Use	Building	GFA (m^2)	GFA (ft^2)
Warehouse/ Distribution Centre	A	123,457	1,328,874
	B	37,691	405,705
	C	17,636	189,827
	D	21,509	231,519
	Total	200,292	2,155,926

Figure 1-2: Proposed Site Plan



Source: Baldassarra Architects Inc. (March 8th, 2021)

1.2 ACCESS ARRANGEMENT

The proposed development will be accessible via three (3) all-moves accesses and one (1) right-in/right-out (RIRO) access along Dixie Road, as well as one (1) all-moves access along Mayfield Road. The Mayfield Road

4 SITE-GENERATED TRAFFIC

4.1 TRIP GENERATION

The proposed buildings are expected to operate similarly to a typical warehouse/distribution centre. To determine the trip generation for the proposed development, the average rate in the Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition for Warehousing (Land Use Code 150) was applied to the proposed uses. The heavy vehicle trip generation rates are derived from the ITE Trip Generation 10th Edition Online Supplement for LUC 150. The heavy vehicle percentages have been calculated by dividing the heavy vehicle trip generation rate by the total vehicle trip generation rate. The vehicle and truck trip rates utilized in the trip generation calculations are shown in Table 4-1, and the trip generation breakdown by building is summarized in Table 4-2.

Table 4-1: Vehicle and Truck Warehousing Trip Rates

Trip Generation	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
All Vehicle Directional Distribution	77%	23%	100%	27%	73%	100%
All Vehicles Trip Rate (Per 1,000ft^2)	0.13	0.04	0.17	0.05	0.14	0.19
Heavy Vehicle Directional Distribution	52%	48%	100%	52%	48%	100%
Heavy Vehicle Trip Rate (Per 1,000ft^2)	0.01	0.01	0.02	0.02	0.01	0.03
Heavy Vehicle Percentage	8%	26%	12%	39%	7%	16%

Table 4-2: Trip Generation Summary

Building	Trip Generation	AM Peak Hour (Trips)			PM Peak Hour (Trips)		
		In	Out	Total	In	Out	Total
Building A (1,328,874 ft^2)	Total Building A Traffic	174	52	226	68	184	252
	Employee Traffic	161	39	199	41	172	212
	Truck Traffic	13	13	27	27	13	40
Building B (405,705 ft^2)	Total Building B Traffic	53	16	69	21	56	77
	Employee Traffic	49	12	61	13	52	64
	Truck Traffic	4	4	8	8	4	12
Building C (189,827 ft^2)	Total Building C Traffic	25	7	32	10	26	36
	Employee Traffic	23	5	28	6	24	30
	Truck Traffic	2	2	4	4	2	6
Building D (231,519 ft^2)	Total Building D Traffic	30	9	39	12	32	44
	Employee Traffic	28	7	34	7	30	37
	Truck Traffic	2	2	5	5	2	7
Total Site	Total Site Traffic	282	84	366	111	298	409
	Employee Traffic	261	63	322	67	277	344
	Truck Traffic	21	21	44	44	21	65

The proposed development is projected to generate a total of 366 new trips (282 inbound, 84 outbound) and 409 new trips (111 inbound, 298 outbound) during the AM and PM peak hour periods, respectively.

4.2 TRIP DISTRIBUTION AND ASSIGNMENT

The trip distribution of employee vehicle traffic was estimated using Transportation Tomorrow Survey (TTS) 2016 data. The TTS data was filtered for auto home-based work trips during the weekday AM peak period. It is assumed that the PM peak period trip distribution is the reverse of the AM peak period since employees entering the subject site in the morning will be utilizing the same routing in the afternoon to exit, and vice versa. Table 4-3 summarizes the trip distribution for this study. Detailed TTS calculations are available in Appendix E.

Table 4-3: Vehicle Trip Distribution

Direction	Roadway	AM		PM	
		Inbound	Outbound	Inbound	Outbound
North	Dixie Road	33%	23%	23%	33%
South	Dixie Road	15%	11%	11%	15%
East	Mayfield Road	10%	6%	6%	10%
West	Mayfield Road	42%	60%	60%	42%
	TOTAL	100%	100%	100%	100%

The majority of site traffic is expected to use Highway 410 to/from the proposed development which is located west of the subject site. The employee trip assignment was subsequently determined based on the trip origin and destination, site accesses, and the most logical routing. Figure 4-1 illustrates the trip assignment of employee traffic on the study road network.

As for heavy vehicle site traffic, it is assumed that most trucks will utilize the highway network for longer distance travel. Given the subject site's close proximity to Highway 410, heavy vehicle site traffic was assigned to utilize this highway to travel to/from the site, as shown in Figure 4-2.

The total site generated traffic volumes for the weekday AM and PM peak hours are illustrated in Figure 4-3.

Figure 4-1: Employee Vehicle Site Generated Peak Hour Traffic Volumes

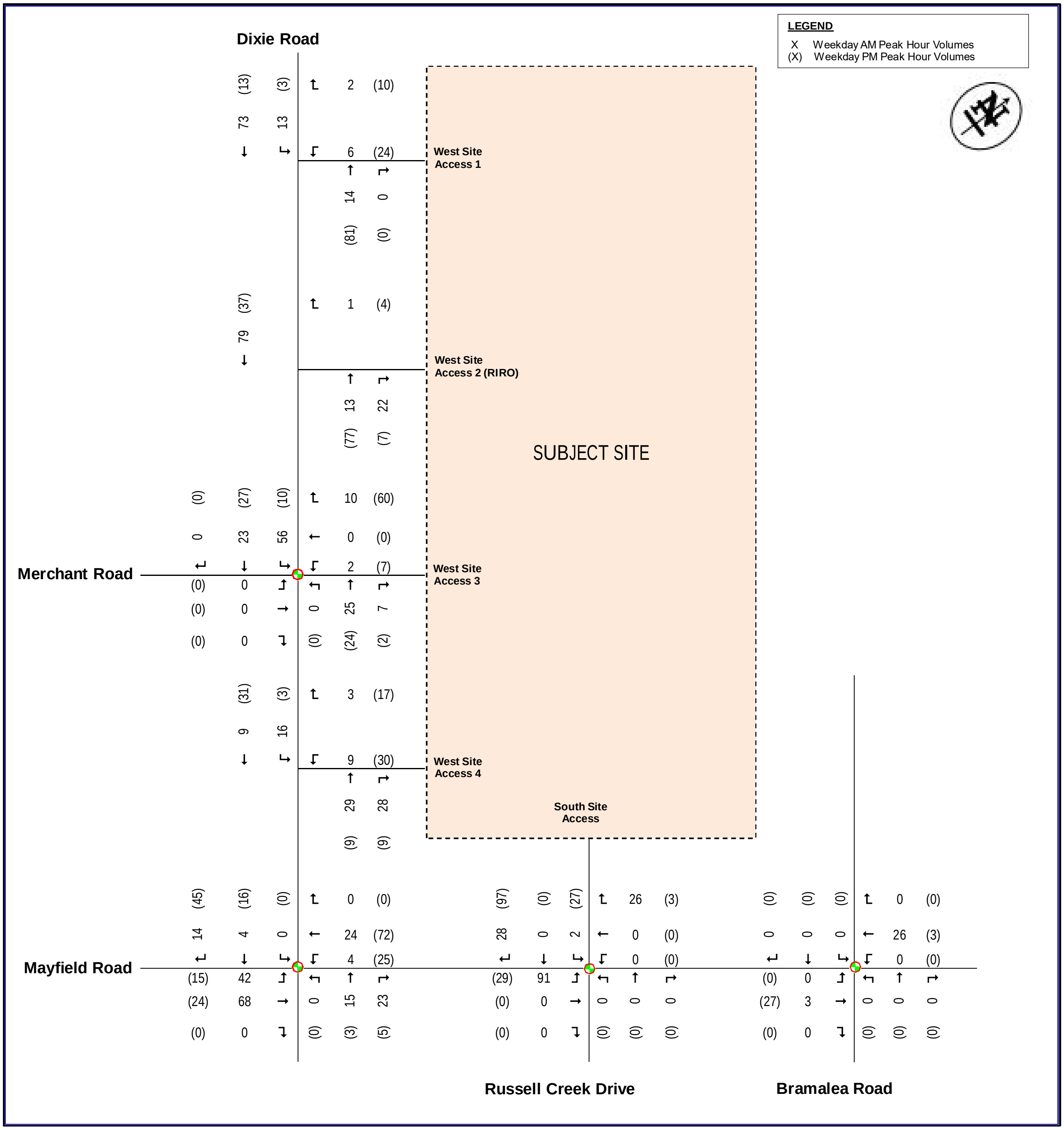


Figure 4-2: Heavy Vehicle Site Generated Peak Hour Traffic Volumes

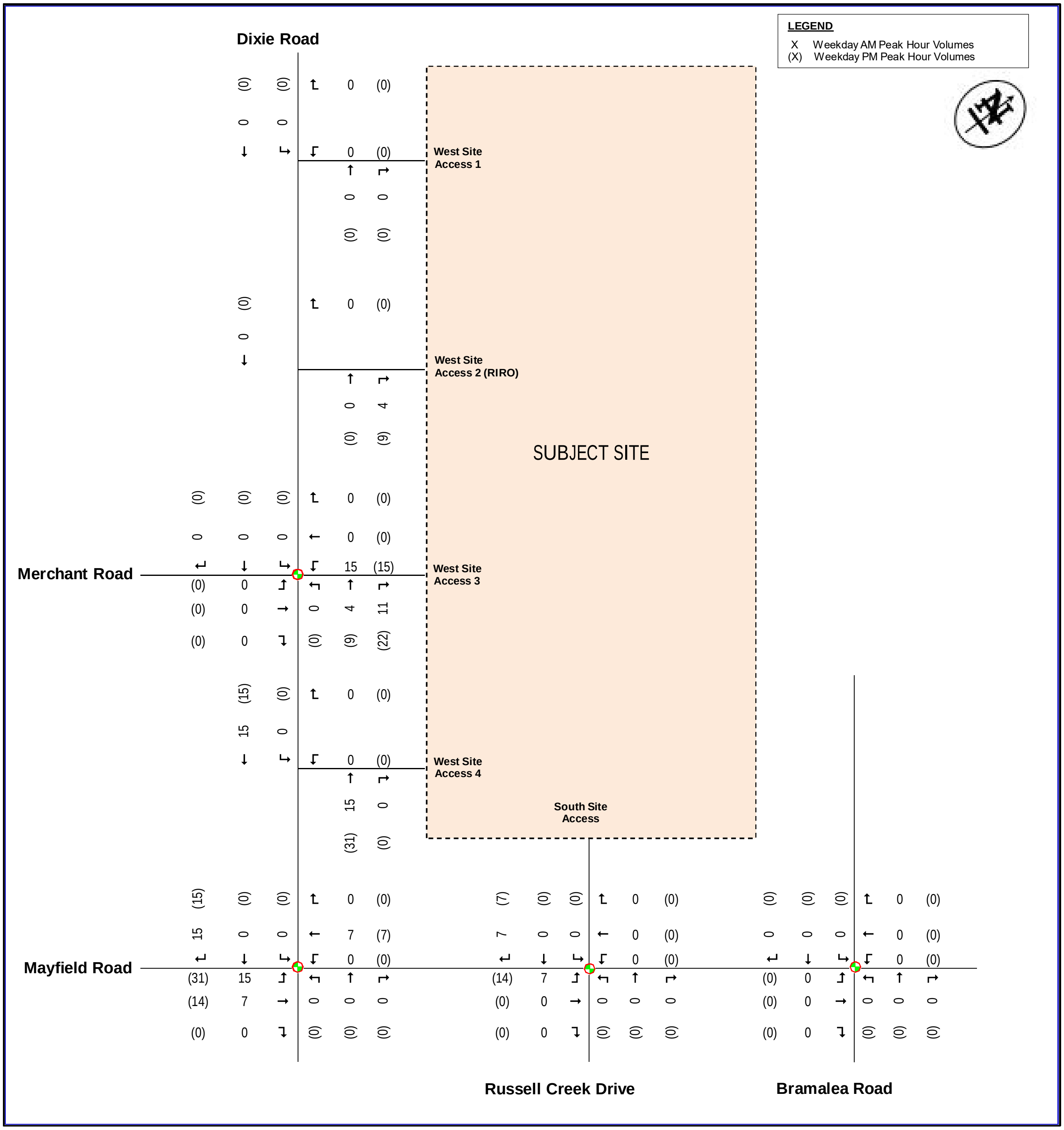
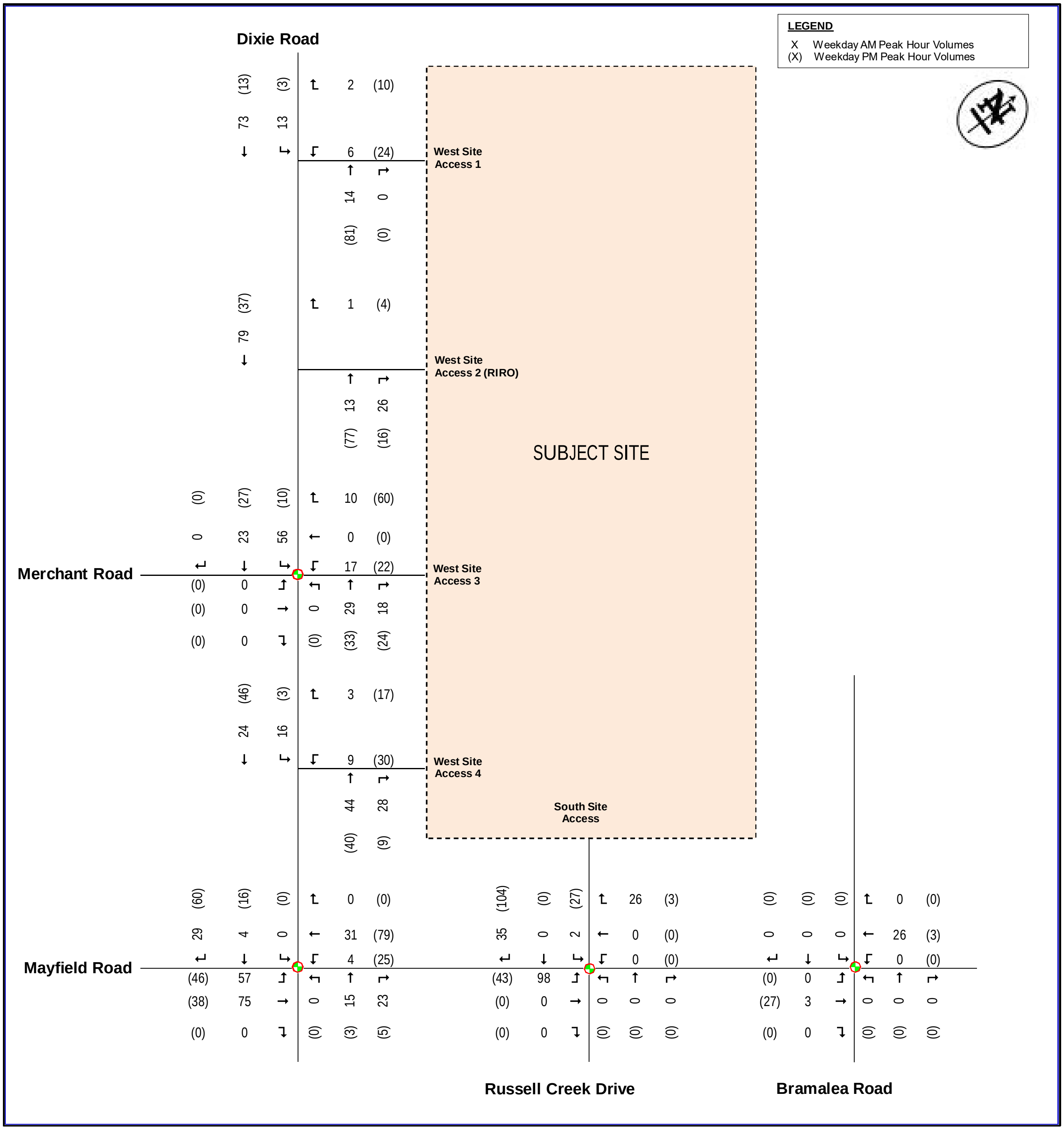


Figure 4-3: Total Site Generated Peak Hour Traffic Volumes



Traffic Impact Study

Abbotside Way Warehouse Development

GHD | 6705 Millcreek Drive Unit 1 Mississauga Ontario L5N 5M4 Canada

11222643 | 800 | Report No 1 | December 21, 2020

Figure 1 Site Location

2. Site Characteristics

2.1 Site Environment

The subject site is generally located on the south side of Abbotside Way east of Learmont Avenue. The site is bounded by Abbotside Way to the north, Highway 410 to the south and vacant lands to the east and west.

2.2 Study Area

The study area intersections include the following:

- Kennedy Road North and Abbotside Way
- Abbotside Way and Sie Driveway A
- Abbotside Way and Site Driveway B

Table 1 Site Trip Generation

Land Use Code	Units/GFA (ft^2)	Parameters	Peak Hour Trip Generation					
			Weekday AM			Weekday PM		
			In	Out	Total	In	Out	Total
Warehousing (LUC 150)	139,000 GFA (ft^2)	Trip Rate	0.231	0.073	0.304	0.087	0.231	0.318
		Trip Ratio	77%	23%	-	27%	73%	-
		Total New Trips	32	10	42	12	32	44

The proposed warehouse development is expected to generate a total of 42 two way vehicle trips during the a.m. peak hour consisting of 32 inbound and 10 outbound trips. During the p.m. peak hour it is expected to generate 44 new two way vehicle trips consisting of 12 inbound and 32 outbound trips.

In order to calculate the future number of trucks generated by the proposed site, GHD adopted the following truck percentages (**Table 2**) based on engineering judgment and experience with similar sites.

Table 2 summarizes the estimated truck percentage calculations.

Table 2 Site trips - Breakdown

Parameters	Peak Hour Trip Generation					
	Weekday AM			Weekday PM		
	In	Out	Total	In	Out	Total
% of Trucks	40%	11%		50%	30%	
Total New trips (veh)	20	9	39	6	22	28
Total New trips (trucks)	12	1	13	6	10	16
Total New trips	32	10	42	12	32	44

5.4 Site Trip Distribution and Assignment

Site-generated trips were assigned to the future surrounding road network based existing traffic conditions and engineering judgment. Based on a review of the existing traffic patterns in the area and the location of the subject site with respect to the surrounding areas, it was determined that the majority of the site trips will originate and be destined to the south via Kennedy Road.

Therefore, most of the passenger car and all of the truck inbound site trips were added to the northbound right turn movement from Kennedy Road to Abbotside Way and conversely, most of the outbound passenger vehicle and all of the truck trips were added to the westbound left turn movement from Abbotside Way to Kennedy Road.

Conservatively, all site trips were assumed to make a right turn to enter the site via one of the two proposed driveways and exit the site by making a left turn onto Abbotside Way from one of the two site driveways.

A breakdown of the site trip distribution for both peak hours can be seen in **Table 2-1.**

Table 2-1 Site Distribution

Direction	Passenger Car		Heavy Vehicles	
	a.m. peak hour Inbound (Outbound)	p.m. peak hour Inbound (Outbound)	a.m. peak hour Inbound (Outbound)	p.m. peak hour Inbound (Outbound)
To/From west on Abbotside Way	100%	100%	100%	100%
To/From the North on Kennedy Road North	5%	5%	0%	0%
To/From the South on Kennedy Road North	95%	95%	100%	100%

The resulting site trips are shown in **Figure 6**. Truck trips have been converted to passenger car equivalents using a conversion factor of 2.0 vehicles representing each truck.

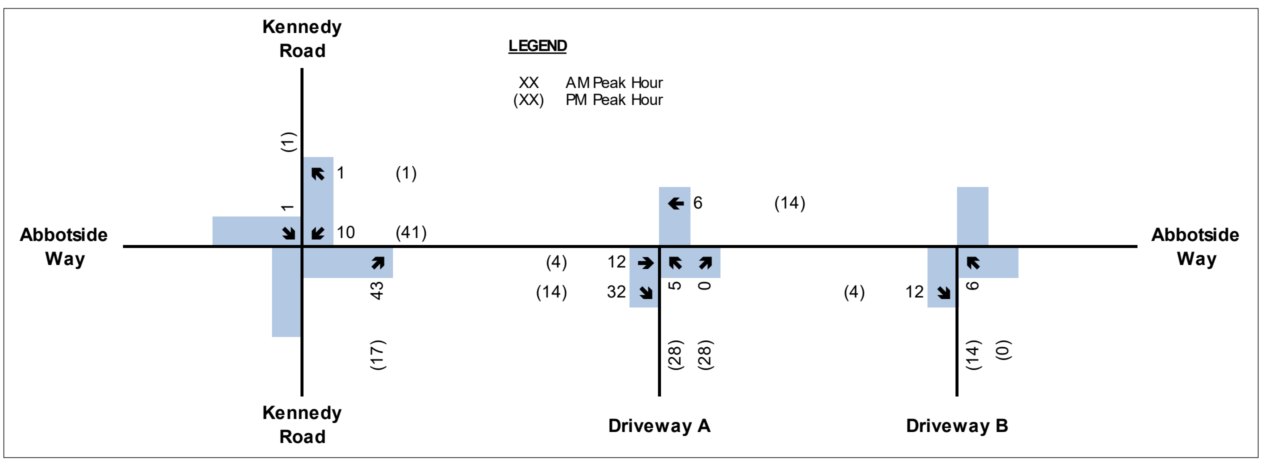


Figure 6 Estimated Site Trips (Passenger Car Equivalents)

6. Future Total Traffic

6.1 Future Total Traffic

The future total traffic conditions in the weekday a.m. and p.m. peak study hours for the 2025 planning horizon was derived by combining the future background traffic volumes with the corresponding estimates of site trips generated by the subject site. The 2025 future total traffic volumes at the study area intersections are summarized in **Figure 7**.

Dream Industrial LP

TRANSPORTATION IMPACT STUDY

Proposed Industrial Development Abbotside Way, Town of Caledon

August 2021

21320

1 INTRODUCTION

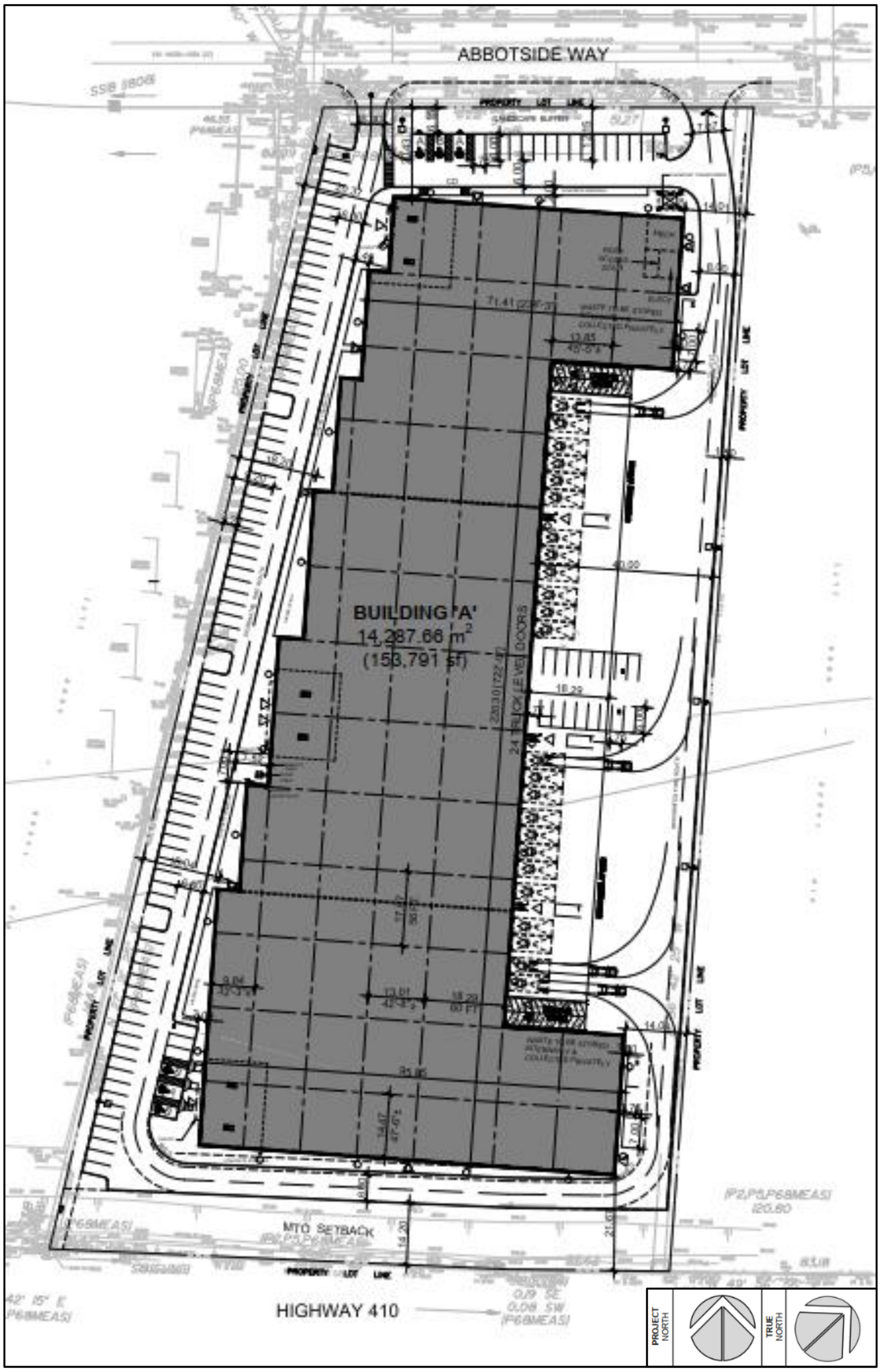
LEA Consulting Ltd. (LEA) has been retained by Dream Industrial LP to undertake a Transportation Impact Study (TIS) for the proposed industrial development located on the southeast corner of Abbotside Way and Learmont Avenue (hereinafter referred to as the "subject site") in the Town of Caledon. Currently, the subject site is vacant. The site location is illustrated in **Figure 1-1**.

Figure 1-1: Site Location

Source: Google Maps, 2021

The development proposal consists of one single storey industrial/warehouse facility with an approximate GFA of 14,290 m^2 (154,000 ft^2). A total of 131 parking spaces are provided in one (1) surface lot. **Figure 1-2** illustrates the proposed site plan.

Figure 1-2: Proposed Site Plan



Source: Baldassarra Architects Inc., August 2021

3 FUTURE BACKGROUND CONDITIONS

For the analysis of future background conditions, the study considered a five-year horizon to the year 2026.

3.1 BACKGROUND DEVELOPMENTS

Two (2) background developments were identified within the immediate study area. The background development traffic volumes were extracted from their studies and subsequently assigned to the study area road network. The site statistics of the background developments are summarized in **Table 3-1**. Detailed excerpts from the studies are provided in **Appendix C.**

Table 3-1: Background Development

Location	Site Statistics	Source
Buttermill Developments	175 Residential Units, 1,389 m^2 Retail GFA	WSP (October 2019)
Abbotside Way Warehouse Development (Previously proposed as Sikh Place of Worship in 2017)	12,913 m^2 Warehouse GFA	GHD (December 2020)

3.2 CORRIDOR GROWTH

LEA assumed a growth rate of 2% annual growth rate for the north-south through traffic on Kennedy Road during both peak hours for a five-year horizon to the year 2026. This aligns with the GHD Traffic Report dated May 2017 for the adjacent Sikh Place of Worship, which was confirmed with the Town.

3.3 INTERSECTION CAPACITY ANALYSIS

Future background traffic conditions were determined by incorporating background development traffic, corridor growth and existing traffic volumes. It is noted that the study area intersection lane configurations remain unchanged from existing conditions. The future traffic volumes for the weekday AM and PM peak hours are illustrated in **Figure 3-1**.

4 SITE GENERATED TRAFFIC

The proposed development consists of one industrial/warehouse facility with an approximate GFA of 14,290 m^2. The sections below discuss the calculation, distribution, and assignment of site generated vehicles trips.

4.1 TRIP GENERATION

Trip generation for the proposed development was estimated based on the ITE Trip Generation Manual 10th Edition for Warehousing (LUC 150) land use. The average trip rates were applied to estimate car and truck trips. The trip calculations are summarized in **Table 4-1**. The proposed development is forecasted to generate less than 40 trips during both peak hours.

Table 4-1: Trip Generation Summary

Land Use			Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
Warehousing ITE LUC 150 (Car)	14,290 m^2 (154,000 ft^2)	Directional Distribution	77%	23%	100%	27%	73%	100%
		Trip Rate (Average)	0.13	0.04	0.17	0.05	0.13	0.18
		ITE Vehicle (Car) Trips	20	6	26	8	21	29
Warehousing ITE LUC 150 (Truck)	14,290 m^2 (154,000 ft^2)	Directional Distribution	52%	48%	100%	52%	48%	100%
		Trip Rate (Average)	0.01	0.01	0.02	0.02	0.01	0.03
		ITE Vehicle (Truck) Trips	2	1	3	3	2	5
		Total ITE Vehicle Trips	**22**	**7**	**29**	**11**	**23**	**34**

4.2 TRIP DISTRIBUTION AND ASSIGNMENT

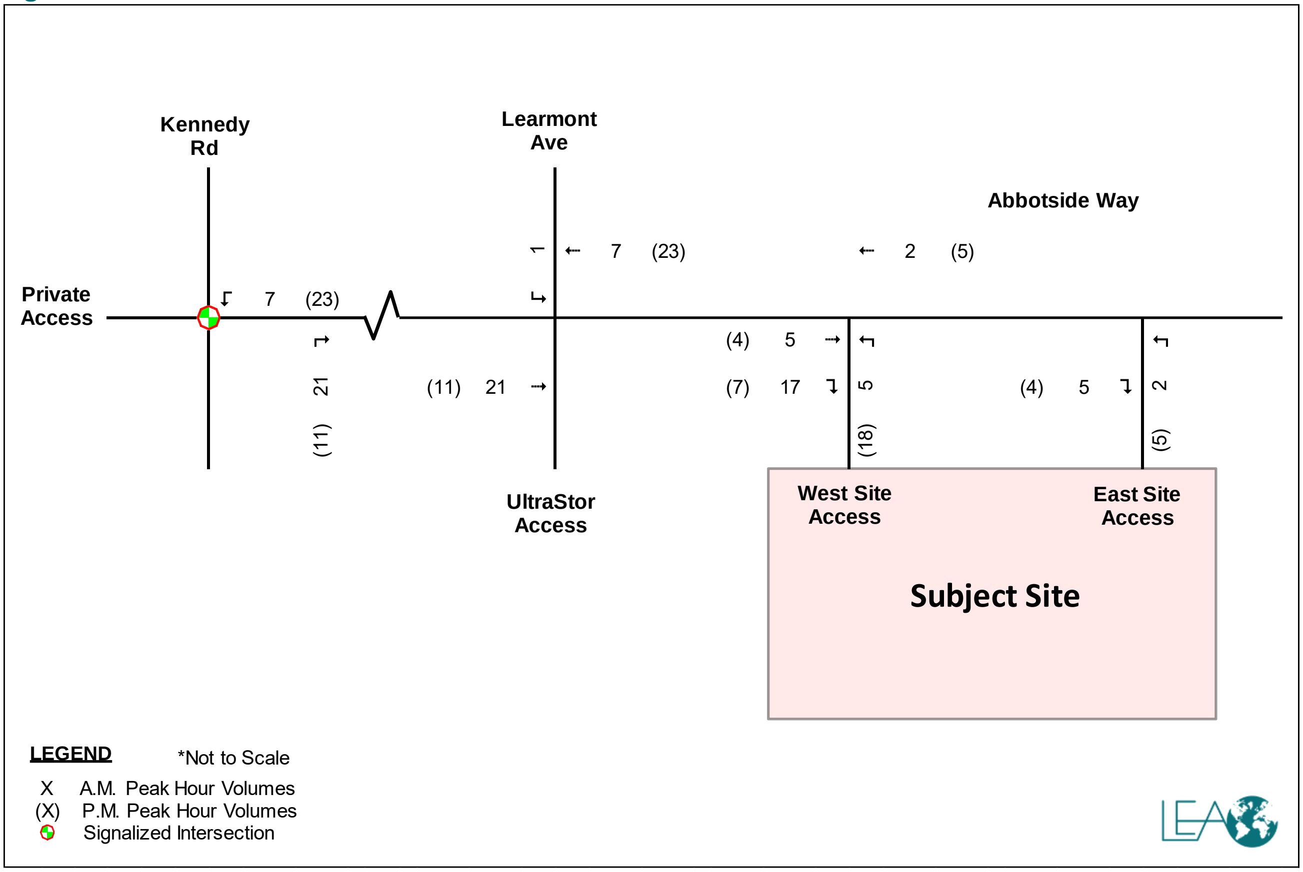
Directional trip distribution of the site traffic was derived using Transportation Tomorrow Survey (TTS) 2016 data. The site traffic was assigned to the road network based on trip patterns in the study area, location and configuration of the site accesses. TTS data was filtered for home-based auto trips during the AM and PM peak periods. **Table 4-2** below outlines the trip distribution for this study. Detailed TTS calculations are provided in **Appendix E**.

Table 4-2: General Trip Distribution

Direction	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
North	2%	3%	2%	0%
South	95%	97%	98%	100%
East	3%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**

Figure 4-1 illustrates the site generated traffic volume for the weekday AM and PM peak hours.

Figure 4-1: Site Generated Traffic Volumes



Tribal Partners Canada Inc.

TRANSPORTATION IMPACT STUDY

12892 Dixie Road, Town of Caledon Proposed Industrial/Employment Development

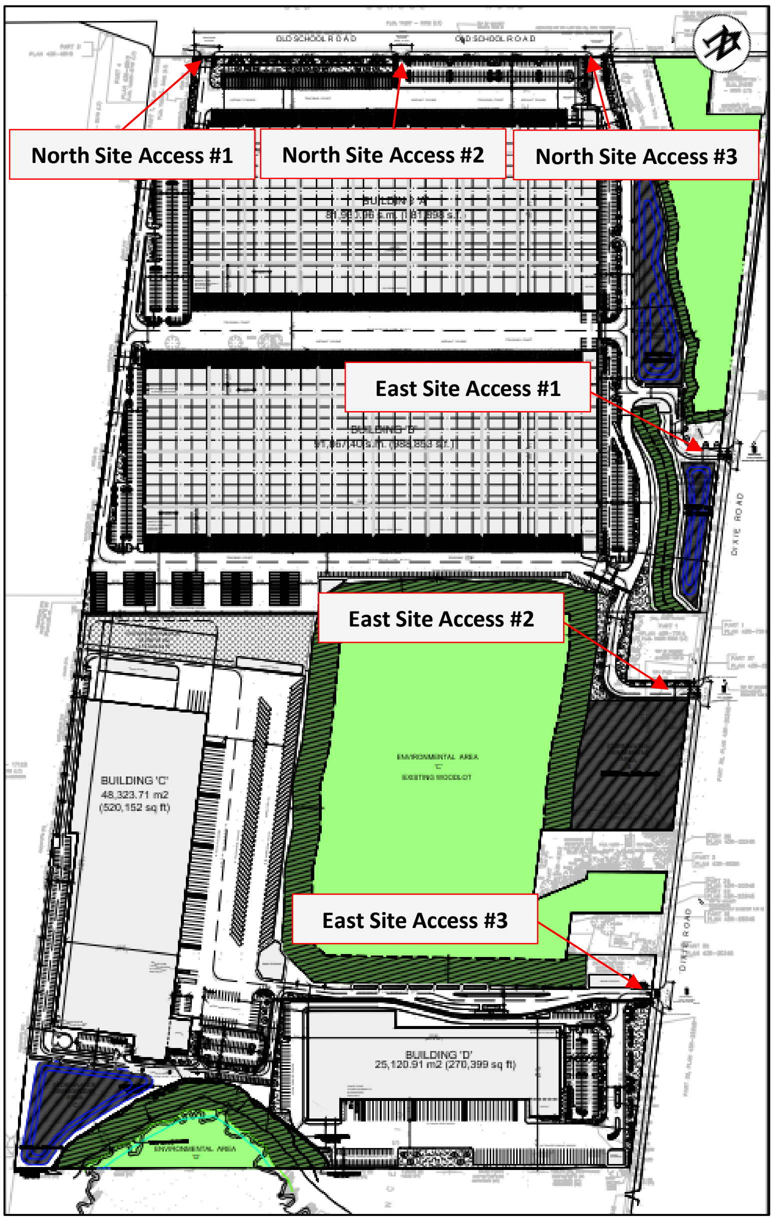
February 2021

21211

Table 1-1: Proposed Site Statistics

Land Use	Building	GFA (m^2)	GFA (ft^2)
Warehouse/ Distribution Centre	A	81,930	881,898
	B	91,867	988,853
	C	48,324	520,152
	D	25,121	270,399
	Total	**247,243**	**2,661,302**

Figure 1-2: Proposed Site Plan



Source: Baldassarra Architects Inc. (February 24th, 2021)

4 SITE-GENERATED TRAFFIC

4.1 TRIP GENERATION

The proposed buildings are expected to operate similarly to a typical warehouse/distribution centre. To determine the trip generation for the proposed development, the average rate in the Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition for Warehousing (Land Use Code 150) was applied to the proposed uses. The heavy vehicle trip generation rates are derived from the ITE Trip Generation 10th Edition Online Supplement for LUC 150. The heavy vehicle percentages have been calculated by dividing the heavy vehicle trip generation rate by the total vehicle trip generation rate. The vehicle and truck trip rates utilized in the trip generation calculations are shown in **Table 4-1**, and the trip generation breakdown by building is summarized in **Table 4-2**.

Table 4-1: Vehicle and Truck Warehousing Trip Rates

Trip Generation	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
All Vehicle Directional Distribution	77%	23%	100%	27%	73%	100%
All Vehicles Trip Rate (Per 1,000ft^2)	0.13	0.04	0.17	0.05	0.14	0.19
Heavy Vehicle Directional Distribution	52%	48%	100%	52%	48%	100%
Heavy Vehicle Trip Rate (Per 1,000ft^2)	0.01	0.01	0.02	0.02	0.01	0.03
Heavy Vehicle Percentage	8%	26%	12%	39%	7%	16%

Table 4-2: Trip Generation Summary

Building	Trip Generation	AM Peak Hour (Trips)			PM Peak Hour (Trips)		
		In	Out	Total	In	Out	Total
Building A (811,866 ft²)	**Total Building A Traffic**	**115**	**35**	**150**	**45**	**123**	**168**
	Employee Traffic	106	26	132	27	114	141
	Truck Traffic	9	9	18	18	9	27
Building B (988,852 ft²)	**Total Building B Traffic**	**129**	**39**	**168**	**51**	**137**	**188**
	Employee Traffic	119	29	148	31	127	158
	Truck Traffic	10	10	20	20	10	30
Building C (520,151.58 ft²)	**Total Building C Traffic**	**68**	**20**	**88**	**27**	**72**	**99**
	Employee Traffic	63	15	78	16	67	83
	Truck Traffic	5	5	10	11	5	16
Building D (270,399.00 ft²)	**Total Building D Traffic**	**35**	**11**	**46**	**14**	**37**	**51**
	Employee Traffic	32	8	41	9	34	43
	Truck Traffic	3	3	5	5	3	8
Total Site	**Total Site Traffic**	**347**	**105**	**452**	**137**	**369**	**506**
	Employee Traffic	320	78	399	83	342	425
	Truck Traffic	27	27	53	54	27	81

The proposed development is projected to generate a total of 452 new trips (347 inbound, 105 outbound) and 506 new trips (137 inbound, 369 outbound) during the AM and PM peak hour periods, respectively.

4.2 TRIP DISTRIBUTION AND ASSIGNMENT

The trip distribution of employee vehicle traffic was estimated using Transportation Tomorrow Survey (TTS) 2016 data. The TTS data was filtered for auto home-based work trips during the weekday AM peak period. It is assumed that the PM peak period trip distribution is the reverse of the AM peak period since employees entering the subject site in the morning will be utilizing the same routing in the afternoon to exit, and vice versa. **Table 4-3** summarizes the trip distribution for this study. Detailed TTS calculations are available in **Appendix E.**

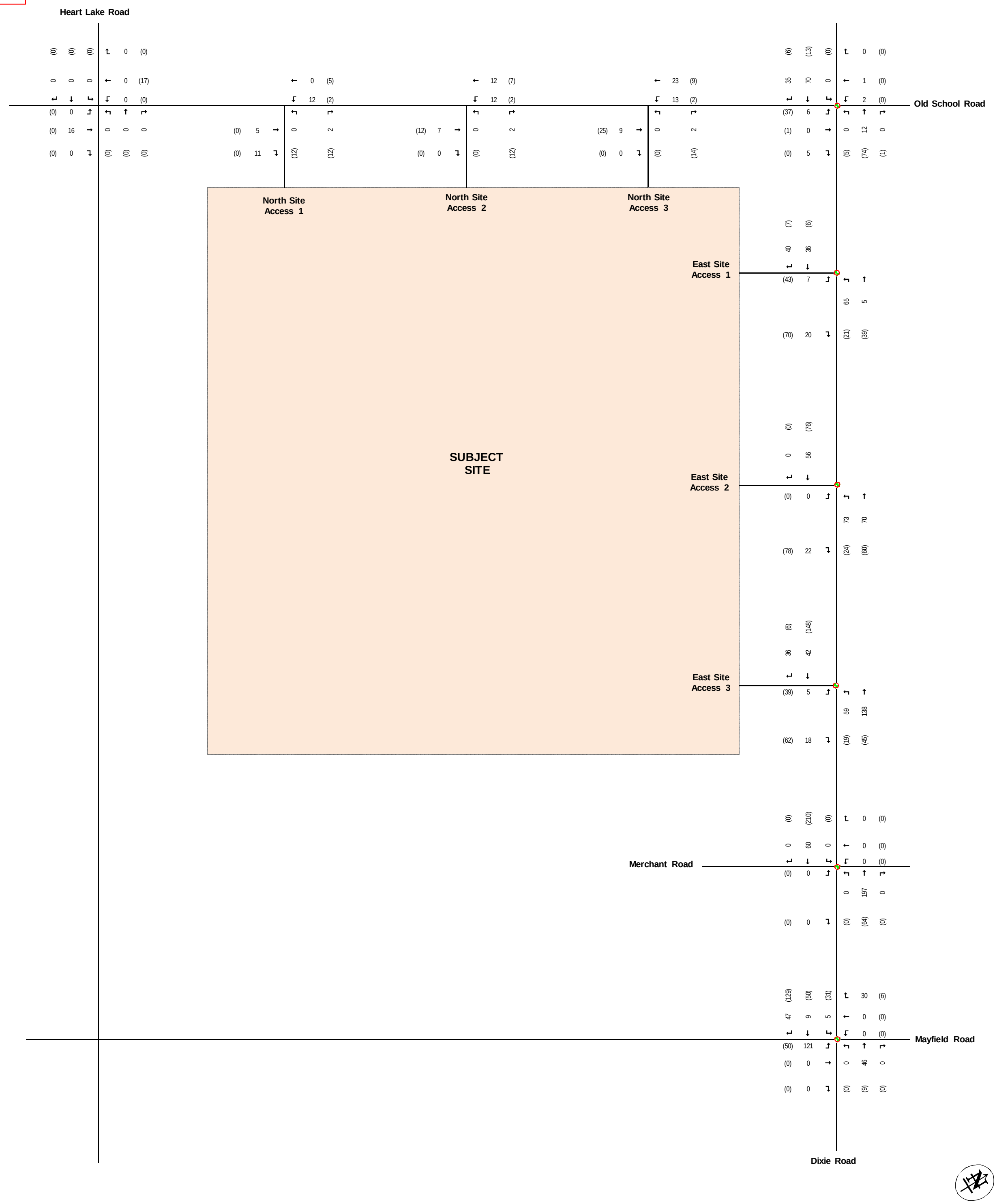
Table 4-3: Vehicle Trip Distribution

Direction	Roadway	AM		PM	
		Inbound	Outbound	Inbound	Outbound
North	Dixie Road	33%	23%	23%	33%
South	Dixie Road	15%	11%	11%	15%
East	Mayfield Road	9%	6%	6%	9%
	Old School Road	1%	-	-	1%
West	Mayfield Road	38%	60%	60%	38%
	Old School Road	5%	-	-	5%
	TOTAL	**100%**	**100%**	**100%**	**100%**

The majority of site traffic is expected to use Highway 410 to/from the proposed development which is located west of the subject site. The employee trip assignment was subsequently determined based on the trip origin and destination, site accesses, and the most logical routing. **Figure 4-1** illustrates the trip assignment of employee traffic on the study road network.

As for heavy vehicle site traffic, it is assumed that most trucks will utilize the highway network for longer distance travel. Given the subject site's close proximity to Highway 410, heavy vehicle site traffic was assigned to utilize this highway to travel to/from the site, as shown in **Figure 4-2**.

The total site generated traffic volumes for the weekday AM and PM peak hours are illustrated in **Figure 4-3**.



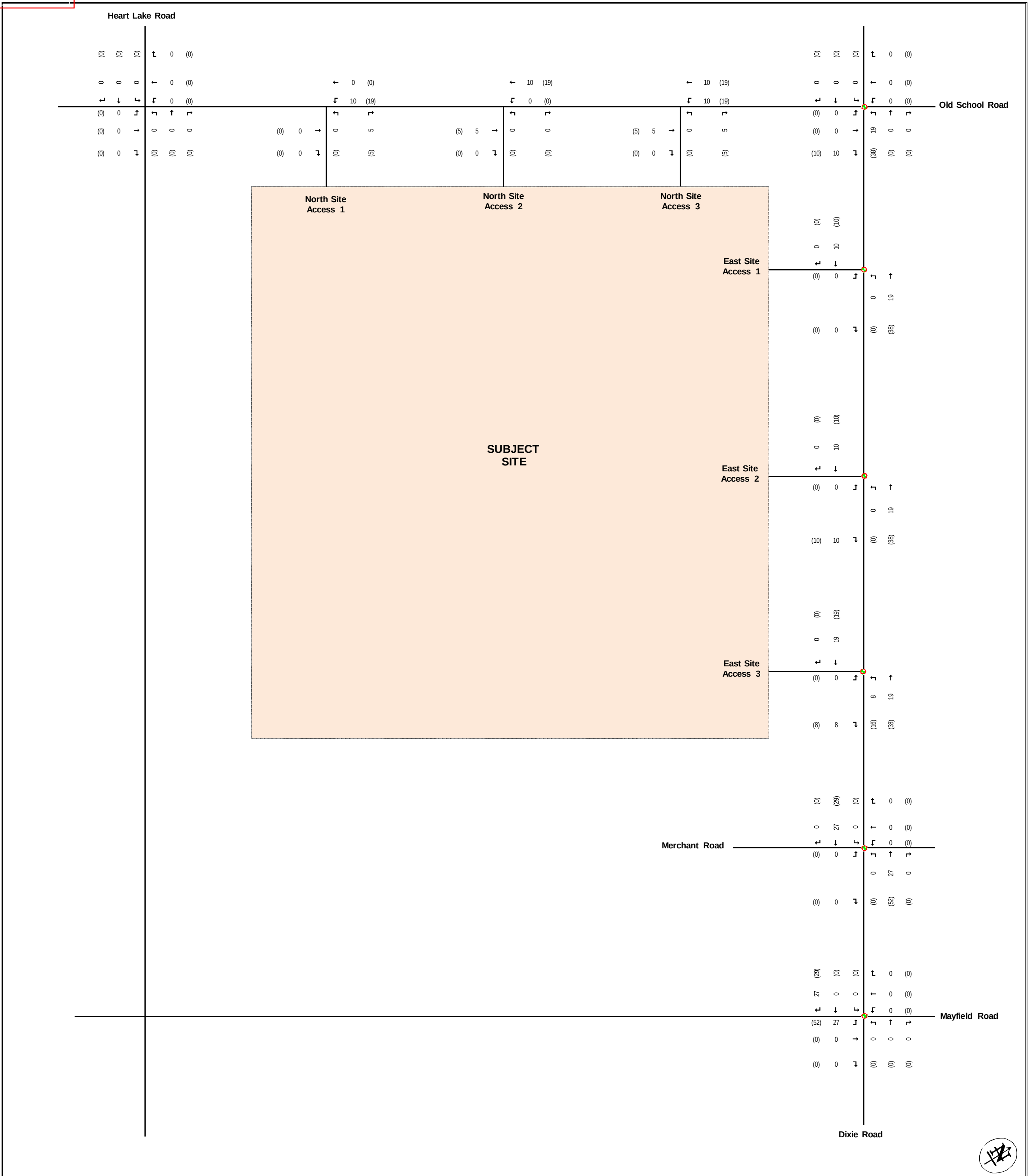
SITE GENERATED TRAFFIC (EMPLOYEE VEHICLES)
FIGURE 4-1

LEA Consulting Ltd.
February 24, 2021

LEGEND

XX (XX) WEEKDAY AM (PM) PEAK HOUR TRAFFIC VOLUMES

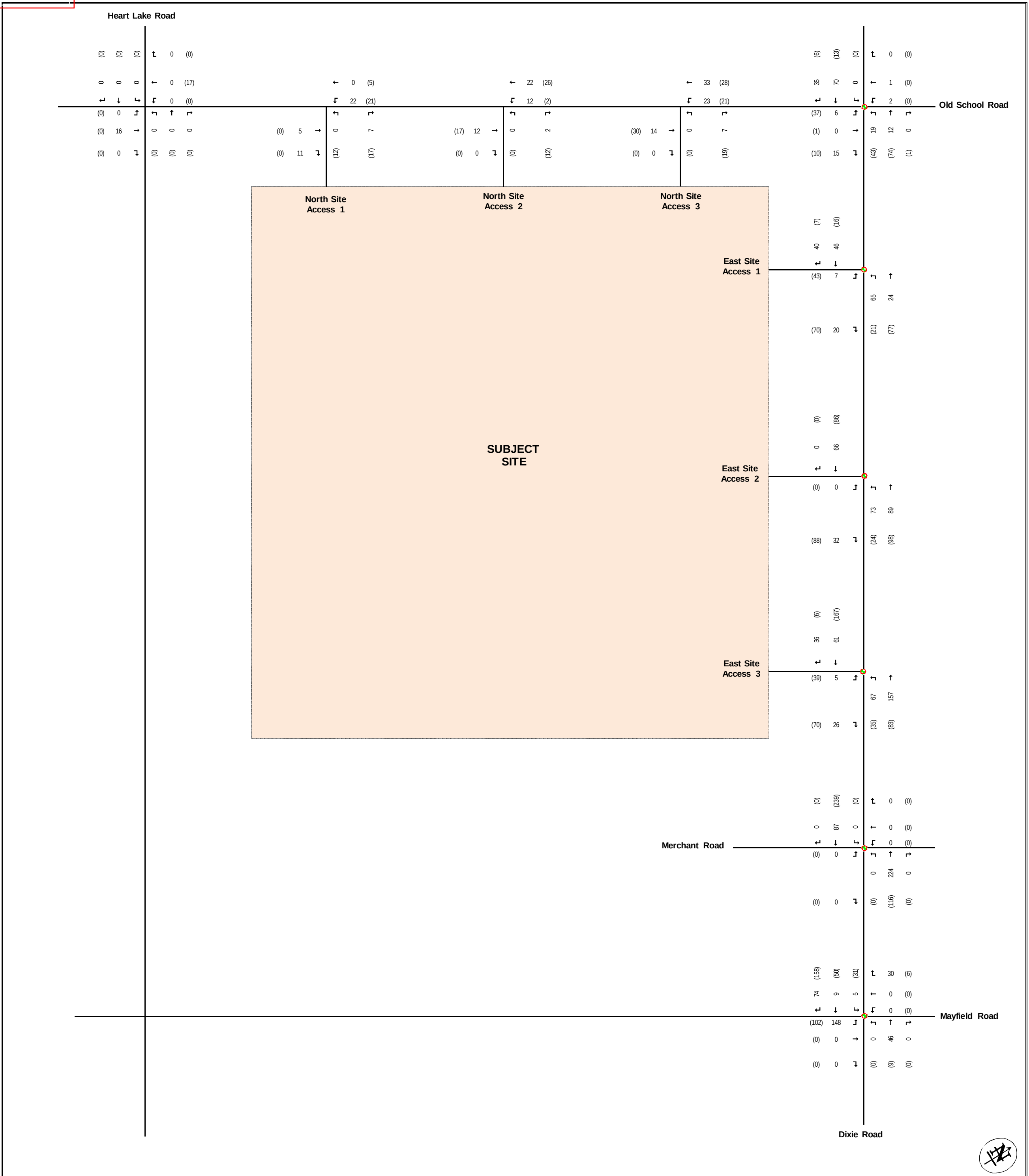
SIGNALIZED INTERSECTION



SITE GENERATED TRAFFIC (HEAVY VEHICLES)
FIGURE 4-2

LEA Consulting Ltd.
February 24, 2021

LEGEND
XX (XX) WEEKDAY AM (PM) PEAK HOUR TRAFFIC VOLUMES
SIGNALIZED INTERSECTION



SITE GENERATED TRAFFIC (TOTAL)
FIGURE 4-3

LEA Consulting Ltd.
February 24, 2021

LEGEND
XX (XX) WEEKDAY AM (PM) PEAK HOUR TRAFFIC VOLUMES
SIGNALIZED INTERSECTION

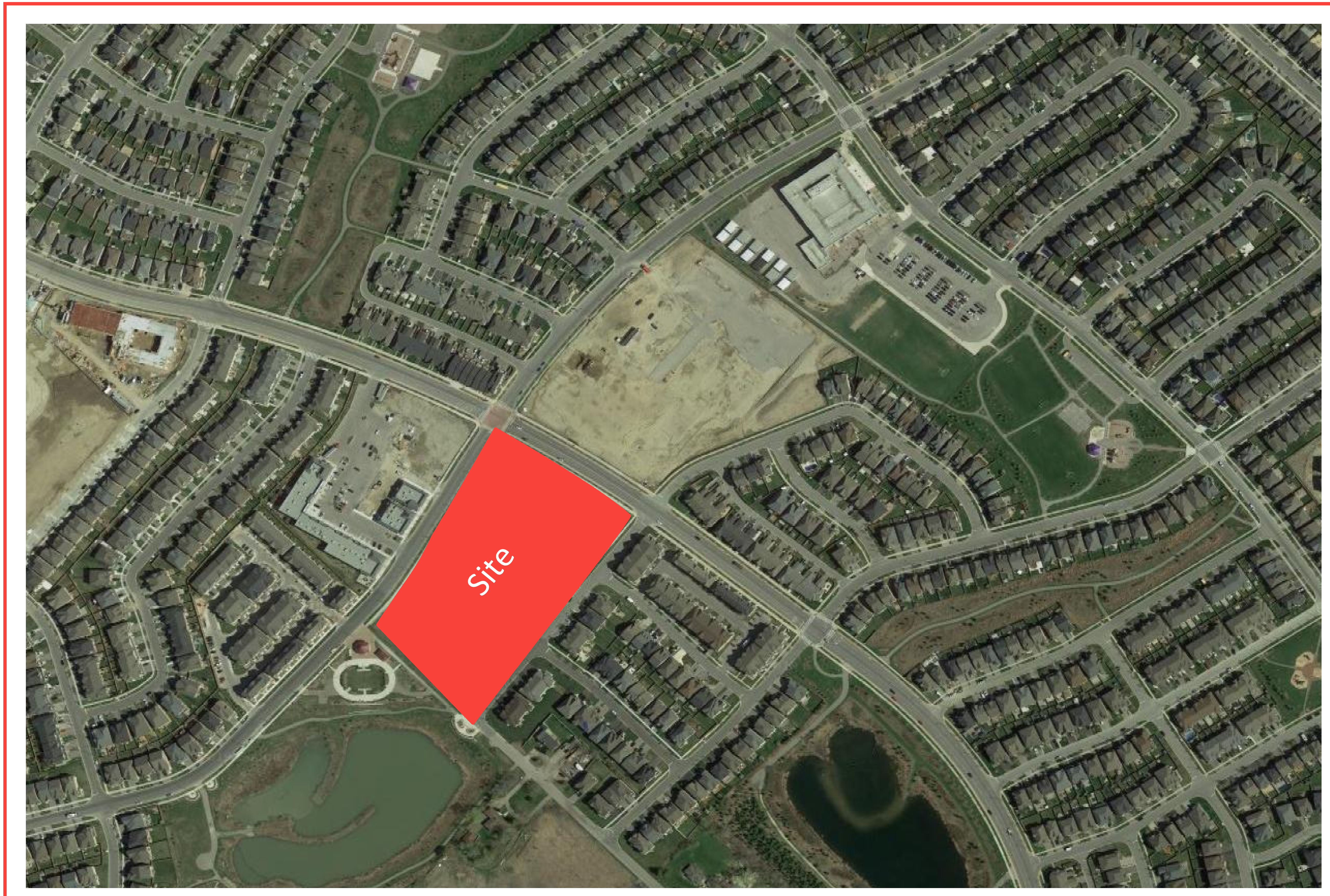
BUTTERMILL DEVELOPMENTS INC.

PROPOSED DEVELOPMENT AT DOUGALL AVENUE AND KENNEDY ROAD, CALEDON

TRAFFIC IMPACT STUDY

TOWN REFERENCE NO.: SP 18-0078

October 18, 2019



wsp

Figure 1.1

Site Location

4 FUTURE TOTAL CONDITIONS

4.1 TRAFFIC GENERATION

As discussed in the introduction, the trip generation for the development was based on the previous site plan that included 172 total residential units, as well as 1,495 sq.m of retail space. Of the 172 units, 121 will be townhouses and 51 will be apartments and dwelling units in a mixed-use building above the 1,495 sq.m retail space at the northeast corner of the site. The only change made in the new site plan was a reduction in the retail space from 1,495 sq.m to 1,389 sq.m and the increase in residential units from 172 to 175. WSP has not updated the traffic analysis as the difference in trip generation would not be significant (one additional trip in the AM peak hour and two additional trips in the PM peak hour) and the analysis results and findings would not change.

Trip generation estimates for the site during the weekday AM and PM peak hours were obtained from the ITE Trip Generation Manual, 10th Edition. The auto trip generation for the apartment and townhouse units was estimated using ITE Land Use Code 221, which is considered to be any residential building that has between 3 to 10 floors. The auto trip generation for the retail portion of the development was estimated using ITE land use code 820. Please note that the equation rate was used for the residential units and an average rate was used for the retail floor space due to the relatively small amount of retail space.

The trip generation calculations are shown in **Table 4-1**. To be conservative, no mode split reductions were applied.

Table 4-1 Estimated Site Vehicle Trip Generation

Land Use	Parameter		Vehicle Trips					
			Weekday AM Peak Hour			Weekday PM Peak Hour		
			Inbound	**Outbound**	**Total**	**Inbound**	**Outbound**	**Total**
Mid- Rise Multi-Family Housing (172 Units)	ITE Land Use 221	Directional Distribution	26%	74%	100%	61%	39%	100%
		Trip Rate	LN(T)=0.98*LN(x)-0.98 = 0.34			LN(T)=0.96*LN(x)-0.63 = 0.43		
		Generated Trips	15	43	58	45	29	74
Retail (1,495 sq.m)	ITE Land Use 820	Directional Distribution	62%	38%	100%	48%	52%	100%
		Average Trip Rate	0.94			3.81		
		Generated Trips	1	1	2	3	3	6
		Total Vehicle Trips	**16**	**44**	**60**	**48**	**32**	**80**

The proposed development is expected to generate 60 vehicle trips (16 inbound and 44 outbound) during the weekday AM peak hour and 80 vehicle trips (48 inbound and 32 outbound) during the weekday PM peak hour.

4.2 TRIP DISTRIBUTION AND ASSIGNMENT

Site traffic distribution for the proposed development is based on the 2016 TTS. To determine the distribution of the generated traffic, a query of ten traffic zones was used from the surrounding site area. The zones included six from Caledon (3007, 3008, 3009, 3010, 3011, and 3146) and four from Brampton (3381, 3459, 3460, and 3465). The combination of the existing travel patterns across these zones, according to the 2016 TTS, determined the final gateway distributions used for this study as shown in **Table 4-2**.

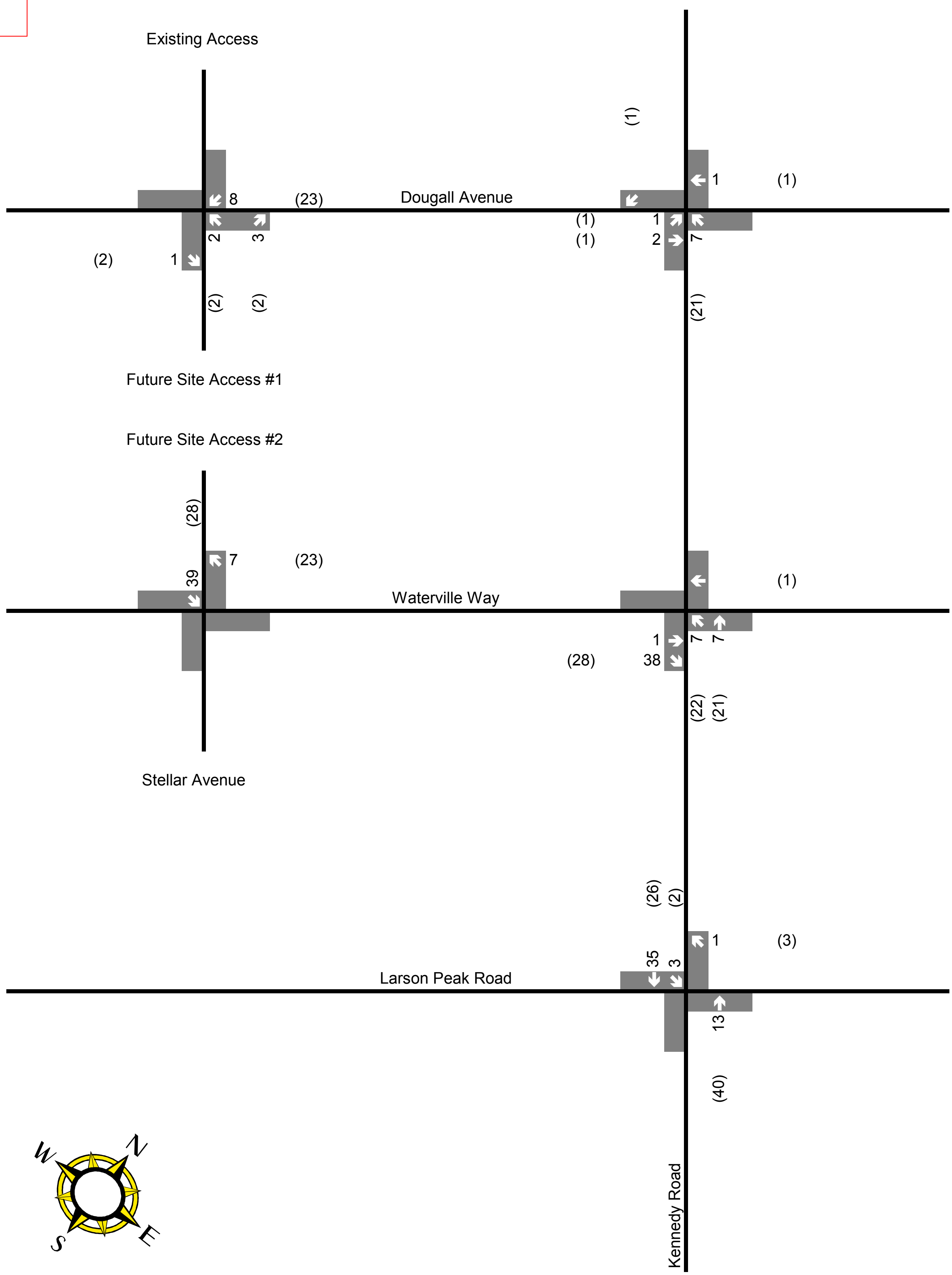
Table 4-2 Gateway Distribution

Gateway Number	Location	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)
1	South via Kennedy	79%	79%	81%	80%
2	North via Kennedy	2%	2%	2%	3%
3	East via Dougall	4%	4%	3%	2%
4	West via Dougall	5%	5%	5%	5%
5	East via Larson Peak Road	7%	7%	6%	6%
6	West via Larson Peak Road	1%	1%	1%	1%
7	East via Waterville	2%	2%	2%	2%
8	West via Waterville	1%	1%	1%	1%
9	South via Stellar	0%	0%	0%	0%
	TOTAL	100%	100%	100%	100%

Traffic generated by the proposed residential development was assigned to the boundary roads in accordance with the trip distribution shown in **Table 4-2**. The majority of site generated traffic is coming and going from the South along Kennedy Road. Since the intersection of Dougall Avenue and Kennedy Road is already experiencing significant delays from the background growth, it is assumed that outbound traffic will make use of the southern site access in the AM peak hour. In the PM peak hour, it is assumed that 50% of traffic will make use of the southern access to the site and 50% will make use of the northern access. Site traffic volumes are shown in **Figure 4.1.**

4.3 FUTURE TOTAL TRAFFIC VOLUMES

Future total conditions include the addition of 2024 future background traffic volumes to the estimated site traffic volumes in the study area during the weekday AM and PM peak hours. The resulting volumes are presented in **Figure 4.2.**



Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

Figure 4.1
Site Traffic
Turning Movement Counts

Appendix I

2023 Future Background Conditions – Synchro Analysis Results

Lane Group	EBT	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	2	354	10	295	163	803
v/c Ratio	0.00	0.90	0.03	0.16	0.18	0.43
Control Delay	0.0	54.8	0.1	9.2	2.2	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	54.8	0.1	9.2	2.2	11.5
Queue Length 50th (m)	0.0	50.5	0.0	10.9	0.0	35.7
Queue Length 95th (m)	0.0	#96.5	0.0	16.9	7.7	48.4
Internal Link Dist (m)	87.7	374.1		556.6		106.5
Turn Bay Length (m)					50.0	
Base Capacity (vph)	502	418	378	1886	890	1869
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	0.00	0.85	0.03	0.16	0.18	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	1	354	0	10	0	295	163	13	790	0
Future Volume (vph)	1	0	1	354	0	10	0	295	163	13	790	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes		0.99			1.00	0.99		1.00	0.98		1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.93			1.00	0.85		1.00	0.85		1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1734			1749	1151		3411	1479		3563	
Flt Permitted		0.88			0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)		1565			1393	1151		3411	1479		3382	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	0	1	354	0	10	0	295	163	13	790	0
RTOR Reduction (vph)	0	1	0	0	0	7	0	0	73	0	0	0
Lane Group Flow (vph)	0	1	0	0	354	3	0	295	90	0	803	0
Confl. Peds. (#/hr)	1		3	3		1	6		8	8		6
Heavy Vehicles (%)	0%	0%	0%	4%	0%	40%	0%	7%	8%	23%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)		22.3			22.3	22.3		43.5	43.5		43.5	
Effective Green, g (s)		22.3			22.3	22.3		43.5	43.5		43.5	
Actuated g/C Ratio		0.28			0.28	0.28		0.55	0.55		0.55	
Clearance Time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		443			394	326		1885	817		1869	
v/s Ratio Prot								0.09				
v/s Ratio Perm		0.00			c0.25	0.00			0.06		c0.24	
v/c Ratio		0.00			0.90	0.01		0.16	0.11		0.43	
Uniform Delay, d1		20.2			27.1	20.3		8.6	8.4		10.3	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			22.4	0.0		0.2	0.3		0.7	
Delay (s)		20.2			49.5	20.3		8.8	8.7		11.0	
Level of Service		C			D	C		A	A		B	
Approach Delay (s)		20.2			48.7			8.7			11.0	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	78.7	Sum of lost time (s)	12.9
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	119	65	90	6	5	323
Future Volume (vph)	119	65	90	6	5	323
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	119	65	90	6	5	323

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	141	43	60	36	328
Volume Left (vph)	119	0	0	0	5
Volume Right (vph)	0	0	0	6	323
Hadj (s)	0.47	0.05	0.07	-0.06	-0.54
Departure Headway (s)	5.8	5.4	5.5	5.4	4.1
Degree Utilization, x	0.23	0.07	0.09	0.05	0.37
Capacity (veh/h)	582	627	604	619	840
Control Delay (s)	9.4	7.6	7.9	7.5	9.5
Approach Delay (s)	8.9		7.8		9.5
Approach LOS	A		A		A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	40	1656	553	125	1053	47	117	25	19	142	126	98
v/c Ratio	0.14	0.56	0.47	0.60	0.33	0.05	0.40	0.06	0.05	0.69	0.46	0.31
Control Delay	14.1	16.4	2.5	20.6	9.3	2.1	39.9	36.1	0.2	66.0	51.9	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	16.4	2.5	20.6	9.3	2.1	39.9	36.1	0.2	66.0	51.9	10.9
Queue Length 50th (m)	3.9	81.2	0.0	8.5	34.9	0.0	22.0	4.6	0.0	31.9	27.3	0.0
Queue Length 95th (m)	11.3	111.5	15.3	#20.1	52.1	3.9	37.6	11.7	0.0	53.0	45.8	14.6
Internal Link Dist (m)		694.2			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	280	2976	1171	207	3204	861	290	759	677	455	608	588
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.56	0.47	0.60	0.33	0.05	0.40	0.03	0.03	0.31	0.21	0.17

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1540	514	116	979	44	109	23	18	132	117	91
Future Volume (vph)	37	1540	514	116	979	44	109	23	18	132	117	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1738	5043	1601	1772	4812	1266	1738	1921	1633	1825	1902	1633
Flt Permitted	0.26	1.00	1.00	0.10	1.00	1.00	0.55	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)	475	5043	1601	182	4812	1266	1006	1921	1633	1423	1902	1633
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	40	1656	553	125	1053	47	117	25	19	142	126	98
RTOR Reduction (vph)	0	0	226	0	0	16	0	0	15	0	0	84
Lane Group Flow (vph)	40	1656	327	125	1053	31	117	25	4	142	126	14
Heavy Vehicles (%)	5%	4%	2%	3%	9%	29%	5%	0%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	70.4	70.4	70.4	79.4	79.4	79.4	26.2	26.2	26.2	17.2	17.2	17.2
Effective Green, g (s)	70.4	70.4	70.4	79.4	79.4	79.4	26.2	26.2	26.2	17.2	17.2	17.2
Actuated g/C Ratio	0.59	0.59	0.59	0.67	0.67	0.67	0.22	0.22	0.22	0.14	0.14	0.14
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	280	2978	945	201	3205	843	257	422	358	205	274	235
v/s Ratio Prot		0.33		c0.03	0.22		c0.02	0.01			0.07	
v/s Ratio Perm	0.08		0.20	c0.38		0.02	0.08		0.00	c0.10		0.01
v/c Ratio	0.14	0.56	0.35	0.62	0.33	0.04	0.46	0.06	0.01	0.69	0.46	0.06
Uniform Delay, d1	10.9	14.9	12.6	10.8	8.5	6.8	39.3	36.8	36.4	48.5	46.7	44.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.8	1.0	5.9	0.3	0.1	1.3	0.1	0.0	9.7	1.2	0.1
Delay (s)	12.0	15.6	13.6	16.7	8.8	6.9	40.6	36.8	36.4	58.2	48.0	44.1
Level of Service	B	B	B	B	A	A	D	D	D	E	D	D
Approach Delay (s)		15.1			9.5			39.5			50.9	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	119.2	Sum of lost time (s)	19.6
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1186	1214	303	21
v/c Ratio	0.63	0.67	0.19	0.03
Control Delay	19.0	19.8	13.1	6.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.0	19.8	13.1	6.3
Queue Length 50th (m)	44.5	46.5	11.9	0.0
Queue Length 95th (m)	56.5	59.2	22.4	4.2
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2452	2340	1557	676
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	0.52	0.19	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1127	1153	0	286	22
Future Volume (vph)	0	1127	1153	0	286	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		4995	4768		3478	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		4995	4768		3478	1486
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1186	1214	0	301	23
RTOR Reduction (vph)	0	0	0	0	1	12
Lane Group Flow (vph)	0	1186	1214	0	302	9
Heavy Vehicles (%)	0%	5%	10%	0%	2%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		26.4	26.4		31.2	31.2
Effective Green, g (s)		26.4	26.4		31.2	31.2
Actuated g/C Ratio		0.38	0.38		0.45	0.45
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1894	1808		1559	666
v/s Ratio Prot		0.24	c0.25		c0.09	
v/s Ratio Perm						0.01
v/c Ratio		0.63	0.67		0.19	0.01
Uniform Delay, d1		17.6	18.0		11.6	10.7
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.7	1.0		0.3	0.0
Delay (s)		18.2	19.0		11.9	10.7
Level of Service		B	B		B	B
Approach Delay (s)		18.2	19.0		11.8	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	69.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1491	1629	642	354
v/c Ratio	0.61	0.69	0.59	0.72
Control Delay	16.3	17.7	22.9	31.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.3	17.7	22.9	31.0
Queue Length 50th (m)	57.5	66.3	39.0	47.6
Queue Length 95th (m)	71.4	82.2	55.3	#89.8
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	2435	2367	1079	491
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	0.61	0.69	0.59	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱
Traffic Volume (vph)	1416	0	0	1548	274	673
Future Volume (vph)	1416	0	0	1548	274	673
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.92	0.85
Flt Protected	1.00			1.00	0.98	1.00
Satd. Flow (prot)	4995			4856	2950	1327
Flt Permitted	1.00			1.00	0.98	1.00
Satd. Flow (perm)	4995			4856	2950	1327
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1491	0	0	1629	288	708
RTOR Reduction (vph)	0	0	0	0	11	11
Lane Group Flow (vph)	1491	0	0	1629	631	343
Heavy Vehicles (%)	5%	0%	0%	8%	15%	12%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	39.0			39.0	29.0	29.0
Effective Green, g (s)	39.0			39.0	29.0	29.0
Actuated g/C Ratio	0.49			0.49	0.36	0.36
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	2435			2367	1069	481
v/s Ratio Prot	0.30			c0.34	0.21	
v/s Ratio Perm						c0.26
v/c Ratio	0.61			0.69	0.59	0.71
Uniform Delay, d1	15.0			15.8	20.7	21.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.7			1.1	2.4	8.7
Delay (s)	15.6			16.9	23.1	30.7
Level of Service	B			B	C	C
Approach Delay (s)	15.6			16.9	25.8	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	186	4	701	327	450
v/c Ratio	0.68	0.01	0.29	0.28	0.20
Control Delay	44.7	0.0	7.1	1.6	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	0.0	7.1	1.6	6.5
Queue Length 50th (m)	27.2	0.0	21.6	0.0	12.8
Queue Length 95th (m)	47.3	0.0	38.7	9.5	24.4
Internal Link Dist (m)	374.1		556.6		106.5
Turn Bay Length (m)				50.0	
Base Capacity (vph)	400	474	2414	1170	2276
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.01	0.29	0.28	0.20

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	186	0	4	0	701	327	2	446	2
Future Volume (vph)	0	0	0	186	0	4	0	701	327	2	446	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor					1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes					1.00	0.98		1.00	0.98		1.00	
Flpb, ped/bikes					1.00	1.00		1.00	1.00		1.00	
Frt					1.00	0.85		1.00	0.85		1.00	
Flt Protected					0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)					1823	1608		3650	1603		3611	
Flt Permitted					0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)					1453	1608		3650	1603		3442	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	186	0	4	0	701	327	2	446	2
RTOR Reduction (vph)	0	0	0	0	0	3	0	0	111	0	0	0
Lane Group Flow (vph)	0	0	0	0	186	1	0	701	216	0	450	0
Confl. Peds. (#/hr)	3		1	1		3	2		5	5		2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)					16.1	16.1		56.7	56.7		56.7	
Effective Green, g (s)					16.1	16.1		56.7	56.7		56.7	
Actuated g/C Ratio					0.19	0.19		0.66	0.66		0.66	
Clearance Time (s)					6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)					272	302		2414	1060		2277	
v/s Ratio Prot								c0.19				
v/s Ratio Perm					c0.13	0.00			0.14		0.13	
v/c Ratio					0.68	0.00		0.29	0.20		0.20	
Uniform Delay, d1					32.4	28.3		6.1	5.7		5.6	
Progression Factor					1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2					6.9	0.0		0.3	0.4		0.2	
Delay (s)					39.4	28.3		6.4	6.1		5.8	
Level of Service					D	C		A	A		A	
Approach Delay (s)		0.0			39.1			6.3			5.8	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	85.7	Sum of lost time (s)	12.9
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	222	103	98	2	1	155
Future Volume (vph)	222	103	98	2	1	155
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	222	103	98	2	1	155

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	256	69	65	35	156
Volume Left (vph)	222	0	0	0	1
Volume Right (vph)	0	0	0	2	155
Hadj (s)	0.45	0.00	0.02	-0.02	-0.58
Departure Headway (s)	5.4	5.0	5.2	5.2	4.3
Degree Utilization, x	0.39	0.09	0.09	0.05	0.19
Capacity (veh/h)	642	701	656	663	771
Control Delay (s)	10.6	7.3	7.6	7.2	8.3
Approach Delay (s)	9.9		7.4		8.3
Approach LOS	A		A		A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	84	1172	134	39	1882	145	332	79	12	88	48	54
v/c Ratio	1.08	0.45	0.15	0.14	0.63	0.15	0.69	0.14	0.02	0.59	0.22	0.22
Control Delay	158.9	17.8	3.3	10.6	17.1	3.7	38.9	28.8	0.1	62.8	46.1	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	0.0
Total Delay	158.9	17.8	3.3	10.6	17.1	3.7	38.9	28.8	0.1	62.8	46.1	6.3
Queue Length 50th (m)	~21.4	58.9	0.0	3.1	93.0	2.3	58.4	12.5	0.0	18.4	9.6	0.0
Queue Length 95th (m)	#40.1	78.9	10.2	8.2	122.7	11.8	85.6	23.7	0.0	34.8	20.5	6.1
Internal Link Dist (m)		694.2			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	78	2608	882	278	2980	977	478	988	797	424	623	572
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.08	0.45	0.15	0.14	0.63	0.15	0.69	0.08	0.02	0.21	0.08	0.09

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	1113	127	37	1788	138	315	75	11	84	46	51
Future Volume (vph)	80	1113	127	37	1788	138	315	75	11	84	46	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4902	1541	1738	5142	1601	1807	1921	1498	1706	1865	1555
Flt Permitted	0.08	1.00	1.00	0.18	1.00	1.00	0.59	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	147	4902	1541	332	5142	1601	1123	1921	1498	1267	1865	1555
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	1172	134	39	1882	145	332	79	12	88	48	54
RTOR Reduction (vph)	0	0	63	0	0	49	0	0	8	0	0	48
Lane Group Flow (vph)	84	1172	71	39	1882	96	332	79	4	88	48	6
Heavy Vehicles (%)	3%	7%	6%	5%	2%	2%	1%	0%	9%	7%	3%	5%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	59.1	59.1	59.1	65.6	65.6	65.6	33.1	33.1	33.1	13.1	13.1	13.1
Effective Green, g (s)	59.1	59.1	59.1	65.6	65.6	65.6	33.1	33.1	33.1	13.1	13.1	13.1
Actuated g/C Ratio	0.53	0.53	0.53	0.58	0.58	0.58	0.29	0.29	0.29	0.12	0.12	0.12
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	77	2579	810	237	3003	935	434	566	441	147	217	181
v/s Ratio Prot		0.24		0.01	c0.37		c0.12	0.04			0.03	
v/s Ratio Perm	c0.57		0.05	0.09		0.06	c0.11		0.00	0.07		0.00
v/c Ratio	1.09	0.45	0.09	0.16	0.63	0.10	0.76	0.14	0.01	0.60	0.22	0.03
Uniform Delay, d1	26.6	16.6	13.2	10.8	15.3	10.3	34.4	29.1	28.0	47.1	45.0	44.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	129.5	0.6	0.2	0.3	1.0	0.2	7.8	0.1	0.0	6.4	0.5	0.1
Delay (s)	156.1	17.1	13.4	11.1	16.3	10.5	42.2	29.2	28.0	53.5	45.5	44.1
Level of Service	F	B	B	B	B	B	D	C	C	D	D	D
Approach Delay (s)		25.2			15.8			39.4			48.8	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	112.3	Sum of lost time (s)	19.6
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	872	2122	92	11
v/c Ratio	0.39	0.93	0.07	0.02
Control Delay	15.1	30.1	14.2	13.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.1	30.1	14.2	13.5
Queue Length 50th (m)	30.1	103.4	4.0	0.9
Queue Length 95th (m)	39.4	#140.1	8.2	4.0
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2248	2270	1373	598
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	0.39	0.93	0.07	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	811	1973	0	85	11
Future Volume (vph)	0	811	1973	0	85	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5092	5142		3411	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5092	5142		3411	1486
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	872	2122	0	91	12
RTOR Reduction (vph)	0	0	0	0	1	1
Lane Group Flow (vph)	0	872	2122	0	91	10
Heavy Vehicles (%)	0%	3%	2%	0%	4%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		34.0	34.0		31.0	31.0
Effective Green, g (s)		34.0	34.0		31.0	31.0
Actuated g/C Ratio		0.44	0.44		0.40	0.40
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2248	2270		1373	598
v/s Ratio Prot		0.17	c0.41		c0.03	
v/s Ratio Perm						0.01
v/c Ratio		0.39	0.93		0.07	0.02
Uniform Delay, d1		14.5	20.4		14.1	13.8
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	7.9		0.1	0.1
Delay (s)		14.6	28.4		14.2	13.9
Level of Service		B	C		B	B
Approach Delay (s)		14.6	28.4		14.2	
Approach LOS		B	C		B	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	891	1788	1214	560
v/c Ratio	0.45	0.89	0.72	0.79
Control Delay	25.0	38.0	24.1	30.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	25.0	38.0	24.1	30.6
Queue Length 50th (m)	50.3	129.2	98.2	97.0
Queue Length 95th (m)	62.0	150.6	122.9	151.7
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	1998	1998	1677	709
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	0.45	0.89	0.72	0.79

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	846	0	0	1699	841	845
Future Volume (vph)	846	0	0	1699	841	845
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.96	0.85
Flt Protected	1.00			1.00	0.96	1.00
Satd. Flow (prot)	4995			4995	3361	1389
Flt Permitted	1.00			1.00	0.96	1.00
Satd. Flow (perm)	4995			4995	3361	1389
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	891	0	0	1788	885	889
RTOR Reduction (vph)	0	0	0	0	28	28
Lane Group Flow (vph)	891	0	0	1788	1186	532
Heavy Vehicles (%)	5%	0%	0%	5%	1%	7%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	44.0			44.0	54.0	54.0
Effective Green, g (s)	44.0			44.0	54.0	54.0
Actuated g/C Ratio	0.40			0.40	0.49	0.49
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	1998			1998	1649	681
v/s Ratio Prot	0.18			c0.36	0.35	
v/s Ratio Perm						c0.38
v/c Ratio	0.45			0.89	0.72	0.78
Uniform Delay, d1	24.1			30.8	22.0	23.1
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			6.0	2.7	8.7
Delay (s)	24.4			36.9	24.8	31.8
Level of Service	C			D	C	C
Approach Delay (s)	24.4			36.9	27.0	
Approach LOS	C			D	C	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Appendix J

2023 Future Background Conditions with Improvements – Synchro Analysis Results

Left Turn Phasing Warrant Calculation

Ontario Traffic Manual - Analytical Method

Ontario Capacity Analysis Method

Traffic Condition: 2023 Future Background AM Peak hour

Major Street: Mayfield Road

Minor Street: Heart Lake Road

Movement: Eastbound Left

The volume adjustment for the opposing number of lanes	(f)=	0.5
Total opposing traffic flow (vph), including through lanes, shared lanes and right-turn lanes where right-turn channelization does not exist	V_o=	1926
Green time interval for the opposing flow (seconds)	G=	62
Cycle length (seconds)	C=	135
7200/C vph and is the number of vehicles turning left on amber assuming two vehicles per cycle	Lt_a=	53
The capacity of the separate left-turn lane during the permissive stage of the phase in vehicles per hour	c_{Lt}=	-267
Number of Vehicles Turn left		80

Overall Warrant => **Left Turn Phasing is Warranted**

Result=> **Calculated value of cLt is not less than the actual number of left-turning vehicl**

C:\Users\dumitru.liubeznii\IBI Group\135636 12304 Heart Lake Road, Caledon - Internal Documents\6.0_Technical\6.23_Traffic\04_Design-Analysis\Synchro\2021-10-04\Warrants\2023\[2023 FB OTM Left Turn Signal Phasing Warrant.xlsx]SB Left

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	84	1172	134	39	1882	145	332	79	12	88	48	54
v/c Ratio	0.47	0.41	0.14	0.13	0.66	0.16	0.82	0.16	0.03	0.60	0.22	0.22
Control Delay	20.3	14.9	2.7	8.8	20.6	5.2	53.8	34.1	0.1	65.3	48.5	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	14.9	2.7	8.8	20.6	5.2	53.8	34.1	0.1	65.3	48.5	6.8
Queue Length 50th (m)	6.2	54.6	0.0	2.8	108.6	3.9	66.1	14.1	0.0	19.4	10.1	0.0
Queue Length 95th (m)	19.1	73.5	9.2	7.5	141.7	14.8	#99.9	26.2	0.0	36.2	21.4	6.7
Internal Link Dist (m)		694.2			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	191	2835	947	307	2835	930	405	894	725	412	607	557
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.41	0.14	0.13	0.66	0.16	0.82	0.09	0.02	0.21	0.08	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	1113	127	37	1788	138	315	75	11	84	46	51
Future Volume (vph)	80	1113	127	37	1788	138	315	75	11	84	46	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4902	1541	1738	5142	1601	1807	1921	1498	1706	1865	1555
Flt Permitted	0.06	1.00	1.00	0.21	1.00	1.00	0.59	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	116	4902	1541	377	5142	1601	1126	1921	1498	1267	1865	1555
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	1172	134	39	1882	145	332	79	12	88	48	54
RTOR Reduction (vph)	0	0	57	0	0	48	0	0	9	0	0	48
Lane Group Flow (vph)	84	1172	77	39	1882	97	332	79	3	88	48	6
Heavy Vehicles (%)	3%	7%	6%	5%	2%	2%	1%	0%	9%	7%	3%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	72.1	66.2	66.2	67.3	63.8	63.8	29.4	29.4	29.4	13.3	13.3	13.3
Effective Green, g (s)	72.1	66.2	66.2	67.3	63.8	63.8	29.4	29.4	29.4	13.3	13.3	13.3
Actuated g/C Ratio	0.62	0.57	0.57	0.58	0.55	0.55	0.25	0.25	0.25	0.11	0.11	0.11
Clearance Time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	156	2804	881	260	2835	882	363	488	380	145	214	178
v/s Ratio Prot	c0.03	0.24		0.00	c0.37		c0.10	0.04			0.03	
v/s Ratio Perm	0.31		0.05	0.08		0.06	c0.13		0.00	0.07		0.00
v/c Ratio	0.54	0.42	0.09	0.15	0.66	0.11	0.91	0.16	0.01	0.61	0.22	0.03
Uniform Delay, d1	14.4	13.9	11.1	10.6	18.4	12.4	40.8	33.6	32.3	48.7	46.5	45.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	0.5	0.2	0.3	1.2	0.3	26.8	0.2	0.0	7.0	0.5	0.1
Delay (s)	18.0	14.4	11.3	10.8	19.6	12.6	67.5	33.7	32.3	55.7	47.0	45.6
Level of Service	B	B	B	B	B	B	E	C	C	E	D	D
Approach Delay (s)		14.3			19.0			60.2			50.6	
Approach LOS		B			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	115.7	Sum of lost time (s)	19.6
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Appendix K

2028 Future Background Conditions – Synchro Analysis Results

Lane Group	EBT	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	2	370	11	340	216	923
v/c Ratio	0.00	0.93	0.03	0.18	0.25	0.50
Control Delay	0.0	59.4	0.2	9.4	2.2	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	59.4	0.2	9.4	2.2	12.3
Queue Length 50th (m)	0.0	53.6	0.0	12.7	0.0	43.0
Queue Length 95th (m)	0.0	#102.2	0.0	19.3	8.8	57.6
Internal Link Dist (m)	87.7	374.1		556.6		106.5
Turn Bay Length (m)					50.0	
Base Capacity (vph)	499	416	387	1893	873	1860
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	0.00	0.89	0.03	0.18	0.25	0.50

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	1	370	0	11	0	340	216	14	909	0
Future Volume (vph)	1	0	1	370	0	11	0	340	216	14	909	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes		0.99			1.00	0.99		1.00	0.98		1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.93			1.00	0.85		1.00	0.85		1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1734			1749	1185		3444	1414		3565	
Flt Permitted		0.88			0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)		1563			1393	1185		3444	1414		3381	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	0	1	370	0	11	0	340	216	14	909	0
RTOR Reduction (vph)	0	1	0	0	0	8	0	0	97	0	0	0
Lane Group Flow (vph)	0	1	0	0	370	3	0	340	119	0	923	0
Confl. Peds. (#/hr)	1		3	3		1	6		8	8		6
Heavy Vehicles (%)	0%	0%	0%	4%	0%	36%	0%	6%	13%	21%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)		22.7			22.7	22.7		43.5	43.5		43.5	
Effective Green, g (s)		22.7			22.7	22.7		43.5	43.5		43.5	
Actuated g/C Ratio		0.29			0.29	0.29		0.55	0.55		0.55	
Clearance Time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		448			399	340		1893	777		1859	
v/s Ratio Prot								0.10				
v/s Ratio Perm		0.00			c0.27	0.00			0.08		c0.27	
v/c Ratio		0.00			0.93	0.01		0.18	0.15		0.50	
Uniform Delay, d1		20.1			27.4	20.2		8.9	8.7		11.0	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			27.3	0.0		0.2	0.4		1.0	
Delay (s)		20.1			54.7	20.2		9.1	9.2		12.0	
Level of Service		C			D	C		A	A		B	
Approach Delay (s)		20.1			53.7			9.1			12.0	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	79.1	Sum of lost time (s)	12.9
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	119	87	97	6	5	323
Future Volume (vph)	119	87	97	6	5	323
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	119	87	97	6	5	323

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	148	58	65	38	328
Volume Left (vph)	119	0	0	0	5
Volume Right (vph)	0	0	0	6	323
Hadj (s)	0.46	0.08	0.08	-0.04	-0.54
Departure Headway (s)	5.8	5.5	5.6	5.5	4.2
Degree Utilization, x	0.24	0.09	0.10	0.06	0.38
Capacity (veh/h)	582	622	598	612	824
Control Delay (s)	9.5	7.8	8.0	7.6	9.7
Approach Delay (s)	9.0		7.9		9.7
Approach LOS	A		A		A

Intersection Summary			
Delay	9.2		
Level of Service	A		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	40	1910	553	125	1190	47	117	26	96	142	137	98
v/c Ratio	0.16	0.64	0.47	0.75	0.37	0.05	0.42	0.06	0.24	0.69	0.50	0.32
Control Delay	14.8	18.0	2.5	42.9	9.7	2.1	40.3	36.1	9.8	66.0	53.1	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	18.0	2.5	42.9	9.7	2.1	40.3	36.1	9.8	66.0	53.1	11.1
Queue Length 50th (m)	4.0	101.3	0.0	9.2	40.9	0.0	22.0	4.8	0.9	31.9	29.9	0.0
Queue Length 95th (m)	11.7	138.0	15.3	#44.7	60.4	3.9	37.6	12.2	14.1	53.0	49.0	14.6
Internal Link Dist (m)		694.2			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	243	2976	1171	167	3232	860	280	759	631	454	608	563
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.64	0.47	0.75	0.37	0.05	0.42	0.03	0.15	0.31	0.23	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1776	514	116	1107	44	109	24	89	132	127	91
Future Volume (vph)	37	1776	514	116	1107	44	109	24	89	132	127	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1738	5043	1601	1772	4856	1266	1738	1921	1458	1825	1902	1555
Flt Permitted	0.22	1.00	1.00	0.07	1.00	1.00	0.52	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)	412	5043	1601	122	4856	1266	953	1921	1458	1422	1902	1555
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	40	1910	553	125	1190	47	117	26	96	142	137	98
RTOR Reduction (vph)	0	0	227	0	0	16	0	0	71	0	0	84
Lane Group Flow (vph)	40	1910	326	125	1190	31	117	26	25	142	137	14
Heavy Vehicles (%)	5%	4%	2%	3%	8%	29%	5%	0%	12%	0%	1%	5%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	70.4	70.4	70.4	79.4	79.4	79.4	26.3	26.3	26.3	17.3	17.3	17.3
Effective Green, g (s)	70.4	70.4	70.4	79.4	79.4	79.4	26.3	26.3	26.3	17.3	17.3	17.3
Actuated g/C Ratio	0.59	0.59	0.59	0.67	0.67	0.67	0.22	0.22	0.22	0.15	0.15	0.15
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	2975	944	164	3231	842	249	423	321	206	275	225
v/s Ratio Prot		0.38		c0.04	0.25		c0.02	0.01			0.07	
v/s Ratio Perm	0.10		0.20	c0.47		0.02	0.08		0.02	c0.10		0.01
v/c Ratio	0.16	0.64	0.35	0.76	0.37	0.04	0.47	0.06	0.08	0.69	0.50	0.06
Uniform Delay, d1	11.1	16.1	12.6	16.5	8.8	6.8	39.4	36.7	36.9	48.4	47.0	44.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	1.1	1.0	18.7	0.3	0.1	1.4	0.1	0.1	9.2	1.4	0.1
Delay (s)	12.6	17.2	13.6	35.2	9.2	6.9	40.8	36.8	37.0	57.7	48.4	44.1
Level of Service	B	B	B	D	A	A	D	D	D	E	D	D
Approach Delay (s)		16.3			11.5			38.8			50.8	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	119.3	Sum of lost time (s)	19.6
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1452	1368	327	22
v/c Ratio	0.70	0.69	0.22	0.03
Control Delay	19.9	19.6	14.7	8.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.9	19.6	14.7	8.4
Queue Length 50th (m)	58.6	54.6	14.9	0.5
Queue Length 95th (m)	73.3	68.9	24.0	5.0
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2318	2233	1472	637
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	0.63	0.61	0.22	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1379	1300	0	309	23
Future Volume (vph)	0	1379	1300	0	309	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		4995	4812		3478	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		4995	4812		3478	1486
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1452	1368	0	325	24
RTOR Reduction (vph)	0	0	0	0	1	9
Lane Group Flow (vph)	0	1452	1368	0	326	13
Heavy Vehicles (%)	0%	5%	9%	0%	2%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		30.3	30.3		31.1	31.1
Effective Green, g (s)		30.3	30.3		31.1	31.1
Actuated g/C Ratio		0.41	0.41		0.42	0.42
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2061	1986		1473	629
v/s Ratio Prot		c0.29	0.28		c0.09	
v/s Ratio Perm						0.01
v/c Ratio		0.70	0.69		0.22	0.02
Uniform Delay, d1		17.8	17.7		13.5	12.3
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		1.1	1.0		0.3	0.1
Delay (s)		19.0	18.7		13.8	12.4
Level of Service		B	B		B	B
Approach Delay (s)		19.0	18.7		13.7	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1763	1987	781	474
v/c Ratio	0.72	0.85	0.89dr	0.98
Control Delay	18.4	22.3	26.7	63.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.4	22.3	26.7	63.2
Queue Length 50th (m)	73.8	91.6	51.5	75.8
Queue Length 95th (m)	90.5	112.5	71.4	#141.8
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	2435	2345	1072	485
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	0.72	0.85	0.73	0.98

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1675	0	0	1888	292	901
Future Volume (vph)	1675	0	0	1888	292	901
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.91	0.85
Flt Protected	1.00			1.00	0.98	1.00
Satd. Flow (prot)	4995			4812	2946	1327
Flt Permitted	1.00			1.00	0.98	1.00
Satd. Flow (perm)	4995			4812	2946	1327
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1763	0	0	1987	307	948
RTOR Reduction (vph)	0	0	0	0	4	4
Lane Group Flow (vph)	1763	0	0	1987	777	470
Heavy Vehicles (%)	5%	0%	0%	9%	14%	12%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	39.0			39.0	29.0	29.0
Effective Green, g (s)	39.0			39.0	29.0	29.0
Actuated g/C Ratio	0.49			0.49	0.36	0.36
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	2435			2345	1067	481
v/s Ratio Prot	0.35			c0.41	0.26	
v/s Ratio Perm						c0.35
v/c Ratio	0.72			0.85	0.89dr	0.98
Uniform Delay, d1	16.2			17.9	22.1	25.2
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.3			3.4	4.4	35.5
Delay (s)	17.6			21.3	26.4	60.7
Level of Service	B			C	C	E
Approach Delay (s)	17.6			21.3	39.4	
Approach LOS	B			C	D	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
dr Defacto Right Lane. Recode with 1 though lane as a right lane.			
c Critical Lane Group			

Lane Group	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	240	5	815	349	524
v/c Ratio	0.79	0.01	0.36	0.31	0.24
Control Delay	50.6	0.0	8.7	1.8	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	0.0	8.7	1.8	7.9
Queue Length 50th (m)	37.1	0.0	31.4	0.0	18.4
Queue Length 95th (m)	62.3	0.0	46.8	9.9	28.9
Internal Link Dist (m)	374.1		556.6		106.5
Turn Bay Length (m)				50.0	
Base Capacity (vph)	377	469	2280	1109	2168
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.64	0.01	0.36	0.31	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	240	0	5	0	815	349	3	519	2
Future Volume (vph)	0	0	0	240	0	5	0	815	349	3	519	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor					1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes					1.00	0.98		1.00	0.98		1.00	
Flpb, ped/bikes					1.00	1.00		1.00	1.00		1.00	
Frt					1.00	0.85		1.00	0.85		1.00	
Flt Protected					0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)					1736	1608		3614	1556		3611	
Flt Permitted					0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)					1384	1608		3614	1556		3438	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	240	0	5	0	815	349	3	519	2
RTOR Reduction (vph)	0	0	0	0	0	4	0	0	129	0	0	0
Lane Group Flow (vph)	0	0	0	0	240	1	0	815	220	0	524	0
Confl. Peds. (#/hr)	3		1	1		3	2		5	5		2
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	1%	3%	0%	1%	0%
Turn Type				Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)					19.0	19.0		54.6	54.6		54.6	
Effective Green, g (s)					19.0	19.0		54.6	54.6		54.6	
Actuated g/C Ratio					0.22	0.22		0.63	0.63		0.63	
Clearance Time (s)					6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)					304	353		2281	982		2170	
v/s Ratio Prot								c0.23				
v/s Ratio Perm					c0.17	0.00			0.14		0.15	
v/c Ratio					0.79	0.00		0.36	0.22		0.24	
Uniform Delay, d1					31.9	26.4		7.6	6.9		6.9	
Progression Factor					1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2					12.8	0.0		0.4	0.5		0.3	
Delay (s)					44.6	26.4		8.0	7.4		7.2	
Level of Service					D	C		A	A		A	
Approach Delay (s)		0.0			44.2			7.8			7.2	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	86.5	Sum of lost time (s)	12.9
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	222	114	121	2	1	155
Future Volume (vph)	222	114	121	2	1	155
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	222	114	121	2	1	155

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	260	76	81	42	156
Volume Left (vph)	222	0	0	0	1
Volume Right (vph)	0	0	0	2	155
Hadj (s)	0.45	0.05	0.03	0.00	-0.58
Departure Headway (s)	5.5	5.1	5.3	5.2	4.4
Degree Utilization, x	0.39	0.11	0.12	0.06	0.19
Capacity (veh/h)	638	690	652	658	756
Control Delay (s)	10.7	7.5	7.8	7.4	8.5
Approach Delay (s)	10.0		7.6		8.5
Approach LOS	B		A		A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	84	1340	134	39	2127	145	332	84	54	88	52	54
v/c Ratio	1.25	0.51	0.15	0.16	0.71	0.15	0.69	0.15	0.13	0.59	0.24	0.21
Control Delay	220.6	18.7	3.3	11.1	18.9	4.4	38.9	28.9	8.2	62.9	46.5	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	0.0
Total Delay	220.6	18.7	3.3	11.1	18.9	4.4	38.9	28.9	8.2	62.9	46.5	6.3
Queue Length 50th (m)	~23.6	70.5	0.0	3.1	113.9	3.6	58.4	13.3	0.0	18.4	10.4	0.0
Queue Length 95th (m)	#44.7	93.1	10.2	8.2	149.2	13.5	85.6	24.9	8.8	34.8	21.8	6.1
Internal Link Dist (m)		694.2			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	67	2631	882	239	2979	971	478	988	667	421	623	571
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	0.51	0.15	0.16	0.71	0.15	0.69	0.09	0.08	0.21	0.08	0.09

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	1273	127	37	2021	138	315	80	51	84	49	51
Future Volume (vph)	80	1273	127	37	2021	138	315	80	51	84	49	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	4948	1541	1738	5142	1601	1807	1921	1247	1706	1865	1555
Flt Permitted	0.07	1.00	1.00	0.14	1.00	1.00	0.59	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	126	4948	1541	260	5142	1601	1119	1921	1247	1261	1865	1555
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	1340	134	39	2127	145	332	84	54	88	52	54
RTOR Reduction (vph)	0	0	63	0	0	43	0	0	38	0	0	48
Lane Group Flow (vph)	84	1340	71	39	2127	102	332	84	16	88	52	6
Heavy Vehicles (%)	3%	6%	6%	5%	2%	2%	1%	0%	31%	7%	3%	5%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	59.1	59.1	59.1	65.6	65.6	65.6	33.1	33.1	33.1	13.1	13.1	13.1
Effective Green, g (s)	59.1	59.1	59.1	65.6	65.6	65.6	33.1	33.1	33.1	13.1	13.1	13.1
Actuated g/C Ratio	0.53	0.53	0.53	0.58	0.58	0.58	0.29	0.29	0.29	0.12	0.12	0.12
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	66	2603	810	197	3003	935	433	566	367	147	217	181
v/s Ratio Prot		0.27		0.01	c0.41		c0.12	0.04			0.03	
v/s Ratio Perm	c0.67		0.05	0.11		0.06	c0.11		0.01	0.07		0.00
v/c Ratio	1.27	0.51	0.09	0.20	0.71	0.11	0.77	0.15	0.04	0.60	0.24	0.03
Uniform Delay, d1	26.6	17.3	13.2	11.3	16.6	10.4	34.4	29.2	28.3	47.1	45.1	44.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	200.6	0.7	0.2	0.5	1.4	0.2	7.9	0.1	0.0	6.4	0.6	0.1
Delay (s)	227.2	18.0	13.4	11.8	18.0	10.6	42.3	29.3	28.3	53.5	45.6	44.1
Level of Service	F	B	B	B	B	B	D	C	C	D	D	D
Approach Delay (s)		28.9			17.4			38.4			48.8	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	112.3	Sum of lost time (s)	19.6
Intersection Capacity Utilization	90.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1046	2385	100	12
v/c Ratio	0.47	1.05	0.07	0.02
Control Delay	16.0	56.8	14.4	14.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.0	56.8	14.4	14.1
Queue Length 50th (m)	37.7	~141.2	4.4	1.0
Queue Length 95th (m)	48.3	#170.1	8.8	4.3
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2248	2270	1372	598
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	1.05	0.07	0.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	973	2218	0	92	12
Future Volume (vph)	0	973	2218	0	92	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5092	5142		3411	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5092	5142		3411	1486
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	1046	2385	0	99	13
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	1046	2385	0	100	12
Heavy Vehicles (%)	0%	3%	2%	0%	4%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		34.0	34.0		31.0	31.0
Effective Green, g (s)		34.0	34.0		31.0	31.0
Actuated g/C Ratio		0.44	0.44		0.40	0.40
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2248	2270		1373	598
v/s Ratio Prot		0.21	c0.46		c0.03	
v/s Ratio Perm						0.01
v/c Ratio		0.47	1.05		0.07	0.02
Uniform Delay, d1		15.1	21.5		14.2	13.9
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.2	33.9		0.1	0.1
Delay (s)		15.3	55.4		14.3	13.9
Level of Service		B	E		B	B
Approach Delay (s)		15.3	55.4		14.2	
Approach LOS		B	E		B	

Intersection Summary			
HCM 2000 Control Delay	42.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1066	2377	1371	641
v/c Ratio	0.54	1.20	0.84	0.95
Control Delay	26.5	126.9	29.5	52.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.5	126.9	29.5	52.0
Queue Length 50th (m)	63.1	~227.5	124.6	135.2
Queue Length 95th (m)	76.4	#256.2	155.0	#220.8
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	1979	1979	1634	672
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	1.20	0.84	0.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1013	0	0	2258	897	1015
Future Volume (vph)	1013	0	0	2258	897	1015
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.95	0.85
Flt Protected	1.00			1.00	0.97	1.00
Satd. Flow (prot)	4948			4948	3299	1339
Flt Permitted	1.00			1.00	0.97	1.00
Satd. Flow (perm)	4948			4948	3299	1339
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1066	0	0	2377	944	1068
RTOR Reduction (vph)	0	0	0	0	15	15
Lane Group Flow (vph)	1066	0	0	2377	1356	626
Heavy Vehicles (%)	6%	0%	0%	6%	1%	11%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	44.0			44.0	54.0	54.0
Effective Green, g (s)	44.0			44.0	54.0	54.0
Actuated g/C Ratio	0.40			0.40	0.49	0.49
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	1979			1979	1619	657
v/s Ratio Prot	0.22			c0.48	0.41	
v/s Ratio Perm						c0.47
v/c Ratio	0.54			1.20	0.84	0.95
Uniform Delay, d1	25.2			33.0	24.2	26.8
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.5			95.6	5.3	25.2
Delay (s)	25.8			128.6	29.5	52.0
Level of Service	C			F	C	D
Approach Delay (s)	25.8			128.6	36.7	
Approach LOS	C			F	D	

Intersection Summary			
HCM 2000 Control Delay	74.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Appendix L

2028 Future Background Conditions with Improvements – Synchro Analysis Results

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1763	1987	781	474
v/c Ratio	0.81	0.95	0.55	0.75
Control Delay	32.1	42.6	23.0	32.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	32.1	42.6	23.0	32.9
Queue Length 50th (m)	124.3	154.5	62.1	91.5
Queue Length 95th (m)	143.9	#190.8	80.1	139.2
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	2171	2092	1411	636
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	0.81	0.95	0.55	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱
Traffic Volume (vph)	1675	0	0	1888	292	901
Future Volume (vph)	1675	0	0	1888	292	901
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.91	0.85
Flt Protected	1.00			1.00	0.98	1.00
Satd. Flow (prot)	4995			4812	2946	1327
Flt Permitted	1.00			1.00	0.98	1.00
Satd. Flow (perm)	4995			4812	2946	1327
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1763	0	0	1987	307	948
RTOR Reduction (vph)	0	0	0	0	2	2
Lane Group Flow (vph)	1763	0	0	1987	779	472
Heavy Vehicles (%)	5%	0%	0%	9%	14%	12%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	48.0			48.0	55.0	55.0
Effective Green, g (s)	50.0			50.0	55.0	55.0
Actuated g/C Ratio	0.43			0.43	0.48	0.48
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	2171			2092	1408	634
v/s Ratio Prot	0.35			c0.41	0.26	
v/s Ratio Perm						c0.36
v/c Ratio	0.81			0.95	0.55	0.74
Uniform Delay, d1	28.4			31.3	21.3	24.3
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	2.7			10.5	1.6	7.7
Delay (s)	31.1			41.8	22.9	32.0
Level of Service	C			D	C	C
Approach Delay (s)	31.1			41.8	26.3	
Approach LOS	C			D	C	

Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1046	2385	100	12
v/c Ratio	0.36	0.82	0.09	0.03
Control Delay	12.1	20.3	24.6	21.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.1	20.3	24.6	21.1
Queue Length 50th (m)	37.7	127.3	7.0	1.3
Queue Length 95th (m)	46.3	148.3	12.8	5.7
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2916	2945	1062	464
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	0.81	0.09	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	973	2218	0	92	12
Future Volume (vph)	0	973	2218	0	92	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5092	5142		3411	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5092	5142		3411	1486
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	1046	2385	0	99	13
RTOR Reduction (vph)	0	0	0	0	1	2
Lane Group Flow (vph)	0	1046	2385	0	99	10
Heavy Vehicles (%)	0%	3%	2%	0%	4%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		56.5	56.5		31.0	31.0
Effective Green, g (s)		56.5	56.5		31.0	31.0
Actuated g/C Ratio		0.57	0.57		0.31	0.31
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2891	2919		1062	462
v/s Ratio Prot		0.21	c0.46		c0.03	
v/s Ratio Perm						0.01
v/c Ratio		0.36	0.82		0.09	0.02
Uniform Delay, d1		11.7	17.3		24.3	23.7
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	1.9		0.2	0.1
Delay (s)		11.8	19.2		24.5	23.8
Level of Service		B	B		C	C
Approach Delay (s)		11.8	19.2		24.4	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	99.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1066	2377	1371	641
v/c Ratio	0.57	1.27	0.75	0.86
Control Delay	35.9	162.5	27.0	39.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	35.9	162.5	27.0	39.1
Queue Length 50th (m)	85.1	~303.0	142.8	156.0
Queue Length 95th (m)	99.6	#330.2	170.2	#245.0
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	1873	1873	1825	747
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	0.57	1.27	0.75	0.86

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1013	0	0	2258	897	1015
Future Volume (vph)	1013	0	0	2258	897	1015
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.95	0.85
Flt Protected	1.00			1.00	0.97	1.00
Satd. Flow (prot)	4948			4948	3299	1339
Flt Permitted	1.00			1.00	0.97	1.00
Satd. Flow (perm)	4948			4948	3299	1339
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1066	0	0	2377	944	1068
RTOR Reduction (vph)	0	0	0	0	11	11
Lane Group Flow (vph)	1066	0	0	2377	1360	630
Heavy Vehicles (%)	6%	0%	0%	6%	1%	11%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	51.0			51.0	77.0	77.0
Effective Green, g (s)	53.0			53.0	77.0	77.0
Actuated g/C Ratio	0.38			0.38	0.55	0.55
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	1873			1873	1814	736
v/s Ratio Prot	0.22			c0.48	0.41	
v/s Ratio Perm						c0.47
v/c Ratio	0.57			1.27	0.75	0.86
Uniform Delay, d1	34.5			43.5	24.1	26.8
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.7			125.5	2.9	12.2
Delay (s)	35.1			169.0	27.0	39.0
Level of Service	D			F	C	D
Approach Delay (s)	35.1			169.0	30.9	
Approach LOS	D			F	C	

Intersection Summary			
HCM 2000 Control Delay	91.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Appendix M

2033 Future Background Conditions – Synchro Analysis Results

Lane Group	EBT	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	2	370	11	374	216	1014
v/c Ratio	0.00	0.93	0.03	0.20	0.25	0.55
Control Delay	0.0	59.4	0.2	9.5	2.2	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	59.4	0.2	9.5	2.2	13.0
Queue Length 50th (m)	0.0	53.6	0.0	14.2	0.0	49.2
Queue Length 95th (m)	0.0	#102.2	0.0	21.1	8.8	65.4
Internal Link Dist (m)	87.7	374.1		556.6		106.5
Turn Bay Length (m)					50.0	
Base Capacity (vph)	499	416	387	1911	873	1860
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	0.00	0.89	0.03	0.20	0.25	0.55

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	1	370	0	11	0	374	216	14	1000	0
Future Volume (vph)	1	0	1	370	0	11	0	374	216	14	1000	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes		0.99			1.00	0.99		1.00	0.98		1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.93			1.00	0.85		1.00	0.85		1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1734			1749	1185		3476	1414		3567	
Flt Permitted		0.88			0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)		1563			1393	1185		3476	1414		3383	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	0	1	370	0	11	0	374	216	14	1000	0
RTOR Reduction (vph)	0	1	0	0	0	8	0	0	97	0	0	0
Lane Group Flow (vph)	0	1	0	0	370	3	0	374	119	0	1014	0
Confl. Peds. (#/hr)	1		3	3		1	6		8	8		6
Heavy Vehicles (%)	0%	0%	0%	4%	0%	36%	0%	5%	13%	21%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)		22.7			22.7	22.7		43.5	43.5		43.5	
Effective Green, g (s)		22.7			22.7	22.7		43.5	43.5		43.5	
Actuated g/C Ratio		0.29			0.29	0.29		0.55	0.55		0.55	
Clearance Time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		448			399	340		1911	777		1860	
v/s Ratio Prot								0.11				
v/s Ratio Perm		0.00			c0.27	0.00			0.08		c0.30	
v/c Ratio		0.00			0.93	0.01		0.20	0.15		0.55	
Uniform Delay, d1		20.1			27.4	20.2		9.0	8.7		11.4	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			27.3	0.0		0.2	0.4		1.2	
Delay (s)		20.1			54.7	20.2		9.2	9.2		12.6	
Level of Service		C			D	C		A	A		B	
Approach Delay (s)		20.1			53.7			9.2			12.6	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	79.1	Sum of lost time (s)	12.9
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	119	87	97	6	5	323
Future Volume (vph)	119	87	97	6	5	323
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	119	87	97	6	5	323

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	148	58	65	38	328
Volume Left (vph)	119	0	0	0	5
Volume Right (vph)	0	0	0	6	323
Hadj (s)	0.46	0.08	0.08	-0.04	-0.54
Departure Headway (s)	5.8	5.5	5.6	5.5	4.2
Degree Utilization, x	0.24	0.09	0.10	0.06	0.38
Capacity (veh/h)	582	622	598	612	824
Control Delay (s)	9.5	7.8	8.0	7.6	9.7
Approach Delay (s)	9.0		7.9		9.7
Approach LOS	A		A		A

Intersection Summary			
Delay	9.2		
Level of Service	A		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	40	2143	553	125	1338	47	117	28	96	142	147	98
v/c Ratio	0.19	0.72	0.47	0.81	0.41	0.05	0.43	0.07	0.25	0.69	0.53	0.32
Control Delay	15.8	19.9	2.5	57.2	10.1	2.1	40.8	36.2	10.5	66.0	54.3	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	19.9	2.5	57.2	10.1	2.1	40.8	36.2	10.5	66.0	54.3	15.9
Queue Length 50th (m)	4.1	123.0	0.0	12.7	48.0	0.0	22.0	5.2	1.5	31.9	32.3	3.5
Queue Length 95th (m)	12.2	166.2	15.3	#51.2	69.8	3.9	37.6	12.7	14.7	53.0	52.5	18.4
Internal Link Dist (m)		694.2			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	211	2975	1171	154	3262	1015	270	759	629	453	608	577
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.72	0.47	0.81	0.41	0.05	0.43	0.04	0.15	0.31	0.24	0.17

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1993	514	116	1244	44	109	26	89	132	137	91
Future Volume (vph)	37	1993	514	116	1244	44	109	26	89	132	137	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1772	5043	1601	1772	4902	1498	1738	1921	1458	1825	1902	1633
Flt Permitted	0.19	1.00	1.00	0.05	1.00	1.00	0.49	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)	359	5043	1601	102	4902	1498	905	1921	1458	1420	1902	1633
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	40	2143	553	125	1338	47	117	28	96	142	147	98
RTOR Reduction (vph)	0	0	227	0	0	16	0	0	69	0	0	69
Lane Group Flow (vph)	40	2143	326	125	1338	31	117	28	27	142	147	29
Heavy Vehicles (%)	3%	4%	2%	3%	7%	9%	5%	0%	12%	0%	1%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	70.4	70.4	70.4	79.4	79.4	79.4	26.3	26.3	26.3	17.3	17.3	17.3
Effective Green, g (s)	70.4	70.4	70.4	79.4	79.4	79.4	26.3	26.3	26.3	17.3	17.3	17.3
Actuated g/C Ratio	0.59	0.59	0.59	0.67	0.67	0.67	0.22	0.22	0.22	0.15	0.15	0.15
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	211	2975	944	151	3262	996	241	423	321	205	275	236
v/s Ratio Prot		0.42		c0.04	0.27		c0.02	0.01			0.08	
v/s Ratio Perm	0.11		0.20	c0.51		0.02	0.08		0.02	c0.10		0.02
v/c Ratio	0.19	0.72	0.35	0.83	0.41	0.03	0.49	0.07	0.09	0.69	0.53	0.12
Uniform Delay, d1	11.3	17.4	12.6	24.9	9.2	6.8	39.5	36.8	36.9	48.5	47.3	44.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	1.5	1.0	29.5	0.4	0.1	1.5	0.1	0.1	9.7	2.0	0.2
Delay (s)	13.3	19.0	13.6	54.5	9.6	6.9	41.0	36.9	37.1	58.2	49.3	44.6
Level of Service	B	B	B	D	A	A	D	D	D	E	D	D
Approach Delay (s)		17.8			13.2			39.0			51.4	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	119.3	Sum of lost time (s)	19.6
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1618	1535	355	23
v/c Ratio	0.66	0.64	0.25	0.04
Control Delay	17.9	17.6	19.6	8.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	17.9	17.6	19.6	8.8
Queue Length 50th (m)	70.0	65.7	19.4	0.0
Queue Length 95th (m)	83.4	78.6	36.5	5.7
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	3296	3204	1394	603
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	0.48	0.25	0.04

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1537	1458	0	334	25
Future Volume (vph)	0	1537	1458	0	334	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5043	4902		3512	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5043	4902		3512	1486
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1618	1535	0	352	26
RTOR Reduction (vph)	0	0	0	0	1	14
Lane Group Flow (vph)	0	1618	1535	0	354	9
Heavy Vehicles (%)	0%	4%	7%	0%	1%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		40.0	40.0		34.3	34.3
Effective Green, g (s)		42.0	42.0		34.3	34.3
Actuated g/C Ratio		0.49	0.49		0.40	0.40
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2454	2385		1395	590
v/s Ratio Prot		c0.32	0.31		c0.10	
v/s Ratio Perm						0.01
v/c Ratio		0.66	0.64		0.25	0.02
Uniform Delay, d1		16.7	16.6		17.4	15.8
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.7	0.6		0.4	0.0
Delay (s)		17.4	17.2		17.9	15.8
Level of Service		B	B		B	B
Approach Delay (s)		17.4	17.2		17.7	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	86.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1974	2219	834	505
v/c Ratio	0.83	0.97	0.63	0.85
Control Delay	30.6	43.7	27.2	43.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	30.6	43.7	27.2	43.7
Queue Length 50th (m)	138.0	173.9	72.7	108.4
Queue Length 95th (m)	158.8	#214.3	93.1	#176.8
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	2368	2280	1329	595
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	0.83	0.97	0.63	0.85

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1875	0	0	2108	312	960
Future Volume (vph)	1875	0	0	2108	312	960
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.91	0.85
Flt Protected	1.00			1.00	0.98	1.00
Satd. Flow (prot)	5043			4856	2993	1339
Flt Permitted	1.00			1.00	0.98	1.00
Satd. Flow (perm)	5043			4856	2993	1339
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1974	0	0	2219	328	1011
RTOR Reduction (vph)	0	0	0	0	2	2
Lane Group Flow (vph)	1974	0	0	2219	832	503
Heavy Vehicles (%)	4%	0%	0%	8%	11%	11%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	52.0			52.0	51.0	51.0
Effective Green, g (s)	54.0			54.0	51.0	51.0
Actuated g/C Ratio	0.47			0.47	0.44	0.44
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	2368			2280	1327	593
v/s Ratio Prot	0.39			c0.46	0.28	
v/s Ratio Perm						c0.38
v/c Ratio	0.83			0.97	0.63	0.85
Uniform Delay, d1	26.6			29.8	24.7	28.6
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	3.0			13.3	2.3	14.1
Delay (s)	29.6			43.1	26.9	42.7
Level of Service	C			D	C	D
Approach Delay (s)	29.6			43.1	32.9	
Approach LOS	C			D	C	

Intersection Summary			
HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	240	5	896	349	576
v/c Ratio	0.79	0.01	0.39	0.31	0.27
Control Delay	50.6	0.0	9.0	1.8	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	0.0	9.0	1.8	8.0
Queue Length 50th (m)	37.1	0.0	35.6	0.0	20.6
Queue Length 95th (m)	62.3	0.0	52.6	9.9	32.1
Internal Link Dist (m)	374.1		556.6		106.5
Turn Bay Length (m)				50.0	
Base Capacity (vph)	377	469	2280	1109	2168
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.64	0.01	0.39	0.31	0.27

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	240	0	5	0	896	349	3	571	2
Future Volume (vph)	0	0	0	240	0	5	0	896	349	3	571	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor					1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes					1.00	0.98		1.00	0.98		1.00	
Flpb, ped/bikes					1.00	1.00		1.00	1.00		1.00	
Frt					1.00	0.85		1.00	0.85		1.00	
Flt Protected					0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)					1736	1608		3614	1556		3611	
Flt Permitted					0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)					1384	1608		3614	1556		3438	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	240	0	5	0	896	349	3	571	2
RTOR Reduction (vph)	0	0	0	0	0	4	0	0	129	0	0	0
Lane Group Flow (vph)	0	0	0	0	240	1	0	896	220	0	576	0
Confl. Peds. (#/hr)	3		1	1		3	2		5	5		2
Heavy Vehicles (%)	0%	0%	0%	5%	0%	0%	0%	1%	3%	0%	1%	0%
Turn Type				Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)					19.0	19.0		54.6	54.6		54.6	
Effective Green, g (s)					19.0	19.0		54.6	54.6		54.6	
Actuated g/C Ratio					0.22	0.22		0.63	0.63		0.63	
Clearance Time (s)					6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)					304	353		2281	982		2170	
v/s Ratio Prot								c0.25				
v/s Ratio Perm					c0.17	0.00			0.14		0.17	
v/c Ratio					0.79	0.00		0.39	0.22		0.27	
Uniform Delay, d1					31.9	26.4		7.8	6.9		7.1	
Progression Factor					1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2					12.8	0.0		0.5	0.5		0.3	
Delay (s)					44.6	26.4		8.3	7.4		7.4	
Level of Service					D	C		A	A		A	
Approach Delay (s)		0.0			44.2			8.1			7.4	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	86.5	Sum of lost time (s)	12.9
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	222	114	121	2	1	155
Future Volume (vph)	222	114	121	2	1	155
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	222	114	121	2	1	155

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	260	76	81	42	156
Volume Left (vph)	222	0	0	0	1
Volume Right (vph)	0	0	0	2	155
Hadj (s)	0.45	0.05	0.03	0.00	-0.58
Departure Headway (s)	5.5	5.1	5.3	5.2	4.4
Degree Utilization, x	0.39	0.11	0.12	0.06	0.19
Capacity (veh/h)	638	690	652	658	756
Control Delay (s)	10.7	7.5	7.8	7.4	8.5
Approach Delay (s)	10.0		7.6		8.5
Approach LOS	B		A		A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	84	1502	134	39	2389	145	332	89	54	88	56	54
v/c Ratio	0.46	0.52	0.14	0.17	0.84	0.15	0.83	0.18	0.15	0.59	0.26	0.22
Control Delay	20.2	16.3	2.7	9.4	26.0	2.8	54.8	34.6	9.7	64.5	49.5	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	16.3	2.7	9.4	26.0	2.8	54.8	34.6	9.7	64.5	49.5	6.8
Queue Length 50th (m)	6.1	76.0	0.0	2.8	162.1	0.0	66.1	16.0	0.0	19.3	11.8	0.0
Queue Length 95th (m)	19.1	99.9	9.2	7.4	208.3	9.9	#101.7	29.0	9.7	36.0	24.1	6.7
Internal Link Dist (m)		694.2			261.3			235.6			351.9	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	193	2869	949	228	2845	959	401	897	611	429	614	573
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.52	0.14	0.17	0.84	0.15	0.83	0.10	0.09	0.21	0.09	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	1427	127	37	2270	138	315	85	51	84	53	51
Future Volume (vph)	80	1427	127	37	2270	138	315	85	51	84	53	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1807	4948	1541	1738	5142	1617	1807	1921	1247	1789	1883	1601
Flt Permitted	0.06	1.00	1.00	0.13	1.00	1.00	0.59	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	115	4948	1541	238	5142	1617	1115	1921	1247	1317	1883	1601
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	1502	134	39	2389	145	332	89	54	88	56	54
RTOR Reduction (vph)	0	0	57	0	0	65	0	0	40	0	0	48
Lane Group Flow (vph)	84	1502	77	39	2389	80	332	89	14	88	56	6
Heavy Vehicles (%)	1%	6%	6%	5%	2%	1%	1%	0%	31%	2%	2%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	72.1	66.2	66.2	67.3	63.8	63.8	29.1	29.1	29.1	13.1	13.1	13.1
Effective Green, g (s)	72.1	66.2	66.2	67.3	63.8	63.8	29.1	29.1	29.1	13.1	13.1	13.1
Actuated g/C Ratio	0.62	0.57	0.57	0.58	0.55	0.55	0.25	0.25	0.25	0.11	0.11	0.11
Clearance Time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	158	2838	884	184	2842	893	359	484	314	149	213	181
v/s Ratio Prot	c0.03	0.30		0.01	c0.46		c0.10	0.05			0.03	
v/s Ratio Perm	0.30		0.05	0.12		0.05	c0.13		0.01	0.07		0.00
v/c Ratio	0.53	0.53	0.09	0.21	0.84	0.09	0.92	0.18	0.04	0.59	0.26	0.03
Uniform Delay, d1	19.8	15.1	11.0	11.0	21.6	12.1	40.9	33.8	32.6	48.6	46.7	45.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.4	0.7	0.2	0.6	3.2	0.2	29.0	0.2	0.1	6.1	0.7	0.1
Delay (s)	23.2	15.8	11.2	11.6	24.8	12.3	69.9	34.0	32.7	54.7	47.4	45.6
Level of Service	C	B	B	B	C	B	E	C	C	D	D	D
Approach Delay (s)		15.8			23.9			58.9			50.2	
Approach LOS		B			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	115.4	Sum of lost time (s)	19.6
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1169	2667	109	13
v/c Ratio	0.39	0.87	0.10	0.03
Control Delay	11.4	21.4	24.7	22.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.4	21.4	24.7	22.0
Queue Length 50th (m)	41.1	148.3	7.6	1.6
Queue Length 95th (m)	50.1	172.5	13.8	6.3
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2975	3063	1068	462
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	0.39	0.87	0.10	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1087	2480	0	100	13
Future Volume (vph)	0	1087	2480	0	100	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5043	5193		3444	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5043	5193		3444	1486
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	1169	2667	0	108	14
RTOR Reduction (vph)	0	0	0	0	1	1
Lane Group Flow (vph)	0	1169	2667	0	108	12
Heavy Vehicles (%)	0%	4%	1%	0%	3%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		57.0	57.0		31.0	31.0
Effective Green, g (s)		59.0	59.0		31.0	31.0
Actuated g/C Ratio		0.59	0.59		0.31	0.31
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2975	3063		1067	460
v/s Ratio Prot		0.23	c0.51		c0.03	
v/s Ratio Perm						0.01
v/c Ratio		0.39	0.87		0.10	0.03
Uniform Delay, d1		10.9	17.3		24.6	24.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	3.0		0.2	0.1
Delay (s)		11.0	20.3		24.8	24.1
Level of Service		B	C		C	C
Approach Delay (s)		11.0	20.3		24.7	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1192	2629	1469	688
v/c Ratio	0.71	1.57	0.75	0.86
Control Delay	43.4	291.6	23.7	35.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	43.4	291.6	23.7	35.8
Queue Length 50th (m)	105.4	~376.7	145.8	163.8
Queue Length 95th (m)	122.2	#402.4	173.1	#251.0
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	1676	1676	1965	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	0.71	1.57	0.75	0.86

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1132	0	0	2498	960	1089
Future Volume (vph)	1132	0	0	2498	960	1089
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.95	0.85
Flt Protected	1.00			1.00	0.97	1.00
Satd. Flow (prot)	4995			4995	3309	1351
Flt Permitted	1.00			1.00	0.97	1.00
Satd. Flow (perm)	4995			4995	3309	1351
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1192	0	0	2629	1011	1146
RTOR Reduction (vph)	0	0	0	0	3	3
Lane Group Flow (vph)	1192	0	0	2629	1466	685
Heavy Vehicles (%)	5%	0%	0%	5%	1%	10%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	45.0			45.0	83.0	83.0
Effective Green, g (s)	47.0			47.0	83.0	83.0
Actuated g/C Ratio	0.34			0.34	0.59	0.59
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	1676			1676	1961	800
v/s Ratio Prot	0.24			c0.53	0.44	
v/s Ratio Perm						c0.51
v/c Ratio	0.71			1.57	0.75	0.86
Uniform Delay, d1	40.6			46.5	20.8	23.6
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.8			258.8	2.7	11.4
Delay (s)	42.4			305.3	23.5	34.9
Level of Service	D			F	C	C
Approach Delay (s)	42.4			305.3	27.1	
Approach LOS	D			F	C	

Intersection Summary			
HCM 2000 Control Delay	152.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	126.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Appendix N

2033 Future Background Conditions with Improvements – Synchro Analysis Results

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1169	2667	109	13
v/c Ratio	0.39	0.87	0.10	0.03
Control Delay	11.4	21.4	24.7	22.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.4	21.4	24.7	22.0
Queue Length 50th (m)	41.1	148.3	7.6	1.6
Queue Length 95th (m)	50.1	172.5	13.8	6.3
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2975	3063	1068	462
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	0.39	0.87	0.10	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1087	2480	0	100	13
Future Volume (vph)	0	1087	2480	0	100	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5043	5193		3444	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5043	5193		3444	1486
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	1169	2667	0	108	14
RTOR Reduction (vph)	0	0	0	0	1	1
Lane Group Flow (vph)	0	1169	2667	0	108	12
Heavy Vehicles (%)	0%	4%	1%	0%	3%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		57.0	57.0		31.0	31.0
Effective Green, g (s)		59.0	59.0		31.0	31.0
Actuated g/C Ratio		0.59	0.59		0.31	0.31
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2975	3063		1067	460
v/s Ratio Prot		0.23	c0.51		c0.03	
v/s Ratio Perm						0.01
v/c Ratio		0.39	0.87		0.10	0.03
Uniform Delay, d1		10.9	17.3		24.6	24.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	3.0		0.2	0.1
Delay (s)		11.0	20.3		24.8	24.1
Level of Service		B	C		C	C
Approach Delay (s)		11.0	20.3		24.7	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Appendix O

Proposed Development Site Plan and Site Statistics

PROJECT DATA:

SITE AREA:		
GROSS:	91.52 AC	37.04 HA
	3,986,633 SF	370,370 m²
BUILDING AREA:		
BUILDING 1	523,234 SF	48,610 m²
FAR:		
GROSS:		0.13
NET:		0.13
COVERAGE:		
GROSS:		13%
NET:		13%

BUILDING 1

▲ DOCK-HIGH DOORS		67
○ GRADE-LEVEL DOORS		2
PARKING REQUIRED:		
WAREHOUSE		
<7k m²	7,000 m²	78 STALLS
7k-20k m²	13,000 m²	90 STALLS
>20k m²	28,610 m²	170 STALLS
TOTAL		338 STALLS
PARKING PROVIDED:		247 STALLS
	@0.47/1000 SF	@0.51/100 m²
REQ. ACCESSIBLE		*To be confimed by City*
TRAILER STALLS		86 STALLS

DEVELOPMENT STANDARDS:

ZONING:	MP/MS
MAX. F.A.R.:	0.50
MAX. COVERAGE:	50%
MAX. HEIGHT:	12.2 m [6]
BUILDING SETBACKS: [4]	
FRONT:	9 m
SIDE (INT):	3m, 6m [5]
SIDE (EXT):	7.5 m
REAR:	7.5 m
PARKING SETBACKS: [1,4]	
FRONT:	6 m
SIDE:	3 m
SIDE (EXT):	3 m
REAR:	3 m
DRIVEWAY	1.5m
LANDSCAPE REQ.:	10%
OFF-STREET PARKING:	
STANDARD:	2.75X6.0
DRIVE AISLE:	6 m
REQ. PARKING RATIO BY USE:	
WAREHOUSE: [2]	
≤7,000 m²	1/90 m²
7k - 20k m²	1/145 m²
>20,000 m²	1/168 m²
OFFICE: [3]	<15%

NOTES:

1 driveway setback - 1.5m from lot line

2 If accessory office use and retail net floor areas are 15% or less of the total net floor area:

Up to 7,000 m2 – 1 parking space per 90 m2 net floor area or portion thereof

7,000 to 20,000 m2 – 78 parking spaces, plus 1 parking space per 145 m2 of net floor area or portion thereof over 7000 m2

Over 20,000 m2 – 168 parking spaces, plus 1 parking space per 170 m2 of net floor area or portion thereof over 20,000 m2

3 If associated office or retail net floor areas are more than 15% of the total net floor area:
In addition to the standards contained above in, the applicable net floor areas exceeding 15% shall be subject to 1 parking space per 30 m2 of net floor area or portion thereof

4 14.0m from a provincial highway.
20m front yard abutting a residential zone. 15m exterior/interior side and rear yards abutting residential

5 3m on one side, 6m on the other

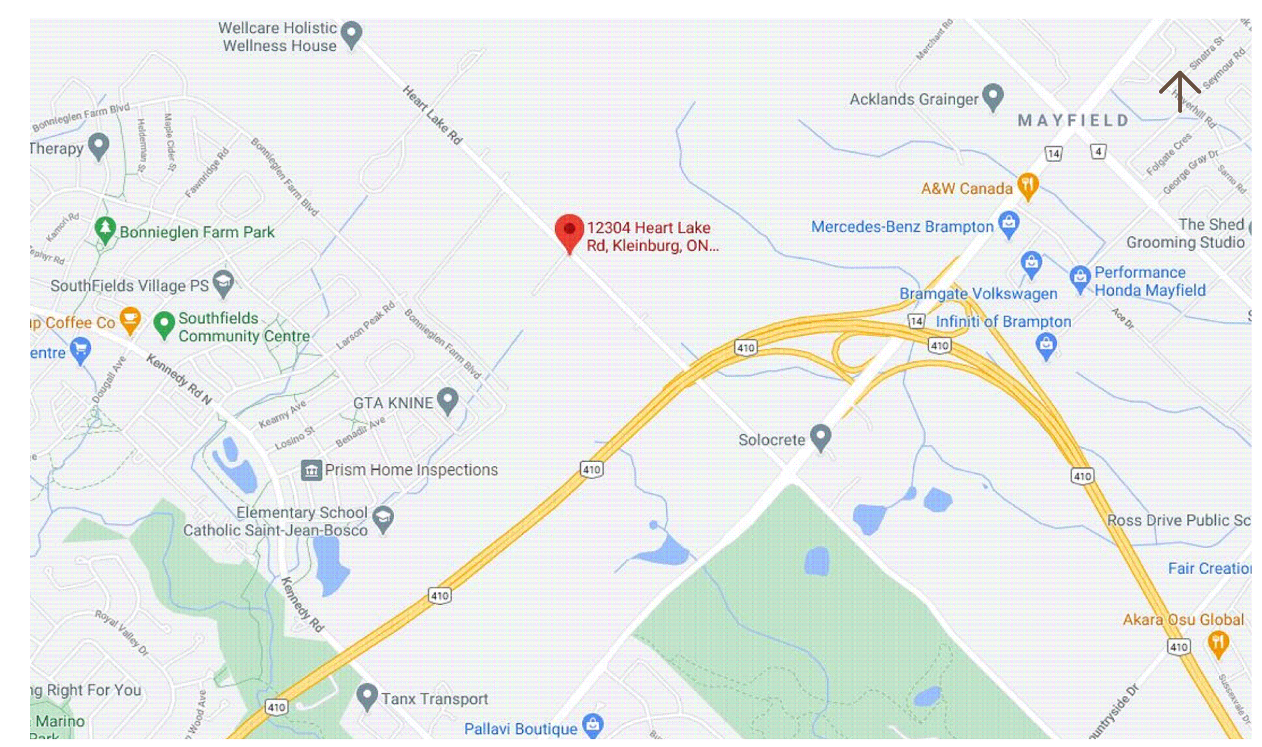
6 18m in MP zone, 12.2m in MS zone

NOTE: HEIGHT VARIANCE MAY BE REQUIRED DEPENDING ON ZONING

This conceptual design is based upon a preliminary review of entitlement requirements and on unverified and possibly incomplete site and/or building information, and is intended merely to assist in exploring how the project might be developed.

Stormwater Management Design:
ASSUMED UNDERGROUND SYSTEM

Boundary Source:
PDF ALTA SURVEY



1:1500
0 20m 40m 75m 150m

NORTH

scheme: 09

Conceptual Site Plan

BROCCOLINI

12304 Heart Lake Road
Caledon, ON, Canada

WARE MALCOMB

TOR21-0032-00
10.27.2021

SHEET
1

Appendix P

Directional Trip Distribution Analysis

Fri Sep 17 2021 10:37:29 GMT-0400 (Eastern Daylight Time) - Run Time: 2566ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
(Start time of trip - start_time In 700-900
and
Primary travel mode of trip - mode_prime In d, P,
and
Trip purpose of destination - purp_dest In W, R,
and
2006 GTA zone of destination - gta06_dest In 3438, 3013)

Subject Site Municipal Address
12304 Heart Lake Road, Caledon, Peel Region

Subject Site Latitude
43.7587

Subject Site Longitude
-79.8115

Roadway Hierarchy Sensitivity Threshold
10 km

Is the Subject Site located within 10 km of a major expressway or freeway? (Y/N)
Y

2006 TTS Zone Numbers for Study Area:
3438 | 3013

Subject Site - 2006 TTS Zone(s)
Peel | Region

Inbound

AM Peak

		2%		
		6		
		N		
24%	51 **W**	220	**E** 139	63%
		S		
		24		
		11%		

GOOD

Zone #	3438	3013
	207	13

Target Traffic Zones (with interaction to Subject Site) 2006 TTS Zone #	Zone Region		Internal / External	Direction	North N 6	East E 139	South S 24	West W 51
2209	York	Region	Ext	W				25
3188	Peel	Region	Int	W				26
3417	Peel	Region	Int	E		13		
3449	Peel	Region	Int	E		126		
3879	Peel	Region	Int	N	6			
8663	Simcoe	County	Ext	S			24	

Fri Sep 17 2021 11:19:41 GMT-0400 (Eastern Daylight Time) - Run Time: 2566ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06_dest
Column: 2006 GTA zone of origin - gta06_orig

Filters:
(Start time of trip - start_time In 1600-1800
and
Primary travel mode of trip - mode_prime In d, P,
and
Trip purpose of destination - purp_dest In H,
and
2006 GTA zone of origin - gta06_orig In 3438, 3013)

Subject Site Municipal Address
1204 Heart Lake Road, Caledon, Peel Region

Subject Site Latitude
43.7587

Subject Site Longitude
-79.8115

Roadway Hierarchy Sensitivity Threshold
100 km

Is the Subject Site located within 100 km of a major expressway or freeway? (Y/N)
Y

2006 TTS Zone Numbers for Study Area:
3438 | 3013

Subject Site - 2006 TTS Zone(s)
Peel | Region
Outbound | PM Peak

		12%		
		40		
		N		
12%	41 W	337	E 218	65%
		S		
		38		
		11%		

GOOD

Zone # 3438 3013
231 106

Target Traffic Zones (with interaction to Subject Site): 2006 TTS Zone #	Zone Region		Internal / External	Direction	North N 40	East E 218	South S 38	West W 41
465	Toronto	City	Ext	W				15
2402	York	Region	Ext	E		55		
3100	Peel	Region	Int	N	16			
3188	Peel	Region	Int	W				26
3417	Peel	Region	Int	E		13		
3434	Peel	Region	Int	S			14	
3449	Peel	Region	Int	E		126		
3460	Peel	Region	Int	S			24	
3668	Peel	Region	Int	E		24		
8663	Simcoe	County	Ext	N	24			

Appendix Q

2023 Future Total Conditions – Synchro Analysis Results

Lane Group	EBT	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	2	144	11	295	116	803
v/c Ratio	0.01	0.60	0.04	0.12	0.11	0.34
Control Delay	0.0	36.7	0.3	5.6	1.8	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	36.7	0.3	5.6	1.8	6.7
Queue Length 50th (m)	0.0	17.2	0.0	7.0	0.0	22.8
Queue Length 95th (m)	0.0	33.1	0.0	14.4	5.8	41.4
Internal Link Dist (m)	87.7	374.1		556.6		106.5
Turn Bay Length (m)					50.0	
Base Capacity (vph)	534	442	426	2410	1042	2368
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	0.00	0.33	0.03	0.12	0.11	0.34

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	1	144	0	11	0	295	116	13	790	0
Future Volume (vph)	1	0	1	144	0	11	0	295	116	13	790	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes		0.99			1.00	0.99		1.00	0.98		1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.93			1.00	0.85		1.00	0.85		1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1734			1669	1185		3444	1440		3563	
Flt Permitted		0.85			0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)		1513			1329	1185		3444	1440		3383	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	0	1	144	0	11	0	295	116	13	790	0
RTOR Reduction (vph)	0	2	0	0	0	9	0	0	39	0	0	0
Lane Group Flow (vph)	0	0	0	0	144	2	0	295	77	0	803	0
Confl. Peds. (#/hr)	1		3	3		1	6		8	8		6
Heavy Vehicles (%)	0%	0%	0%	9%	0%	36%	0%	6%	11%	23%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)		11.2			11.2	11.2		48.4	48.4		48.4	
Effective Green, g (s)		11.2			11.2	11.2		48.4	48.4		48.4	
Actuated g/C Ratio		0.15			0.15	0.15		0.67	0.67		0.67	
Clearance Time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		233			205	183		2299	961		2258	
v/s Ratio Prot								0.09				
v/s Ratio Perm		0.00			c0.11	0.00			0.05		c0.24	
v/c Ratio		0.00			0.70	0.01		0.13	0.08		0.36	
Uniform Delay, d1		25.9			29.1	26.0		4.4	4.2		5.3	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			10.4	0.0		0.1	0.2		0.4	
Delay (s)		25.9			39.5	26.0		4.5	4.4		5.7	
Level of Service		C			D	C		A	A		A	
Approach Delay (s)		25.9			38.5			4.5			5.7	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	72.5	Sum of lost time (s)	12.9
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	83	54	45	42	169	159
Future Volume (vph)	83	54	45	42	169	159
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	83	54	45	42	169	159

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	101	36	30	57	328
Volume Left (vph)	83	0	0	0	169
Volume Right (vph)	0	0	0	42	159
Hadj (s)	0.49	0.07	0.15	-0.48	-0.14
Departure Headway (s)	5.9	5.5	5.6	5.0	4.3
Degree Utilization, x	0.17	0.05	0.05	0.08	0.40
Capacity (veh/h)	575	619	596	671	799
Control Delay (s)	8.9	7.6	7.7	7.2	10.2
Approach Delay (s)	8.5		7.4		10.2
Approach LOS	A		A		B

Intersection Summary			
Delay	9.3		
Level of Service	A		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	52	173	67	18	48	48
Future Volume (vph)	52	173	67	18	48	48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	52	173	67	18	48	48

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	110	115	45	40	96
Volume Left (vph)	52	0	0	0	48
Volume Right (vph)	0	0	0	18	48
Hadj (s)	0.29	0.03	0.10	-0.26	-0.13
Departure Headway (s)	5.1	4.8	5.0	4.7	4.5
Degree Utilization, x	0.16	0.16	0.06	0.05	0.12
Capacity (veh/h)	692	723	688	743	759
Control Delay (s)	7.8	7.5	7.2	6.7	8.1
Approach Delay (s)	7.7		7.0		8.1
Approach LOS	A		A		A

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	45	1602	553	125	1024	138	117	56	19	218	289	99
v/c Ratio	0.16	0.58	0.53	0.65	0.34	0.14	0.56	0.11	0.04	0.79	0.74	0.24
Control Delay	18.7	21.1	8.3	27.5	13.0	2.4	44.2	34.2	0.2	68.3	59.3	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	21.1	8.3	27.5	13.0	2.4	44.2	34.2	0.2	68.3	59.3	10.5
Queue Length 50th (m)	5.4	94.4	24.7	11.2	43.2	0.0	22.0	10.6	0.0	52.6	68.9	1.4
Queue Length 95th (m)	15.0	131.1	64.2	#29.5	64.8	9.0	36.5	20.6	0.0	80.4	98.4	15.2
Internal Link Dist (m)		694.2			261.3			235.6			728.0	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	277	2769	1043	193	2980	997	209	706	633	403	571	550
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.58	0.53	0.65	0.34	0.14	0.56	0.08	0.03	0.54	0.51	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	1490	514	116	952	128	109	52	18	203	269	92
Future Volume (vph)	42	1490	514	116	952	128	109	52	18	203	269	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5043	1601	1772	4812	1526	1738	1921	1633	1789	1921	1633
Flt Permitted	0.27	1.00	1.00	0.10	1.00	1.00	0.27	1.00	1.00	0.72	1.00	1.00
Satd. Flow (perm)	504	5043	1601	182	4812	1526	495	1921	1633	1357	1921	1633
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	45	1602	553	125	1024	138	117	56	19	218	289	99
RTOR Reduction (vph)	0	0	164	0	0	52	0	0	14	0	0	73
Lane Group Flow (vph)	45	1602	389	125	1024	86	117	56	5	218	289	26
Heavy Vehicles (%)	2%	4%	2%	3%	9%	7%	5%	0%	0%	2%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	70.6	70.6	70.6	79.6	79.6	79.6	35.2	35.2	35.2	26.2	26.2	26.2
Effective Green, g (s)	70.6	70.6	70.6	79.6	79.6	79.6	35.2	35.2	35.2	26.2	26.2	26.2
Actuated g/C Ratio	0.55	0.55	0.55	0.62	0.62	0.62	0.27	0.27	0.27	0.20	0.20	0.20
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	277	2772	880	187	2983	946	193	526	447	276	391	333
v/s Ratio Prot		0.32		c0.03	0.21		c0.03	0.03			0.15	
v/s Ratio Perm	0.09		0.24	c0.38		0.06	0.14		0.00	c0.16		0.02
v/c Ratio	0.16	0.58	0.44	0.67	0.34	0.09	0.61	0.11	0.01	0.79	0.74	0.08
Uniform Delay, d1	14.3	19.1	17.2	14.2	11.8	9.8	38.7	34.8	33.9	48.5	47.9	41.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.9	1.6	8.7	0.3	0.2	5.3	0.1	0.0	13.9	7.2	0.1
Delay (s)	15.5	20.0	18.8	23.0	12.1	10.0	44.0	34.9	33.9	62.4	55.1	41.4
Level of Service	B	B	B	C	B	B	D	C	C	E	E	D
Approach Delay (s)		19.6			12.9			40.4			55.5	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	128.4	Sum of lost time (s)	19.6
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1193	1274	303	21
v/c Ratio	0.61	0.68	0.20	0.03
Control Delay	18.6	19.8	13.5	6.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.6	19.8	13.5	6.5
Queue Length 50th (m)	44.8	49.5	12.1	0.0
Queue Length 95th (m)	56.9	62.9	22.4	4.2
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2415	2326	1534	666
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	0.55	0.20	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1133	1210	0	286	22
Future Volume (vph)	0	1133	1210	0	286	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		4995	4812		3478	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		4995	4812		3478	1486
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1193	1274	0	301	23
RTOR Reduction (vph)	0	0	0	0	1	12
Lane Group Flow (vph)	0	1193	1274	0	302	9
Heavy Vehicles (%)	0%	5%	9%	0%	2%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		27.5	27.5		31.2	31.2
Effective Green, g (s)		27.5	27.5		31.2	31.2
Actuated g/C Ratio		0.39	0.39		0.44	0.44
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1942	1871		1534	655
v/s Ratio Prot		0.24	c0.26		c0.09	
v/s Ratio Perm						0.01
v/c Ratio		0.61	0.68		0.20	0.01
Uniform Delay, d1		17.3	18.0		12.1	11.1
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.6	1.0		0.3	0.0
Delay (s)		17.9	19.0		12.4	11.1
Level of Service		B	B		B	B
Approach Delay (s)		17.9	19.0		12.3	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	70.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1497	1646	686	354
v/c Ratio	0.61	0.70	0.63	0.72
Control Delay	16.4	17.9	23.6	31.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.4	17.9	23.6	31.1
Queue Length 50th (m)	57.9	67.5	42.4	47.9
Queue Length 95th (m)	71.7	83.5	59.5	#90.1
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	2435	2367	1096	491
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	0.61	0.70	0.63	0.72

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱
Traffic Volume (vph)	1422	0	0	1564	315	673
Future Volume (vph)	1422	0	0	1564	315	673
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.92	0.85
Flt Protected	1.00			1.00	0.98	1.00
Satd. Flow (prot)	4995			4856	2998	1327
Flt Permitted	1.00			1.00	0.98	1.00
Satd. Flow (perm)	4995			4856	2998	1327
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1497	0	0	1646	332	708
RTOR Reduction (vph)	0	0	0	0	10	10
Lane Group Flow (vph)	1497	0	0	1646	676	344
Heavy Vehicles (%)	5%	0%	0%	8%	12%	12%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	39.0			39.0	29.0	29.0
Effective Green, g (s)	39.0			39.0	29.0	29.0
Actuated g/C Ratio	0.49			0.49	0.36	0.36
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	2435			2367	1086	481
v/s Ratio Prot	0.30			c0.34	0.23	
v/s Ratio Perm						c0.26
v/c Ratio	0.61			0.70	0.62	0.71
Uniform Delay, d1	15.0			15.9	21.0	21.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.7			1.2	2.7	8.8
Delay (s)	15.7			17.0	23.7	30.7
Level of Service	B			B	C	C
Approach Delay (s)	15.7			17.0	26.1	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	223	118	56	177	1
Future Volume (Veh/h)	11	223	118	56	177	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	11	223	127	60	190	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	504	190	191			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	504	190	191			
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	74	91			
cM capacity (veh/h)	482	851	1371			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	11	223	187	191
Volume Left	11	0	127	0
Volume Right	0	223	0	1
cSH	482	851	1371	1700
Volume to Capacity	0.02	0.26	0.09	0.11
Queue Length 95th (m)	0.5	8.0	2.3	0.0
Control Delay (s)	12.7	10.7	5.6	0.0
Lane LOS	B	B	A	
Approach Delay (s)	10.8		5.6	0.0
Approach LOS	B			

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	216	7	29	86	1	9
Future Volume (Veh/h)	216	7	29	86	1	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	216	7	29	86	1	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			223		320	112
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			223		320	112
tC, single (s)			4.4		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.6
p0 queue free %			98		100	99
cM capacity (veh/h)			1260		638	838

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	144	79	58	57	10
Volume Left	0	0	29	0	1
Volume Right	0	7	0	0	9
cSH	1700	1700	1260	1700	812
Volume to Capacity	0.08	0.05	0.02	0.03	0.01
Queue Length 95th (m)	0.0	0.0	0.5	0.0	0.3
Control Delay (s)	0.0	0.0	4.1	0.0	9.5
Lane LOS			A		A
Approach Delay (s)	0.0		2.0		9.5
Approach LOS					A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	221	0	36	83	2	13
Future Volume (Veh/h)	221	0	36	83	2	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	221	0	36	83	2	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			221		334	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			221		334	110
tC, single (s)			4.2		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			97		100	99
cM capacity (veh/h)			1338		623	882

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	147	74	64	55	15
Volume Left	0	0	36	0	2
Volume Right	0	0	0	0	13
cSH	1700	1700	1338	1700	835
Volume to Capacity	0.09	0.04	0.03	0.03	0.02
Queue Length 95th (m)	0.0	0.0	0.6	0.0	0.4
Control Delay (s)	0.0	0.0	4.5	0.0	9.4
Lane LOS			A		A
Approach Delay (s)	0.0		2.4		9.4
Approach LOS					A

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	62	8	701	274	451
v/c Ratio	0.37	0.04	0.24	0.21	0.17
Control Delay	40.4	0.2	3.7	1.0	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	0.2	3.7	1.0	3.5
Queue Length 50th (m)	10.3	0.0	15.5	0.0	9.2
Queue Length 95th (m)	19.0	0.0	25.0	6.1	15.8
Internal Link Dist (m)	374.1		556.6		106.5
Turn Bay Length (m)				50.0	
Base Capacity (vph)	412	486	2867	1317	2700
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.02	0.24	0.21	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	62	0	8	0	701	274	3	446	2
Future Volume (vph)	0	0	0	62	0	8	0	701	274	3	446	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor					1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes					1.00	0.98		1.00	0.98		1.00	
Flpb, ped/bikes					1.00	1.00		1.00	1.00		1.00	
Frt					1.00	0.85		1.00	0.85		1.00	
Flt Protected					0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)					1823	1608		3650	1603		3610	
Flt Permitted					0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)					1453	1608		3650	1603		3439	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	62	0	8	0	701	274	3	446	2
RTOR Reduction (vph)	0	0	0	0	0	7	0	0	67	0	0	0
Lane Group Flow (vph)	0	0	0	0	62	1	0	701	207	0	451	0
Confl. Peds. (#/hr)	3		1	1		3	2		5	5		2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)					7.8	7.8		64.1	64.1		64.1	
Effective Green, g (s)					7.8	7.8		64.1	64.1		64.1	
Actuated g/C Ratio					0.09	0.09		0.76	0.76		0.76	
Clearance Time (s)					6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)					133	147		2759	1211		2599	
v/s Ratio Prot								c0.19				
v/s Ratio Perm					c0.04	0.00			0.13		0.13	
v/c Ratio					0.47	0.01		0.25	0.17		0.17	
Uniform Delay, d1					36.5	35.0		3.1	2.9		2.9	
Progression Factor					1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2					2.6	0.0		0.2	0.3		0.1	
Delay (s)					39.1	35.0		3.3	3.2		3.1	
Level of Service					D	C		A	A		A	
Approach Delay (s)		0.0			38.6			3.3			3.1	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	4.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	84.8	Sum of lost time (s)	12.9
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	193	80	56	31	79	77
Future Volume (vph)	193	80	56	31	79	77
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	193	80	56	31	79	77

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	220	53	37	50	156
Volume Left (vph)	193	0	0	0	79
Volume Right (vph)	0	0	0	31	77
Hadj (s)	0.47	0.00	0.03	-0.42	-0.19
Departure Headway (s)	5.4	5.0	5.2	4.7	4.6
Degree Utilization, x	0.33	0.07	0.05	0.07	0.20
Capacity (veh/h)	637	699	657	722	738
Control Delay (s)	9.9	7.2	7.3	6.9	8.7
Approach Delay (s)	9.4		7.1		8.7
Approach LOS	A		A		A

Intersection Summary			
Delay	8.8		
Level of Service	A		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	78	88	52	26	50	50
Future Volume (vph)	78	88	52	26	50	50
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	78	88	52	26	50	50

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	107	59	35	43	100
Volume Left (vph)	78	0	0	0	50
Volume Right (vph)	0	0	0	26	50
Hadj (s)	0.40	0.12	0.20	-0.34	-0.18
Departure Headway (s)	5.2	4.9	5.1	4.5	4.3
Degree Utilization, x	0.15	0.08	0.05	0.05	0.12
Capacity (veh/h)	678	710	681	764	795
Control Delay (s)	7.9	7.1	7.1	6.6	7.9
Approach Delay (s)	7.7		6.8		7.9
Approach LOS	A		A		A

Intersection Summary			
Delay	7.5		
Level of Service	A		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	1140	134	39	1853	203	332	108	12	181	147	56
v/c Ratio	0.51	0.44	0.15	0.14	0.73	0.23	0.77	0.18	0.02	0.78	0.42	0.16
Control Delay	26.1	20.8	3.6	13.1	28.2	3.4	47.3	31.7	0.1	71.4	48.3	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	20.8	3.6	13.1	28.2	3.4	47.3	31.7	0.1	71.4	48.3	5.2
Queue Length 50th (m)	8.2	64.3	0.0	3.7	129.8	0.0	66.1	19.6	0.0	43.4	32.6	0.0
Queue Length 95th (m)	23.6	91.1	11.2	10.1	176.2	13.8	93.7	33.1	0.0	68.9	51.9	6.5
Internal Link Dist (m)		694.2			261.3			235.6			728.0	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	177	2562	869	277	2552	874	430	809	661	366	560	525
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.44	0.15	0.14	0.73	0.23	0.77	0.13	0.02	0.49	0.26	0.11

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	1083	127	37	1760	193	315	103	11	172	140	53
Future Volume (vph)	81	1083	127	37	1760	193	315	103	11	172	140	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1807	4902	1541	1738	5142	1555	1807	1921	1498	1722	1902	1601
Flt Permitted	0.06	1.00	1.00	0.20	1.00	1.00	0.53	1.00	1.00	0.69	1.00	1.00
Satd. Flow (perm)	115	4902	1541	372	5142	1555	1010	1921	1498	1246	1902	1601
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	85	1140	134	39	1853	203	332	108	12	181	147	56
RTOR Reduction (vph)	0	0	64	0	0	102	0	0	8	0	0	46
Lane Group Flow (vph)	85	1140	70	39	1853	101	332	108	4	181	147	10
Heavy Vehicles (%)	1%	7%	6%	5%	2%	5%	1%	0%	9%	6%	1%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	73.5	66.1	66.1	68.1	63.4	63.4	39.7	39.7	39.7	23.6	23.6	23.6
Effective Green, g (s)	73.5	66.1	66.1	68.1	63.4	63.4	39.7	39.7	39.7	23.6	23.6	23.6
Actuated g/C Ratio	0.58	0.52	0.52	0.54	0.50	0.50	0.31	0.31	0.31	0.19	0.19	0.19
Clearance Time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	165	2549	801	249	2564	775	397	600	467	231	353	297
v/s Ratio Prot	c0.03	0.23		0.01	c0.36		c0.09	0.06			0.08	
v/s Ratio Perm	0.27		0.05	0.08		0.07	c0.17		0.00	0.15		0.01
v/c Ratio	0.52	0.45	0.09	0.16	0.72	0.13	0.84	0.18	0.01	0.78	0.42	0.04
Uniform Delay, d1	19.1	19.1	15.3	14.4	25.0	17.1	39.1	31.8	30.1	49.3	45.7	42.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	0.6	0.2	0.3	1.8	0.3	14.1	0.1	0.0	15.8	0.8	0.0
Delay (s)	21.8	19.6	15.5	14.7	26.8	17.4	53.2	32.0	30.1	65.1	46.5	42.5
Level of Service	C	B	B	B	C	B	D	C	C	E	D	D
Approach Delay (s)		19.4			25.6			47.5			54.7	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	28.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	127.1	Sum of lost time (s)	19.6
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	895	2151	92	11
v/c Ratio	0.40	0.95	0.07	0.02
Control Delay	15.2	31.7	14.2	13.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.2	31.7	14.2	13.5
Queue Length 50th (m)	31.0	105.8	4.0	0.9
Queue Length 95th (m)	40.5	#143.5	8.2	4.0
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2248	2270	1373	598
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	0.40	0.95	0.07	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	832	2000	0	85	11
Future Volume (vph)	0	832	2000	0	85	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5092	5142		3411	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5092	5142		3411	1486
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	895	2151	0	91	12
RTOR Reduction (vph)	0	0	0	0	1	1
Lane Group Flow (vph)	0	895	2151	0	91	10
Heavy Vehicles (%)	0%	3%	2%	0%	4%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		34.0	34.0		31.0	31.0
Effective Green, g (s)		34.0	34.0		31.0	31.0
Actuated g/C Ratio		0.44	0.44		0.40	0.40
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2248	2270		1373	598
v/s Ratio Prot		0.18	c0.42		c0.03	
v/s Ratio Perm						0.01
v/c Ratio		0.40	0.95		0.07	0.02
Uniform Delay, d1		14.6	20.6		14.1	13.8
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	9.3		0.1	0.1
Delay (s)		14.7	29.9		14.2	13.9
Level of Service		B	C		B	B
Approach Delay (s)		14.7	29.9		14.2	
Approach LOS		B	C		B	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	913	1799	1223	569
v/c Ratio	0.46	0.90	0.73	0.80
Control Delay	25.2	38.4	24.3	31.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	25.2	38.4	24.3	31.9
Queue Length 50th (m)	51.8	130.4	99.6	100.6
Queue Length 95th (m)	63.7	151.9	124.6	#160.3
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	1998	1998	1678	707
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.46	0.90	0.73	0.80

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	867	0	0	1709	858	845
Future Volume (vph)	867	0	0	1709	858	845
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0			6.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.96	0.85
Flt Protected	1.00			1.00	0.96	1.00
Satd. Flow (prot)	4995			4995	3367	1389
Flt Permitted	1.00			1.00	0.96	1.00
Satd. Flow (perm)	4995			4995	3367	1389
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	913	0	0	1799	903	889
RTOR Reduction (vph)	0	0	0	0	26	26
Lane Group Flow (vph)	913	0	0	1799	1197	543
Heavy Vehicles (%)	5%	0%	0%	5%	1%	7%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	44.0			44.0	54.0	54.0
Effective Green, g (s)	44.0			44.0	54.0	54.0
Actuated g/C Ratio	0.40			0.40	0.49	0.49
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	1998			1998	1652	681
v/s Ratio Prot	0.18			c0.36	0.36	
v/s Ratio Perm						c0.39
v/c Ratio	0.46			0.90	0.72	0.80
Uniform Delay, d1	24.2			30.9	22.1	23.4
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			6.4	2.8	9.4
Delay (s)	24.6			37.4	24.9	32.9
Level of Service	C			D	C	C
Approach Delay (s)	24.6			37.4	27.4	
Approach LOS	C			D	C	

Intersection Summary			
HCM 2000 Control Delay	30.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	181	84	134	86	1
Future Volume (Veh/h)	10	181	84	134	86	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	10	181	88	141	91	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	408	92	92			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408	92	92			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	98	81	94			
cM capacity (veh/h)	566	960	1454			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	10	181	229	92
Volume Left	10	0	88	0
Volume Right	0	181	0	1
cSH	566	960	1454	1700
Volume to Capacity	0.02	0.19	0.06	0.05
Queue Length 95th (m)	0.4	5.3	1.5	0.0
Control Delay (s)	11.5	9.6	3.2	0.0
Lane LOS	B	A	A	
Approach Delay (s)	9.7		3.2	0.0
Approach LOS	A			

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	149	3	16	86	1	10
Future Volume (Veh/h)	149	3	16	86	1	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	149	3	16	86	1	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			152		226	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			152		226	76
tC, single (s)			4.9		6.8	7.8
tC, 2 stage (s)						
tF (s)			2.6		3.5	3.8
p0 queue free %			99		100	99
cM capacity (veh/h)			1200		738	844

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	99	53	45	57	11
Volume Left	0	0	16	0	1
Volume Right	0	3	0	0	10
cSH	1700	1700	1200	1700	833
Volume to Capacity	0.06	0.03	0.01	0.03	0.01
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.3
Control Delay (s)	0.0	0.0	3.0	0.0	9.4
Lane LOS			A		A
Approach Delay (s)	0.0		1.3		9.4
Approach LOS					A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	138	0	14	71	7	53
Future Volume (Veh/h)	138	0	14	71	7	53
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	138	0	14	71	7	53
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			138		202	69
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			138		202	69
tC, single (s)			4.4		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		99	95
cM capacity (veh/h)			1360		766	973

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	92	46	38	47	60
Volume Left	0	0	14	0	7
Volume Right	0	0	0	0	53
cSH	1700	1700	1360	1700	944
Volume to Capacity	0.05	0.03	0.01	0.03	0.06
Queue Length 95th (m)	0.0	0.0	0.2	0.0	1.5
Control Delay (s)	0.0	0.0	2.9	0.0	9.1
Lane LOS			A		A
Approach Delay (s)	0.0		1.3		9.1
Approach LOS					A

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix R

2023 Future Total Conditions– Warrant Analysis Results

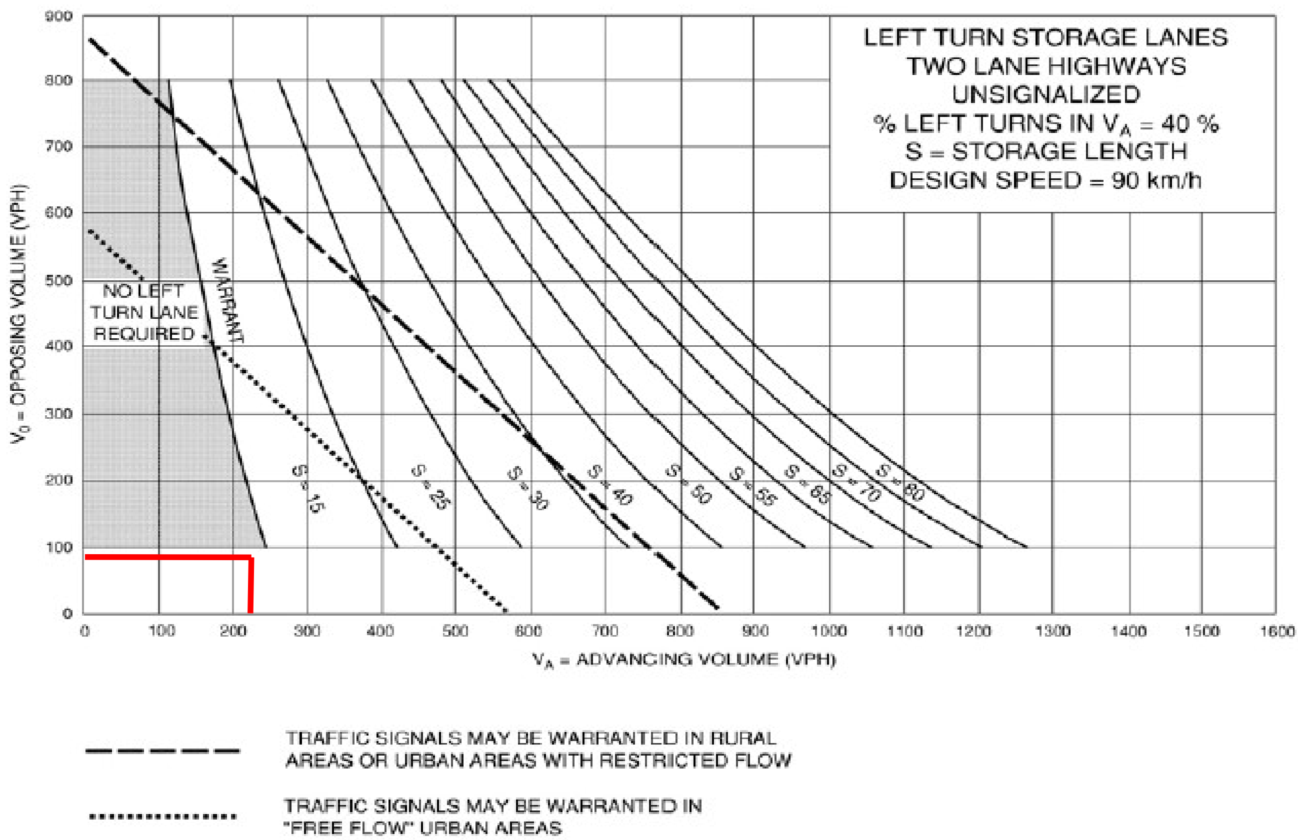
Left Turn Lane Warrant Calculation

(Left Turn Lane Warrant and Storage Length for Two-Lane Highways; Unsignalized Intersections)

Traffic Condition: **2023 Future Total Conditions**
Major Street: **Heart lake Road**
Minor Street: **Abbotside Way (Extension)**
Movement: **Northbound**
Peak Hour: **PM**
Design Speed = **90 km/h**
Advancing Traffic Volume, V_A = 226
Opposing Traffic Volume, V_O = 87
Left Turn Traffic Volume, V_L = 92

*All volumes have ben converted to passenger car dimensions

Percentage of Left Turn Traffic: 41%



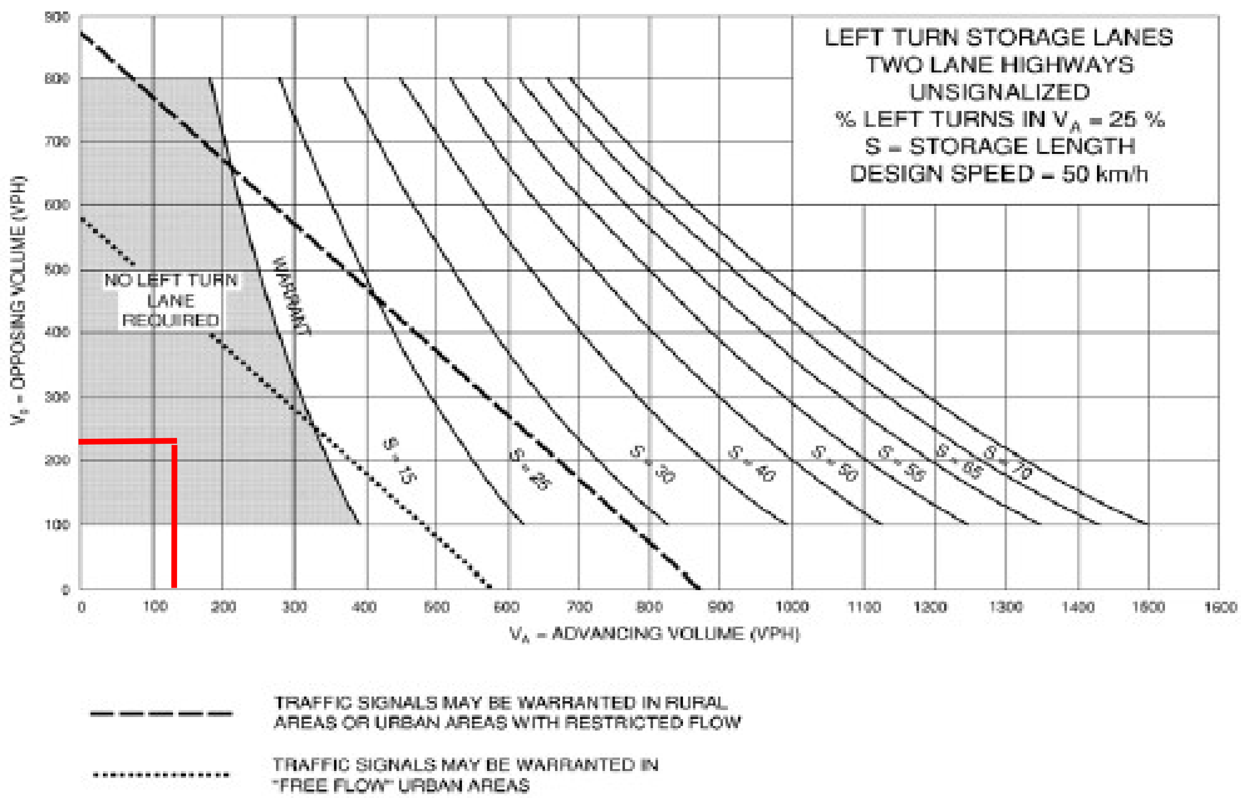
Overall Warrant => Exclusive Left Turn Lane is warranted

Result=> An exclusive left turn lane is warranted with a minimum storage length of 15 m. Given the high percentage of trucks turning left, it is recommeded that an additional 10 m of storage length be provided.

Left Turn Lane Warrant Calculation

(Left Turn Lane Warrant and Storage Length for Two-Lane Highways; Unsignalized Intersections)

Traffic Condition: **2023 Future Total Conditions**
Major Street: **Abbotside Way (Extension)**
Minor Street: **Site Access 1 (West)**
Movement: **Westbound**
Peak Hour: **AM**
Design Speed = **50 km/h**
Advancing Traffic Volume, V_A = 123
Opposing Traffic Volume, V_O = 225
Left Turn Traffic Volume, V_L = 33
*All volumes have ben converted to passenger car dimensions
Percentage of Left Turn Traffic: 27%



Overall Warrant => Exclusive Left Turn Lane is not warranted
Result=> No exclusive left turn lane required.

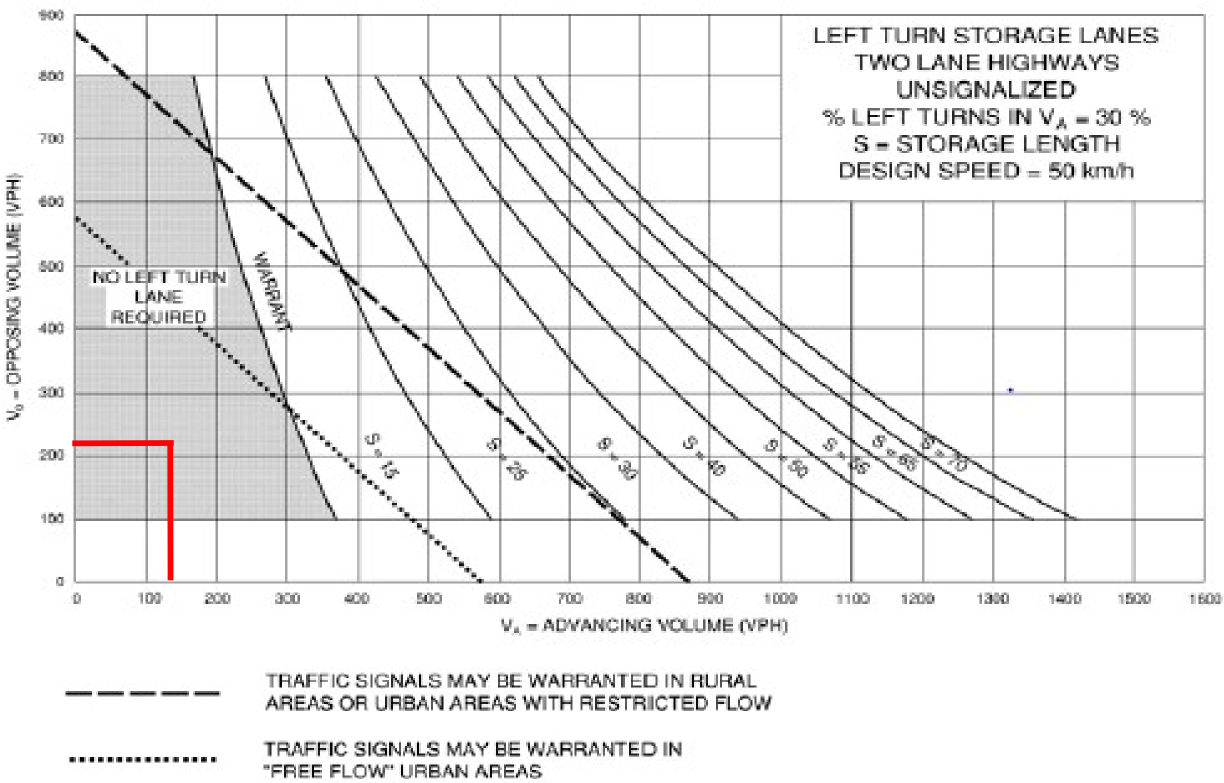
Left Turn Lane Warrant Calculation

(Left Turn Lane Warrant and Storage Length for Two-Lane Highways; Unsignalized Intersections)

Traffic Condition: **2023 Future Total Conditions**
Major Street: **Abbotside Way (Extension)**
Minor Street: **Site Access 2 (East)**
Movement: **Westbound**
Peak Hour: **AM**
Design Speed = **50 km/h**
Advancing Traffic Volume, V_A = 124
Opposing Traffic Volume, V_O = 223
Left Turn Traffic Volume, V_L = 37

*All volumes have ben converted to passenger car dimensions

Percentage of Left Turn Traffic: 30%



Overall Warrant => Exclusive Left Turn Lane is warranted

Result=> An exclusive left turn lane is warranted with a minimum storage length of 15 m. Given the high percentage of trucks turning left, it is recommeded that an additional 10 m of storage length be provided.

All-Way Stop Warrant Calculation

Intersection	Abbotside Way and Bonnieglen Farm Boulevard	
Analysis Scenario:	2023 Future Total Conditions	
Peak Hour:	AM Peak Hour	
East/West Total Approach Volume:	310	75% (minor collector road)
North/South Total Approach Volume:	96	25% (minor collector road)
Total Approach Volume:	406	

All-way Stop sign controls disrupt the flow of traffic and introduce delays to all drivers within the intersection and should only be considered on minor roadway intersections where the following minimum volume conditions are met:

<u>Condition 1:</u>
Two relatively equal roadways having similar traffic volume demand and operating characteristics.

Condition 1 Satisfied

<u>Condition 2:</u>
Total Vehicle Volume on all intersection approaches exceeds 350 for the highest hour recorded.

Condition 2 Satisfied

<u>Condition 3:</u>
Volume split does not exceed **75 / 25 for three-way control** or 65 / 35 for four-way control. Volume is defined as vehicles only

Condition 3 Satisfied

<u>Warrant Result:</u>

All-Way-Stop Sign is Warranted.

Information Source: Ontario Traffic Manual (OTM) Book 5 – Regulatory Signs

All-Way Stop Warrant Calculation

Intersection	Heart Lake Road and Abbotside Way	
Analysis Scenario:	2023 Future Total Conditions	
Peak Hour:	AM Peak Hour	
East/West Total Approach Volume:	235	39% (minor collector road)
North/South Total Approach Volume:	352	61% (minor collector road)
Total Approach Volume:	587	

All-way Stop sign controls disrupt the flow of traffic and introduce delays to all drivers within the intersection and should only be considered on minor roadway intersections where the following minimum volume conditions are met:

<u>Condition 1:</u>
Two relatively equal roadways having similar traffic volume demand and operating characteristics.

Condition 1 Not Satisfied

<u>Condition 2:</u>
Total Vehicle Volume on all intersection approaches exceeds 350 for the highest hour recorded.

Condition 2 Satisfied

<u>Condition 3:</u>
Volume split does not exceed **75 / 25 for three-way control** or 65 / 35 for four-way control. Volume is defined as vehicles only

Condition 3 Satisfied

<u>Warrant Result:</u>

All-Way-Stop Sign is Not Warranted.

Information Source: Ontario Traffic Manual (OTM) Book 5 – Regulatory Signs

Signal Warrant Calculation

Justification 7 - Projected Volumes

Major Street: Heart Lake Road North/South

Minor Street: Abbotside Way East/West

Traffic Condition: 2023 Future Total

Number of Approach Lanes: 2

Tee Intersection: Yes

Existing Intersection: No

Flow Condition: Restricted Flow (Urban)

No. of Peak Hours: 2

Volume	1st Hour	2nd Hour	Factor	Average Hour
1A - All	595	511	4	277
1B - Minor	238	198	4	109
2A - Major	357	313	4	168
2B - Crossing	11	10	4	5

WARRANT 1 - MINIMUM VEHICULAR VOLUME => 31% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	277	31%
B.	Vehicle volume, along minor streets (average hour)	255	109	43%

WARRANT 2 - DELAY TO CROSS TRAFFIC => 3% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	168	19%
B.	Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	5	3%

Overall Warrant => 31% Satsified

Result => No signals are warranted nor provision for undergrounds needed.

Signal Warrant Calculation

Justification 7 - Projected Volumes

Major Street: Abbotside Way — East/West

Minor Street: Site Access 1 (BLDG 1) — North/South

Traffic Condition: 2023 Future Total

Number of Approach Lanes: 2

Tee Intersection: Yes

Existing Intersection: No

Flow Condition: Restricted Flow (Urban)

No. of Peak Hours: 2

Volume	1st Hour	2nd Hour	Factor	Average Hour
1A - All	385	277	4	165
1B - Minor	13	16	4	7
2A - Major	372	261	4	158
2B - Crossing	1	1	4	1

WARRANT 1 - MINIMUM VEHICULAR VOLUME => 3% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	165	18%
B.	Vehicle volume, along minor streets (average hour)	255	7	3%

WARRANT 2 - DELAY TO CROSS TRAFFIC => 1% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	158	18%
B.	Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	1	1%

Overall Warrant => 3% Satsified

Result => No signals are warranted nor provision for undergrounds needed.

Signal Warrant Calculation

Justification 7 - Projected Volumes

Major Street: Abbotside Way — East/West

Minor Street: Site Access 2 (BLDG 1&2) — North/South

Traffic Condition: 2023 Future Total

Number of Approach Lanes: 1

Tee Intersection: Yes

Existing Intersection: Yes

Flow Condition: Restricted Flow (Urban)

No. of Peak Hours: 2

Volume	1st Hour	2nd Hour	Factor	Average Hour
1A - All	364	300	4	166
1B - Minor	17	62	4	20
2A - Major	347	238	4	146
2B - Crossing	2	7	4	2

WARRANT 1 - MINIMUM VEHICULAR VOLUME => 8% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	720	166	23%
B.	Vehicle volume, along minor streets (average hour)	255	20	8%

WARRANT 2 - DELAY TO CROSS TRAFFIC => 3% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	720	146	20%
B.	Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	2	3%

Overall Warrant => 8% Satsified

Result => No signals are warranted nor provision for undergrounds needed.

Appendix S

2028 Future Total Conditions – Synchro Analysis Results

Lane Group	EBT	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	2	160	12	340	169	923
v/c Ratio	0.01	0.64	0.04	0.15	0.18	0.43
Control Delay	0.0	38.5	0.3	6.3	1.8	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	38.5	0.3	6.3	1.8	8.2
Queue Length 50th (m)	0.0	19.4	0.0	8.5	0.0	28.8
Queue Length 95th (m)	0.0	36.4	0.0	17.4	7.2	52.2
Internal Link Dist (m)	87.7	374.1		556.6		106.5
Turn Bay Length (m)					50.0	
Base Capacity (vph)	525	422	417	2194	938	2156
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	0.00	0.38	0.03	0.15	0.18	0.43

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	1	160	0	12	0	340	169	14	909	0
Future Volume (vph)	1	0	1	160	0	12	0	340	169	14	909	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes		0.99			1.00	0.99		1.00	0.98		1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.93			1.00	0.85		1.00	0.85		1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1734			1669	1212		3444	1378		3565	
Flt Permitted		0.87			0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)		1554			1329	1212		3444	1378		3383	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	0	1	160	0	12	0	340	169	14	909	0
RTOR Reduction (vph)	0	2	0	0	0	10	0	0	61	0	0	0
Lane Group Flow (vph)	0	0	0	0	160	2	0	340	108	0	923	0
Confl. Peds. (#/hr)	1		3	3		1	6		8	8		6
Heavy Vehicles (%)	0%	0%	0%	9%	0%	33%	0%	6%	16%	21%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)		14.1			14.1	14.1		47.4	47.4		47.4	
Effective Green, g (s)		14.1			14.1	14.1		47.4	47.4		47.4	
Actuated g/C Ratio		0.19			0.19	0.19		0.64	0.64		0.64	
Clearance Time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		294			251	229		2194	877		2155	
v/s Ratio Prot								0.10				
v/s Ratio Perm		0.00			c0.12	0.00			0.08		c0.27	
v/c Ratio		0.00			0.64	0.01		0.15	0.12		0.43	
Uniform Delay, d1		24.4			27.8	24.5		5.4	5.3		6.7	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			5.2	0.0		0.2	0.3		0.6	
Delay (s)		24.4			33.0	24.5		5.6	5.6		7.4	
Level of Service		C			C	C		A	A		A	
Approach Delay (s)		24.4			32.4			5.6			7.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	74.4	Sum of lost time (s)	12.9
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	83	76	52	42	169	159
Future Volume (vph)	83	76	52	42	169	159
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	83	76	52	42	169	159

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	108	51	35	59	328
Volume Left (vph)	83	0	0	0	169
Volume Right (vph)	0	0	0	42	159
Hadj (s)	0.47	0.09	0.17	-0.45	-0.14
Departure Headway (s)	5.9	5.5	5.7	5.1	4.4
Degree Utilization, x	0.18	0.08	0.05	0.08	0.40
Capacity (veh/h)	576	616	590	661	785
Control Delay (s)	9.0	7.8	7.8	7.3	10.4
Approach Delay (s)	8.6		7.5		10.4
Approach LOS	A		A		B

Intersection Summary			
Delay	9.4		
Level of Service	A		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	52	173	67	18	48	48
Future Volume (vph)	52	173	67	18	48	48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	52	173	67	18	48	48

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	110	115	45	40	96
Volume Left (vph)	52	0	0	0	48
Volume Right (vph)	0	0	0	18	48
Hadj (s)	0.29	0.03	0.10	-0.26	-0.13
Departure Headway (s)	5.1	4.8	5.0	4.7	4.5
Degree Utilization, x	0.16	0.16	0.06	0.05	0.12
Capacity (veh/h)	692	723	688	743	759
Control Delay (s)	7.8	7.5	7.2	6.7	8.1
Approach Delay (s)	7.7		7.0		8.1
Approach LOS	A		A		A

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	45	1856	553	125	1161	138	117	57	96	218	300	99
v/c Ratio	0.19	0.67	0.54	0.82	0.39	0.14	0.58	0.11	0.20	0.78	0.75	0.24
Control Delay	19.7	23.4	9.2	56.8	13.7	2.4	45.1	34.1	8.1	66.8	60.1	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.7	23.4	9.2	56.8	13.7	2.4	45.1	34.1	8.1	66.8	60.1	11.5
Queue Length 50th (m)	5.5	118.2	28.5	12.4	50.7	0.0	22.0	10.8	0.7	52.6	72.0	2.3
Queue Length 95th (m)	15.5	162.4	69.3	#53.4	75.2	9.0	36.5	21.0	13.1	80.4	102.2	16.1
Internal Link Dist (m)		694.2			261.3			235.6			728.0	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	241	2757	1031	153	2994	994	203	703	592	401	569	545
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.67	0.54	0.82	0.39	0.14	0.58	0.08	0.16	0.54	0.53	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	1726	514	116	1080	128	109	53	89	203	279	92
Future Volume (vph)	42	1726	514	116	1080	128	109	53	89	203	279	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1807	5043	1601	1772	4856	1526	1738	1921	1458	1789	1921	1633
Flt Permitted	0.23	1.00	1.00	0.06	1.00	1.00	0.26	1.00	1.00	0.72	1.00	1.00
Satd. Flow (perm)	441	5043	1601	117	4856	1526	470	1921	1458	1356	1921	1633
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	45	1856	553	125	1161	138	117	57	96	218	300	99
RTOR Reduction (vph)	0	0	156	0	0	53	0	0	66	0	0	70
Lane Group Flow (vph)	45	1856	397	125	1161	85	117	57	30	218	300	29
Heavy Vehicles (%)	1%	4%	2%	3%	8%	7%	5%	0%	12%	2%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	70.6	70.6	70.6	79.6	79.6	79.6	35.8	35.8	35.8	26.8	26.8	26.8
Effective Green, g (s)	70.6	70.6	70.6	79.6	79.6	79.6	35.8	35.8	35.8	26.8	26.8	26.8
Actuated g/C Ratio	0.55	0.55	0.55	0.62	0.62	0.62	0.28	0.28	0.28	0.21	0.21	0.21
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	241	2759	876	149	2996	941	189	533	404	281	399	339
v/s Ratio Prot		0.37		c0.04	0.24		c0.03	0.03			0.16	
v/s Ratio Perm	0.10		0.25	c0.48		0.06	0.14		0.02	c0.16		0.02
v/c Ratio	0.19	0.67	0.45	0.84	0.39	0.09	0.62	0.11	0.07	0.78	0.75	0.09
Uniform Delay, d1	14.7	20.9	17.6	21.8	12.4	10.0	38.8	34.7	34.4	48.3	48.0	41.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	1.3	1.7	31.8	0.4	0.2	5.9	0.1	0.1	12.6	7.8	0.1
Delay (s)	16.4	22.3	19.3	53.6	12.8	10.2	44.7	34.8	34.4	60.8	55.8	41.3
Level of Service	B	C	B	D	B	B	D	C	C	E	E	D
Approach Delay (s)		21.5			16.1			39.0			55.2	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	129.0	Sum of lost time (s)	19.6
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1458	1428	327	22
v/c Ratio	0.70	0.71	0.22	0.03
Control Delay	19.8	20.0	14.8	9.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.8	20.0	14.8	9.4
Queue Length 50th (m)	59.0	57.9	15.3	0.8
Queue Length 95th (m)	73.7	72.6	24.0	5.2
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2311	2246	1468	634
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	0.63	0.64	0.22	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1385	1357	0	309	23
Future Volume (vph)	0	1385	1357	0	309	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		4995	4856		3478	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		4995	4856		3478	1486
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1458	1428	0	325	24
RTOR Reduction (vph)	0	0	0	0	1	8
Lane Group Flow (vph)	0	1458	1428	0	326	14
Heavy Vehicles (%)	0%	5%	8%	0%	2%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		30.6	30.6		31.1	31.1
Effective Green, g (s)		30.6	30.6		31.1	31.1
Actuated g/C Ratio		0.42	0.42		0.42	0.42
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2073	2016		1467	627
v/s Ratio Prot		0.29	c0.29		c0.09	
v/s Ratio Perm						0.01
v/c Ratio		0.70	0.71		0.22	0.02
Uniform Delay, d1		17.8	17.9		13.6	12.4
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		1.1	1.2		0.4	0.1
Delay (s)		18.9	19.0		13.9	12.5
Level of Service		B	B		B	B
Approach Delay (s)		18.9	19.0		13.8	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1769	2004	825	474
v/c Ratio	0.80	0.94	0.59	0.76
Control Delay	31.0	40.5	24.3	34.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	31.0	40.5	24.3	34.4
Queue Length 50th (m)	122.9	154.1	67.8	93.2
Queue Length 95th (m)	142.3	#190.1	86.9	141.7
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	2215	2134	1405	625
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	0.80	0.94	0.59	0.76

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰	↱
Traffic Volume (vph)	1681	0	0	1904	333	901
Future Volume (vph)	1681	0	0	1904	333	901
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.91	0.85
Flt Protected	1.00			1.00	0.98	1.00
Satd. Flow (prot)	4995			4812	2989	1327
Flt Permitted	1.00			1.00	0.98	1.00
Satd. Flow (perm)	4995			4812	2989	1327
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1769	0	0	2004	351	948
RTOR Reduction (vph)	0	0	0	0	2	2
Lane Group Flow (vph)	1769	0	0	2004	823	472
Heavy Vehicles (%)	5%	0%	0%	9%	11%	12%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	49.0			49.0	54.0	54.0
Effective Green, g (s)	51.0			51.0	54.0	54.0
Actuated g/C Ratio	0.44			0.44	0.47	0.47
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	2215			2134	1403	623
v/s Ratio Prot	0.35			c0.42	0.28	
v/s Ratio Perm						c0.36
v/c Ratio	0.80			0.94	0.59	0.76
Uniform Delay, d1	27.6			30.5	22.3	25.1
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	2.4			9.1	1.8	8.4
Delay (s)	30.0			39.6	24.1	33.5
Level of Service	C			D	C	C
Approach Delay (s)	30.0			39.6	27.5	
Approach LOS	C			D	C	

Intersection Summary			
HCM 2000 Control Delay	33.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	223	118	62	195	1
Future Volume (Veh/h)	11	223	118	62	195	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	11	223	127	67	210	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	532	210	211			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	532	210	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 %	98	73	91			
cM capacity (veh/h)	464	830	1348			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	11	223	194	211
Volume Left	11	0	127	0
Volume Right	0	223	0	1
cSH	464	830	1348	1700
Volume to Capacity	0.02	0.27	0.09	0.12
Queue Length 95th (m)	0.6	8.3	2.4	0.0
Control Delay (s)	13.0	10.9	5.5	0.0
Lane LOS	B	B	A	
Approach Delay (s)	11.0		5.5	0.0
Approach LOS	B			

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	216	7	29	86	1	9
Future Volume (Veh/h)	216	7	29	86	1	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	216	7	29	86	1	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			223		320	112
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			223		320	112
tC, single (s)			4.4		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.6
p0 queue free %			98		100	99
cM capacity (veh/h)			1260		638	838

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	144	79	58	57	10
Volume Left	0	0	29	0	1
Volume Right	0	7	0	0	9
cSH	1700	1700	1260	1700	812
Volume to Capacity	0.08	0.05	0.02	0.03	0.01
Queue Length 95th (m)	0.0	0.0	0.5	0.0	0.3
Control Delay (s)	0.0	0.0	4.1	0.0	9.5
Lane LOS			A		A
Approach Delay (s)	0.0		2.0		9.5
Approach LOS					A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	221	0	36	83	2	13
Future Volume (Veh/h)	221	0	36	83	2	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	221	0	36	83	2	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			221		334	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			221		334	110
tC, single (s)			4.2		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			97		100	99
cM capacity (veh/h)			1338		623	882

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	147	74	64	55	15
Volume Left	0	0	36	0	2
Volume Right	0	0	0	0	13
cSH	1700	1700	1338	1700	835
Volume to Capacity	0.09	0.04	0.03	0.03	0.02
Queue Length 95th (m)	0.0	0.0	0.6	0.0	0.4
Control Delay (s)	0.0	0.0	4.5	0.0	9.4
Lane LOS			A		A
Approach Delay (s)	0.0		2.4		9.4
Approach LOS					A

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	116	9	815	296	525
v/c Ratio	0.57	0.03	0.30	0.24	0.21
Control Delay	43.5	0.2	5.4	1.3	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	43.5	0.2	5.4	1.3	4.9
Queue Length 50th (m)	17.1	0.0	22.5	0.0	13.2
Queue Length 95th (m)	31.7	0.0	38.6	7.9	24.0
Internal Link Dist (m)	374.1		556.6		106.5
Turn Bay Length (m)				50.0	
Base Capacity (vph)	377	490	2722	1235	2558
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.31	0.02	0.30	0.24	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	116	0	9	0	815	296	4	519	2
Future Volume (vph)	0	0	0	116	0	9	0	815	296	4	519	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor					1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes					1.00	0.98		1.00	0.98		1.00	
Flpb, ped/bikes					1.00	1.00		1.00	1.00		1.00	
Frt					1.00	0.85		1.00	0.85		1.00	
Flt Protected					0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)					1657	1608		3650	1556		3611	
Flt Permitted					0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)					1321	1608		3650	1556		3433	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	116	0	9	0	815	296	4	519	2
RTOR Reduction (vph)	0	0	0	0	0	8	0	0	84	0	0	0
Lane Group Flow (vph)	0	0	0	0	116	1	0	815	212	0	525	0
Confl. Peds. (#/hr)	3		1	1		3	2		5	5		2
Heavy Vehicles (%)	0%	0%	0%	10%	0%	0%	0%	0%	3%	0%	1%	0%
Turn Type				Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)					10.9	10.9		60.3	60.3		60.3	
Effective Green, g (s)					10.9	10.9		60.3	60.3		60.3	
Actuated g/C Ratio					0.13	0.13		0.72	0.72		0.72	
Clearance Time (s)					6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)					171	208		2617	1115		2461	
v/s Ratio Prot								c0.22				
v/s Ratio Perm					c0.09	0.00			0.14		0.15	
v/c Ratio					0.68	0.01		0.31	0.19		0.21	
Uniform Delay, d1					34.9	31.9		4.3	3.9		4.0	
Progression Factor					1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2					10.2	0.0		0.3	0.4		0.2	
Delay (s)					45.1	31.9		4.6	4.3		4.2	
Level of Service					D	C		A	A		A	
Approach Delay (s)		0.0			44.2			4.5			4.2	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	84.1	Sum of lost time (s)	12.9
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	193	91	79	31	79	77
Future Volume (vph)	193	91	79	31	79	77
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	193	91	79	31	79	77

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	223	61	53	57	156
Volume Left (vph)	193	0	0	0	79
Volume Right (vph)	0	0	0	31	77
Hadj (s)	0.47	0.05	0.07	-0.35	-0.19
Departure Headway (s)	5.5	5.1	5.3	4.8	4.7
Degree Utilization, x	0.34	0.09	0.08	0.08	0.20
Capacity (veh/h)	633	688	651	708	724
Control Delay (s)	10.1	7.3	7.5	7.0	8.8
Approach Delay (s)	9.5		7.3		8.8
Approach LOS	A		A		A

Intersection Summary			
Delay	8.9		
Level of Service	A		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	78	88	52	26	50	50
Future Volume (vph)	78	88	52	26	50	50
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	78	88	52	26	50	50

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	107	59	35	43	100
Volume Left (vph)	78	0	0	0	50
Volume Right (vph)	0	0	0	26	50
Hadj (s)	0.40	0.12	0.20	-0.34	-0.18
Departure Headway (s)	5.2	4.9	5.1	4.5	4.3
Degree Utilization, x	0.15	0.08	0.05	0.05	0.12
Capacity (veh/h)	678	710	681	764	795
Control Delay (s)	7.9	7.1	7.1	6.6	7.9
Approach Delay (s)	7.7		6.8		7.9
Approach LOS	A		A		A

Intersection Summary			
Delay	7.5		
Level of Service	A		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	1308	134	39	2098	203	332	114	54	181	151	56
v/c Ratio	0.51	0.50	0.15	0.17	0.82	0.23	0.78	0.19	0.13	0.78	0.43	0.16
Control Delay	26.2	21.2	3.5	13.8	31.7	3.4	47.7	31.9	8.0	71.5	48.5	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	21.2	3.5	13.8	31.7	3.4	47.7	31.9	8.0	71.5	48.5	5.2
Queue Length 50th (m)	8.2	75.8	0.0	3.7	159.0	0.0	66.1	20.7	0.0	43.4	33.6	0.0
Queue Length 95th (m)	23.7	106.4	11.0	10.1	214.3	13.8	93.7	34.8	8.9	69.0	53.3	6.5
Internal Link Dist (m)		694.2			261.3			235.6			728.0	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	176	2615	877	224	2550	873	427	809	556	364	559	524
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.50	0.15	0.17	0.82	0.23	0.78	0.14	0.10	0.50	0.27	0.11

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	1243	127	37	1993	193	315	108	51	172	143	53
Future Volume (vph)	81	1243	127	37	1993	193	315	108	51	172	143	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1807	4948	1541	1738	5142	1555	1807	1921	1247	1722	1902	1601
Flt Permitted	0.06	1.00	1.00	0.16	1.00	1.00	0.52	1.00	1.00	0.68	1.00	1.00
Satd. Flow (perm)	115	4948	1541	297	5142	1555	995	1921	1247	1239	1902	1601
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	85	1308	134	39	2098	203	332	114	54	181	151	56
RTOR Reduction (vph)	0	0	64	0	0	102	0	0	37	0	0	46
Lane Group Flow (vph)	85	1308	70	39	2098	101	332	114	17	181	151	10
Heavy Vehicles (%)	1%	6%	6%	5%	2%	5%	1%	0%	31%	6%	1%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	73.8	66.9	66.9	67.3	63.4	63.4	39.8	39.8	39.8	23.7	23.7	23.7
Effective Green, g (s)	73.8	66.9	66.9	67.3	63.4	63.4	39.8	39.8	39.8	23.7	23.7	23.7
Actuated g/C Ratio	0.58	0.53	0.53	0.53	0.50	0.50	0.31	0.31	0.31	0.19	0.19	0.19
Clearance Time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	165	2602	810	201	2562	775	394	601	390	230	354	298
v/s Ratio Prot	c0.03	0.26		0.01	c0.41		c0.09	0.06			0.08	
v/s Ratio Perm	0.27		0.05	0.10		0.07	c0.18		0.01	0.15		0.01
v/c Ratio	0.52	0.50	0.09	0.19	0.82	0.13	0.84	0.19	0.04	0.79	0.43	0.04
Uniform Delay, d1	21.9	19.4	15.0	15.0	27.0	17.1	39.1	31.9	30.4	49.3	45.7	42.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	0.7	0.2	0.5	3.1	0.3	15.0	0.2	0.0	16.1	0.8	0.0
Delay (s)	24.6	20.1	15.2	15.5	30.1	17.5	54.2	32.1	30.5	65.5	46.6	42.4
Level of Service	C	C	B	B	C	B	D	C	C	E	D	D
Approach Delay (s)		19.9			28.8			46.6			54.8	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	29.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	127.2	Sum of lost time (s)	19.6
Intersection Capacity Utilization	86.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1069	2414	100	12
v/c Ratio	0.36	0.80	0.09	0.03
Control Delay	11.1	18.4	24.6	20.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.1	18.4	24.6	20.1
Queue Length 50th (m)	36.8	123.2	7.0	1.2
Queue Length 95th (m)	45.3	143.5	12.8	5.6
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2951	3037	1069	464
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	0.79	0.09	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	994	2245	0	92	12
Future Volume (vph)	0	994	2245	0	92	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		4995	5142		3444	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		4995	5142		3444	1486
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	1069	2414	0	99	13
RTOR Reduction (vph)	0	0	0	0	1	3
Lane Group Flow (vph)	0	1069	2414	0	99	9
Heavy Vehicles (%)	0%	5%	2%	0%	3%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		56.9	56.9		31.0	31.0
Effective Green, g (s)		58.9	58.9		31.0	31.0
Actuated g/C Ratio		0.59	0.59		0.31	0.31
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2945	3031		1068	461
v/s Ratio Prot		0.21	c0.47		c0.03	
v/s Ratio Perm						0.01
v/c Ratio		0.36	0.80		0.09	0.02
Uniform Delay, d1		10.7	15.9		24.5	23.9
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	1.5		0.2	0.1
Delay (s)		10.8	17.4		24.6	24.0
Level of Service		B	B		C	C
Approach Delay (s)		10.8	17.4		24.6	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	99.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1088	2387	1389	641
v/c Ratio	0.62	1.35	0.73	0.83
Control Delay	38.9	197.9	24.7	35.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	38.9	197.9	24.7	35.0
Queue Length 50th (m)	90.5	~316.3	138.9	149.6
Queue Length 95th (m)	106.0	#343.4	165.4	219.4
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	1767	1767	1895	772
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	0.62	1.35	0.73	0.83

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰↰↱	↱
Traffic Volume (vph)	1034	0	0	2268	914	1015
Future Volume (vph)	1034	0	0	2268	914	1015
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.95	0.85
Flt Protected	1.00			1.00	0.97	1.00
Satd. Flow (prot)	4948			4948	3302	1339
Flt Permitted	1.00			1.00	0.97	1.00
Satd. Flow (perm)	4948			4948	3302	1339
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1088	0	0	2387	962	1068
RTOR Reduction (vph)	0	0	0	0	7	7
Lane Group Flow (vph)	1088	0	0	2387	1382	634
Heavy Vehicles (%)	6%	0%	0%	6%	1%	11%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	48.0			48.0	80.0	80.0
Effective Green, g (s)	50.0			50.0	80.0	80.0
Actuated g/C Ratio	0.36			0.36	0.57	0.57
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	1767			1767	1886	765
v/s Ratio Prot	0.22			c0.48	0.42	
v/s Ratio Perm						c0.47
v/c Ratio	0.62			1.35	0.73	0.83
Uniform Delay, d1	37.1			45.0	22.1	24.4
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.9			161.7	2.6	10.0
Delay (s)	38.0			206.7	24.7	34.5
Level of Service	D			F	C	C
Approach Delay (s)	38.0			206.7	27.8	
Approach LOS	D			F	C	

Intersection Summary			
HCM 2000 Control Delay	107.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	181	84	148	95	1
Future Volume (Veh/h)	10	181	84	148	95	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	10	181	90	159	102	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	442	102	103			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	442	102	103			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	98	81	94			
cM capacity (veh/h)	541	947	1440			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	10	181	249	103
Volume Left	10	0	90	0
Volume Right	0	181	0	1
cSH	541	947	1440	1700
Volume to Capacity	0.02	0.19	0.06	0.06
Queue Length 95th (m)	0.4	5.3	1.5	0.0
Control Delay (s)	11.8	9.7	3.1	0.0
Lane LOS	B	A	A	
Approach Delay (s)	9.8		3.1	0.0
Approach LOS	A			

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	29.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	149	3	16	86	1	10
Future Volume (Veh/h)	149	3	16	86	1	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	149	3	16	86	1	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			152		226	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			152		226	76
tC, single (s)			4.1		7.6	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.9	3.3
p0 queue free %			99		100	99
cM capacity (veh/h)			1441		644	973

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	99	53	45	57	11
Volume Left	0	0	16	0	1
Volume Right	0	3	0	0	10
cSH	1700	1700	1441	1700	930
Volume to Capacity	0.06	0.03	0.01	0.03	0.01
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.3
Control Delay (s)	0.0	0.0	2.8	0.0	8.9
Lane LOS			A		A
Approach Delay (s)	0.0		1.2		8.9
Approach LOS					A

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	138	0	14	71	7	53
Future Volume (Veh/h)	138	0	14	71	7	53
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	138	0	14	71	7	53
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			138		202	69
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			138		202	69
tC, single (s)			4.4		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		99	95
cM capacity (veh/h)			1360		766	973

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	92	46	38	47	60
Volume Left	0	0	14	0	7
Volume Right	0	0	0	0	53
cSH	1700	1700	1360	1700	944
Volume to Capacity	0.05	0.03	0.01	0.03	0.06
Queue Length 95th (m)	0.0	0.0	0.2	0.0	1.5
Control Delay (s)	0.0	0.0	2.9	0.0	9.1
Lane LOS			A		A
Approach Delay (s)	0.0		1.3		9.1
Approach LOS					A

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix T

2028 Future Total Conditions– Warrant Analysis Results

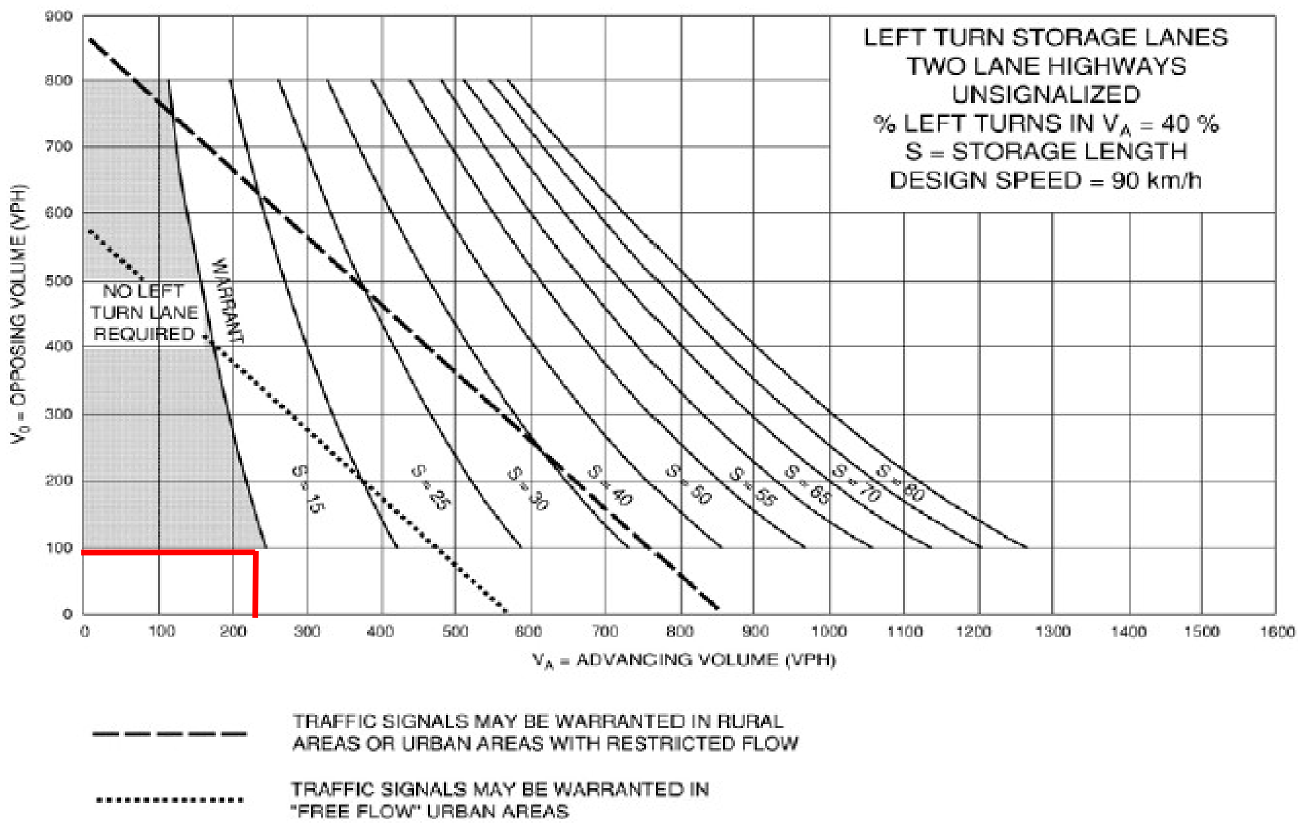
Left Turn Lane Warrant Calculation

(Left Turn Lane Warrant and Storage Length for Two-Lane Highways; Unsignalized Intersections)

Traffic Condition: **2028 Future Total Conditions**
Major Street: **Heart lake Road**
Minor Street: **Abbotside Way (Extension)**
Movement: **Northbound**
Peak Hour: **PM**
Design Speed = **90 km/h**
Advancing Traffic Volume, V_A = 240
Opposing Traffic Volume, V_O = 96
Left Turn Traffic Volume, V_L = 92

*All volumes have ben converted to passenger car dimensions

Percentage of Left Turn Traffic: 38%



Overall Warrant => Exclusive Left Turn Lane is not warranted
Result=> No exclusive left turn lane required.

Signal Warrant Calculation

Justification 7 - Projected Volumes

Major Street: Heart Lake Road — North/South

Minor Street: Abbotside Way — East/West

Traffic Condition: 2028 Future Total

Number of Approach Lanes: 2

Tee Intersection: Yes

Existing Intersection: No

Flow Condition: Restricted Flow (Urban)

No. of Peak Hours: 2

Volume	1st Hour	2nd Hour	Factor	Average Hour
1A - All	619	534	4	288
1B - Minor	238	198	4	109
2A - Major	381	336	4	179
2B - Crossing	11	10	4	5

WARRANT 1 - MINIMUM VEHICULAR VOLUME => 32% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	288	32%
B.	Vehicle volume, along minor streets (average hour)	255	109	43%

WARRANT 2 - DELAY TO CROSS TRAFFIC => 3% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	179	20%
B.	Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	5	3%

Overall Warrant => 32% Satsified

Result => No signals are warranted nor provision for undergrounds needed.

Signal Warrant Calculation

Justification 7 - Projected Volumes

Major Street: Abbotside Way — East/West

Minor Street: Site Access 1 (BLDG 1) — North/South

Traffic Condition: 2028 Future Total

Number of Approach Lanes: 2

Tee Intersection: Yes

Existing Intersection: No

Flow Condition: Restricted Flow (Urban)

No. of Peak Hours: 2

Volume	1st Hour	2nd Hour	Factor	Average Hour
1A - All	385	277	4	165
1B - Minor	13	16	4	7
2A - Major	372	261	4	158
2B - Crossing	1	1	4	1

WARRANT 1 - MINIMUM VEHICULAR VOLUME => 3% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	165	18%
B.	Vehicle volume, along minor streets (average hour)	255	7	3%

WARRANT 2 - DELAY TO CROSS TRAFFIC => 1% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	158	18%
B.	Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	1	1%

Overall Warrant => 3% Satsified

Result => No signals are warranted nor provision for undergrounds needed.

Signal Warrant Calculation

Justification 7 - Projected Volumes

Major Street: Abbotside Way — East/West

Minor Street: Site Access 2 (BLDG 1&2) — North/South

Traffic Condition: 2028 Future Total

Number of Approach Lanes: 1

Tee Intersection: Yes

Existing Intersection: Yes

Flow Condition: Restricted Flow (Urban)

No. of Peak Hours: 2

Volume	1st Hour	2nd Hour	Factor	Average Hour
1A - All	364	300	4	166
1B - Minor	17	62	4	20
2A - Major	347	238	4	146
2B - Crossing	2	7	4	2

WARRANT 1 - MINIMUM VEHICULAR VOLUME => 8% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	720	166	23%
B.	Vehicle volume, along minor streets (average hour)	255	20	8%

WARRANT 2 - DELAY TO CROSS TRAFFIC => 3% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	720	146	20%
B.	Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	2	3%

Overall Warrant => 8% Satsified

Result => No signals are warranted nor provision for undergrounds needed.

Appendix U

2033 Future Total Conditions – Synchro Analysis Result

Lane Group	EBT	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	2	160	12	374	169	1014
v/c Ratio	0.01	0.64	0.04	0.17	0.18	0.47
Control Delay	0.0	38.5	0.3	6.4	1.8	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	38.5	0.3	6.4	1.8	8.6
Queue Length 50th (m)	0.0	19.4	0.0	9.5	0.0	32.8
Queue Length 95th (m)	0.0	36.4	0.0	19.1	7.2	59.1
Internal Link Dist (m)	87.7	374.1		556.6		106.5
Turn Bay Length (m)					50.0	
Base Capacity (vph)	525	422	417	2215	938	2156
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	0.00	0.38	0.03	0.17	0.18	0.47

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	1	160	0	12	0	374	169	14	1000	0
Future Volume (vph)	1	0	1	160	0	12	0	374	169	14	1000	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes		0.99			1.00	0.99		1.00	0.98		1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00		1.00	
Frt		0.93			1.00	0.85		1.00	0.85		1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)		1734			1669	1212		3476	1378		3567	
Flt Permitted		0.87			0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)		1554			1329	1212		3476	1378		3384	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	0	1	160	0	12	0	374	169	14	1000	0
RTOR Reduction (vph)	0	2	0	0	0	10	0	0	61	0	0	0
Lane Group Flow (vph)	0	0	0	0	160	2	0	374	108	0	1014	0
Confl. Peds. (#/hr)	1		3	3		1	6		8	8		6
Heavy Vehicles (%)	0%	0%	0%	9%	0%	33%	0%	5%	16%	21%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)		14.1			14.1	14.1		47.4	47.4		47.4	
Effective Green, g (s)		14.1			14.1	14.1		47.4	47.4		47.4	
Actuated g/C Ratio		0.19			0.19	0.19		0.64	0.64		0.64	
Clearance Time (s)		6.4			6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)		294			251	229		2214	877		2155	
v/s Ratio Prot								0.11				
v/s Ratio Perm		0.00			c0.12	0.00			0.08		c0.30	
v/c Ratio		0.00			0.64	0.01		0.17	0.12		0.47	
Uniform Delay, d1		24.4			27.8	24.5		5.5	5.3		7.0	
Progression Factor		1.00			1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0			5.2	0.0		0.2	0.3		0.7	
Delay (s)		24.4			33.0	24.5		5.7	5.6		7.7	
Level of Service		C			C	C		A	A		A	
Approach Delay (s)		24.4			32.4			5.6			7.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	74.4	Sum of lost time (s)	12.9
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	83	76	52	42	169	159
Future Volume (vph)	83	76	52	42	169	159
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	83	76	52	42	169	159

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	108	51	35	59	328
Volume Left (vph)	83	0	0	0	169
Volume Right (vph)	0	0	0	42	159
Hadj (s)	0.47	0.09	0.17	-0.45	-0.14
Departure Headway (s)	5.9	5.5	5.7	5.1	4.4
Degree Utilization, x	0.18	0.08	0.05	0.08	0.40
Capacity (veh/h)	576	616	590	661	785
Control Delay (s)	9.0	7.8	7.8	7.3	10.4
Approach Delay (s)	8.6		7.5		10.4
Approach LOS	A		A		B

Intersection Summary			
Delay	9.4		
Level of Service	A		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	52	173	67	18	48	48
Future Volume (vph)	52	173	67	18	48	48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	52	173	67	18	48	48

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	110	115	45	40	96
Volume Left (vph)	52	0	0	0	48
Volume Right (vph)	0	0	0	18	48
Hadj (s)	0.29	0.03	0.10	-0.26	-0.13
Departure Headway (s)	5.1	4.8	5.0	4.7	4.5
Degree Utilization, x	0.16	0.16	0.06	0.05	0.12
Capacity (veh/h)	692	723	688	743	759
Control Delay (s)	7.8	7.5	7.2	6.7	8.1
Approach Delay (s)	7.7		7.0		8.1
Approach LOS	A		A		A

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	45	2089	553	125	1309	138	117	59	96	218	311	99
v/c Ratio	0.23	0.77	0.54	0.80	0.43	0.14	0.61	0.11	0.20	0.78	0.78	0.25
Control Delay	21.9	26.8	9.9	57.0	14.2	2.4	47.3	34.2	7.2	67.1	62.4	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	26.8	9.9	57.0	14.2	2.4	47.3	34.2	7.2	67.1	62.4	14.6
Queue Length 50th (m)	5.8	146.7	31.8	15.0	59.6	0.0	22.0	11.2	0.0	52.6	75.1	4.7
Queue Length 95th (m)	16.5	198.9	73.8	#55.0	87.0	9.0	36.5	21.6	12.3	80.4	106.2	18.9
Internal Link Dist (m)		694.2			261.3			235.6			728.0	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	197	2719	1015	157	3025	994	193	704	595	401	569	537
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.77	0.54	0.80	0.43	0.14	0.61	0.08	0.16	0.54	0.55	0.18

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	1943	514	116	1217	128	109	55	89	203	289	92
Future Volume (vph)	42	1943	514	116	1217	128	109	55	89	203	289	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1789	5043	1601	1772	4902	1526	1738	1921	1458	1789	1921	1633
Flt Permitted	0.20	1.00	1.00	0.06	1.00	1.00	0.24	1.00	1.00	0.72	1.00	1.00
Satd. Flow (perm)	367	5043	1601	103	4902	1526	432	1921	1458	1353	1921	1633
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	45	2089	553	125	1309	138	117	59	96	218	311	99
RTOR Reduction (vph)	0	0	152	0	0	53	0	0	69	0	0	60
Lane Group Flow (vph)	45	2089	401	125	1309	85	117	59	27	218	311	39
Heavy Vehicles (%)	2%	4%	2%	3%	7%	7%	5%	0%	12%	2%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	69.5	69.5	69.5	79.5	79.5	79.5	35.7	35.7	35.7	26.7	26.7	26.7
Effective Green, g (s)	69.5	69.5	69.5	79.5	79.5	79.5	35.7	35.7	35.7	26.7	26.7	26.7
Actuated g/C Ratio	0.54	0.54	0.54	0.62	0.62	0.62	0.28	0.28	0.28	0.21	0.21	0.21
Clearance Time (s)	6.7	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	198	2721	863	154	3025	941	180	532	404	280	398	338
v/s Ratio Prot		0.41		c0.04	0.27		c0.03	0.03			c0.16	
v/s Ratio Perm	0.12		0.25	c0.46		0.06	0.15		0.02	0.16		0.02
v/c Ratio	0.23	0.77	0.46	0.81	0.43	0.09	0.65	0.11	0.07	0.78	0.78	0.11
Uniform Delay, d1	15.6	23.3	18.2	28.4	12.9	10.0	38.9	34.7	34.3	48.3	48.3	41.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	2.1	1.8	26.7	0.5	0.2	8.1	0.1	0.1	12.8	9.6	0.2
Delay (s)	18.2	25.4	20.0	55.1	13.3	10.2	47.1	34.8	34.3	61.0	57.9	41.6
Level of Service	B	C	C	E	B	B	D	C	C	E	E	D
Approach Delay (s)		24.2			16.4			39.9			56.4	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	128.8	Sum of lost time (s)	19.6
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1624	1595	355	23
v/c Ratio	0.76	0.76	0.25	0.04
Control Delay	20.9	20.9	15.5	11.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.9	20.9	15.5	11.4
Queue Length 50th (m)	68.9	67.6	17.1	1.5
Queue Length 95th (m)	85.4	84.4	25.8	6.0
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2252	2209	1444	614
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	0.72	0.72	0.25	0.04

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1543	1515	0	334	25
Future Volume (vph)	0	1543	1515	0	334	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		4995	4902		3512	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		4995	4902		3512	1486
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1624	1595	0	352	26
RTOR Reduction (vph)	0	0	0	0	1	4
Lane Group Flow (vph)	0	1624	1595	0	354	19
Heavy Vehicles (%)	0%	5%	7%	0%	1%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		32.5	32.5		31.0	31.0
Effective Green, g (s)		32.5	32.5		31.0	31.0
Actuated g/C Ratio		0.43	0.43		0.41	0.41
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2150	2110		1442	610
v/s Ratio Prot		0.33	c0.33		c0.10	
v/s Ratio Perm						0.01
v/c Ratio		0.76	0.76		0.25	0.03
Uniform Delay, d1		18.1	18.2		14.6	13.3
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		1.6	1.6		0.4	0.1
Delay (s)		19.7	19.7		15.0	13.4
Level of Service		B	B		B	B
Approach Delay (s)		19.7	19.7		14.9	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	75.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1980	2236	878	505
v/c Ratio	0.79	0.92	0.68	0.88
Control Delay	31.7	39.9	35.4	54.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	31.7	39.9	35.4	54.2
Queue Length 50th (m)	161.4	205.1	99.3	138.0
Queue Length 95th (m)	180.5	228.7	122.6	#211.0
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	2521	2428	1289	576
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	0.79	0.92	0.68	0.88

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1881	0	0	2124	353	960
Future Volume (vph)	1881	0	0	2124	353	960
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.91	0.85
Flt Protected	1.00			1.00	0.98	1.00
Satd. Flow (prot)	5043			4856	3004	1339
Flt Permitted	1.00			1.00	0.98	1.00
Satd. Flow (perm)	5043			4856	3004	1339
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1980	0	0	2236	372	1011
RTOR Reduction (vph)	0	0	0	0	2	2
Lane Group Flow (vph)	1980	0	0	2236	876	503
Heavy Vehicles (%)	4%	0%	0%	8%	11%	11%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	68.0			68.0	60.0	60.0
Effective Green, g (s)	70.0			70.0	60.0	60.0
Actuated g/C Ratio	0.50			0.50	0.43	0.43
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	2521			2428	1287	573
v/s Ratio Prot	0.39			c0.46	0.29	
v/s Ratio Perm						c0.38
v/c Ratio	0.79			0.92	0.68	0.88
Uniform Delay, d1	28.8			32.4	32.3	36.6
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.9			6.7	2.9	17.1
Delay (s)	30.8			39.1	35.2	53.8
Level of Service	C			D	D	D
Approach Delay (s)	30.8			39.1	42.0	
Approach LOS	C			D	D	

Intersection Summary			
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	223	118	68	215	1
Future Volume (Veh/h)	11	223	118	68	215	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	11	223	127	73	231	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	558	232	232			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	558	232	232			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	72	90			
cM capacity (veh/h)	446	808	1324			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	11	223	127	73	232
Volume Left	11	0	127	0	0
Volume Right	0	223	0	0	1
cSH	446	808	1324	1700	1700
Volume to Capacity	0.02	0.28	0.10	0.04	0.14
Queue Length 95th (m)	0.6	8.6	2.4	0.0	0.0
Control Delay (s)	13.3	11.1	8.0	0.0	0.0
Lane LOS	B	B	A		
Approach Delay (s)	11.2		5.1		0.0
Approach LOS	B				

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	216	7	29	86	1	9
Future Volume (Veh/h)	216	7	29	86	1	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	216	7	29	86	1	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			223		320	112
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			223		320	112
tC, single (s)			4.4		6.8	7.5
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.6
p0 queue free %			98		100	99
cM capacity (veh/h)			1260		638	838

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	144	79	58	57	10
Volume Left	0	0	29	0	1
Volume Right	0	7	0	0	9
cSH	1700	1700	1260	1700	812
Volume to Capacity	0.08	0.05	0.02	0.03	0.01
Queue Length 95th (m)	0.0	0.0	0.5	0.0	0.3
Control Delay (s)	0.0	0.0	4.1	0.0	9.5
Lane LOS			A		A
Approach Delay (s)	0.0		2.0		9.5
Approach LOS					A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	221	0	36	83	2	13
Future Volume (Veh/h)	221	0	36	83	2	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	221	0	36	83	2	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			221		334	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			221		334	110
tC, single (s)			4.2		6.8	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			97		100	99
cM capacity (veh/h)			1338		623	882

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	147	74	64	55	15
Volume Left	0	0	36	0	2
Volume Right	0	0	0	0	13
cSH	1700	1700	1338	1700	835
Volume to Capacity	0.09	0.04	0.03	0.03	0.02
Queue Length 95th (m)	0.0	0.0	0.6	0.0	0.4
Control Delay (s)	0.0	0.0	4.5	0.0	9.4
Lane LOS			A		A
Approach Delay (s)	0.0		2.4		9.4
Approach LOS					A

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	116	9	896	296	577
v/c Ratio	0.55	0.03	0.33	0.24	0.22
Control Delay	41.9	0.2	5.3	1.2	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	41.9	0.2	5.3	1.2	4.8
Queue Length 50th (m)	17.0	0.0	24.6	0.0	14.3
Queue Length 95th (m)	31.3	0.0	41.0	7.5	25.2
Internal Link Dist (m)	374.1		556.6		106.5
Turn Bay Length (m)				50.0	
Base Capacity (vph)	418	493	2743	1242	2578
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.28	0.02	0.33	0.24	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	116	0	9	0	896	296	4	571	2
Future Volume (vph)	0	0	0	116	0	9	0	896	296	4	571	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.4	6.4		6.5	6.5		6.5	
Lane Util. Factor					1.00	1.00		0.95	1.00		0.95	
Frpb, ped/bikes					1.00	0.98		1.00	0.98		1.00	
Flpb, ped/bikes					1.00	1.00		1.00	1.00		1.00	
Frt					1.00	0.85		1.00	0.85		1.00	
Flt Protected					0.95	1.00		1.00	1.00		1.00	
Satd. Flow (prot)					1823	1608		3650	1556		3611	
Flt Permitted					0.76	1.00		1.00	1.00		0.95	
Satd. Flow (perm)					1453	1608		3650	1556		3433	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	116	0	9	0	896	296	4	571	2
RTOR Reduction (vph)	0	0	0	0	0	8	0	0	82	0	0	0
Lane Group Flow (vph)	0	0	0	0	116	1	0	896	214	0	577	0
Confl. Peds. (#/hr)	3		1	1		3	2		5	5		2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	1%	0%
Turn Type				Perm	NA	Perm		NA	Perm	Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4		4	6		6	2		
Actuated Green, G (s)					10.3	10.3		60.3	60.3		60.3	
Effective Green, g (s)					10.3	10.3		60.3	60.3		60.3	
Actuated g/C Ratio					0.12	0.12		0.72	0.72		0.72	
Clearance Time (s)					6.4	6.4		6.5	6.5		6.5	
Vehicle Extension (s)					3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)					179	198		2635	1123		2479	
v/s Ratio Prot								c0.25				
v/s Ratio Perm					c0.08	0.00			0.14		0.17	
v/c Ratio					0.65	0.01		0.34	0.19		0.23	
Uniform Delay, d1					34.9	32.1		4.3	3.7		3.9	
Progression Factor					1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2					7.8	0.0		0.4	0.4		0.2	
Delay (s)					42.7	32.1		4.6	4.1		4.1	
Level of Service					D	C		A	A		A	
Approach Delay (s)		0.0			41.9			4.5			4.1	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	83.5	Sum of lost time (s)	12.9
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	193	91	79	31	79	77
Future Volume (vph)	193	91	79	31	79	77
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	193	91	79	31	79	77

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	223	61	53	57	156
Volume Left (vph)	193	0	0	0	79
Volume Right (vph)	0	0	0	31	77
Hadj (s)	0.47	0.05	0.07	-0.35	-0.19
Departure Headway (s)	5.5	5.1	5.3	4.8	4.7
Degree Utilization, x	0.34	0.09	0.08	0.08	0.20
Capacity (veh/h)	633	688	651	708	724
Control Delay (s)	10.1	7.3	7.5	7.0	8.8
Approach Delay (s)	9.5		7.3		8.8
Approach LOS	A		A		A

Intersection Summary			
Delay	8.9		
Level of Service	A		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	78	88	52	26	50	50
Future Volume (vph)	78	88	52	26	50	50
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	78	88	52	26	50	50

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total (vph)	107	59	35	43	100
Volume Left (vph)	78	0	0	0	50
Volume Right (vph)	0	0	0	26	50
Hadj (s)	0.40	0.12	0.20	-0.34	-0.18
Departure Headway (s)	5.2	4.9	5.1	4.5	4.3
Degree Utilization, x	0.15	0.08	0.05	0.05	0.12
Capacity (veh/h)	678	710	681	764	795
Control Delay (s)	7.9	7.1	7.1	6.6	7.9
Approach Delay (s)	7.7		6.8		7.9
Approach LOS	A		A		A

Intersection Summary			
Delay	7.5		
Level of Service	A		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	1471	134	39	2360	203	332	119	54	181	155	56
v/c Ratio	0.52	0.54	0.15	0.18	0.89	0.23	0.87	0.21	0.14	0.77	0.43	0.15
Control Delay	26.7	20.2	3.4	12.3	32.5	3.1	59.9	32.8	8.4	67.6	46.2	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	20.2	3.4	12.3	32.5	3.1	59.9	32.8	8.4	67.6	46.2	4.6
Queue Length 50th (m)	7.3	83.8	0.0	3.3	176.3	0.0	65.3	21.4	0.0	41.2	32.8	0.0
Queue Length 95th (m)	23.4	119.5	10.8	9.4	#256.4	13.0	#94.9	36.0	9.0	65.9	52.3	5.9
Internal Link Dist (m)		694.2			261.3			235.6			728.0	
Turn Bay Length (m)	160.0		220.0	150.0		150.0	130.0		50.0	120.0		50.0
Base Capacity (vph)	168	2723	908	230	2653	900	380	781	539	379	584	546
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.54	0.15	0.17	0.89	0.23	0.87	0.15	0.10	0.48	0.27	0.10

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	1397	127	37	2242	193	315	113	51	172	147	53
Future Volume (vph)	81	1397	127	37	2242	193	315	113	51	172	147	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1807	4948	1541	1738	5142	1555	1807	1921	1247	1722	1902	1601
Flt Permitted	0.06	1.00	1.00	0.13	1.00	1.00	0.52	1.00	1.00	0.68	1.00	1.00
Satd. Flow (perm)	114	4948	1541	238	5142	1555	992	1921	1247	1233	1902	1601
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	85	1471	134	39	2360	203	332	119	54	181	155	56
RTOR Reduction (vph)	0	0	61	0	0	97	0	0	38	0	0	45
Lane Group Flow (vph)	85	1471	73	39	2360	106	332	119	16	181	155	11
Heavy Vehicles (%)	1%	6%	6%	5%	2%	5%	1%	0%	31%	6%	1%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6		6	4		4	8		8
Actuated Green, G (s)	73.5	66.7	66.7	67.7	63.8	63.8	35.2	35.2	35.2	23.2	23.2	23.2
Effective Green, g (s)	73.5	66.7	66.7	67.7	63.8	63.8	35.2	35.2	35.2	23.2	23.2	23.2
Actuated g/C Ratio	0.60	0.54	0.54	0.55	0.52	0.52	0.29	0.29	0.29	0.19	0.19	0.19
Clearance Time (s)	3.0	6.7	6.7	3.0	6.7	6.7	3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	162	2696	839	179	2680	810	345	552	358	233	360	303
v/s Ratio Prot	c0.03	0.30		0.01	c0.46		c0.07	0.06			0.08	
v/s Ratio Perm	0.28		0.05	0.11		0.07	c0.21		0.01	0.15		0.01
v/c Ratio	0.52	0.55	0.09	0.22	0.88	0.13	0.96	0.22	0.04	0.78	0.43	0.04
Uniform Delay, d1	22.9	18.0	13.3	13.4	25.9	15.1	42.3	33.1	31.5	47.1	43.8	40.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	0.8	0.2	0.6	4.6	0.3	38.3	0.2	0.1	14.9	0.8	0.0
Delay (s)	26.0	18.8	13.5	14.1	30.5	15.4	80.6	33.3	31.5	62.1	44.6	40.5
Level of Service	C	B	B	B	C	B	F	C	C	E	D	D
Approach Delay (s)		18.8			29.1			64.2			52.1	
Approach LOS		B			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	30.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	122.4	Sum of lost time (s)	19.6
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1191	2696	109	13
v/c Ratio	0.42	0.91	0.10	0.03
Control Delay	12.7	25.2	24.7	23.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.7	25.2	24.7	23.2
Queue Length 50th (m)	44.7	160.6	7.6	1.7
Queue Length 95th (m)	54.5	186.3	13.8	6.4
Internal Link Dist (m)	36.4	61.3	212.5	
Turn Bay Length (m)				
Base Capacity (vph)	2847	2960	1068	461
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	0.91	0.10	0.03

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1108	2507	0	100	13
Future Volume (vph)	0	1108	2507	0	100	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		4995	5193		3444	1486
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		4995	5193		3444	1486
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	1191	2696	0	108	14
RTOR Reduction (vph)	0	0	0	0	1	1
Lane Group Flow (vph)	0	1191	2696	0	108	12
Heavy Vehicles (%)	0%	5%	1%	0%	3%	0%
Turn Type		NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		57.0	57.0		31.0	31.0
Effective Green, g (s)		57.0	57.0		31.0	31.0
Actuated g/C Ratio		0.57	0.57		0.31	0.31
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2847	2960		1067	460
v/s Ratio Prot		0.24	c0.52		c0.03	
v/s Ratio Perm						0.01
v/c Ratio		0.42	0.91		0.10	0.03
Uniform Delay, d1		12.1	19.2		24.6	24.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.1	4.8		0.2	0.1
Delay (s)		12.2	24.0		24.8	24.1
Level of Service		B	C		C	C
Approach Delay (s)		12.2	24.0		24.7	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1214	2640	1486	688
v/c Ratio	0.76	1.64	0.74	0.84
Control Delay	46.2	324.9	22.3	32.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	46.2	324.9	22.3	32.9
Queue Length 50th (m)	110.4	~386.5	143.1	157.9
Queue Length 95th (m)	127.9	#412.2	169.8	232.5
Internal Link Dist (m)	98.4	64.3	223.1	
Turn Bay Length (m)				
Base Capacity (vph)	1605	1605	2013	822
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	0.76	1.64	0.74	0.84

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1153	0	0	2508	977	1089
Future Volume (vph)	1153	0	0	2508	977	1089
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	6.0	6.0
Lane Util. Factor	0.91			0.91	0.97	0.91
Frt	1.00			1.00	0.95	0.85
Flt Protected	1.00			1.00	0.97	1.00
Satd. Flow (prot)	4995			4995	3311	1351
Flt Permitted	1.00			1.00	0.97	1.00
Satd. Flow (perm)	4995			4995	3311	1351
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1214	0	0	2640	1028	1146
RTOR Reduction (vph)	0	0	0	0	2	2
Lane Group Flow (vph)	1214	0	0	2640	1484	686
Heavy Vehicles (%)	5%	0%	0%	5%	1%	10%
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	43.0			43.0	85.0	85.0
Effective Green, g (s)	45.0			45.0	85.0	85.0
Actuated g/C Ratio	0.32			0.32	0.61	0.61
Clearance Time (s)	6.0			6.0	6.0	6.0
Vehicle Extension (s)	5.0			5.0	4.0	4.0
Lane Grp Cap (vph)	1605			1605	2010	820
v/s Ratio Prot	0.24			c0.53	0.45	
v/s Ratio Perm						c0.51
v/c Ratio	0.76			1.64	0.74	0.84
Uniform Delay, d1	42.6			47.5	19.6	21.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	2.5			293.0	2.5	9.9
Delay (s)	45.1			340.5	22.0	31.8
Level of Service	D			F	C	C
Approach Delay (s)	45.1			340.5	25.1	
Approach LOS	D			F	C	

Intersection Summary			
HCM 2000 Control Delay	167.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	127.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	181	84	163	105	1
Future Volume (Veh/h)	10	181	84	163	105	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	10	181	90	175	113	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	468	114	114			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	468	114	114			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	98	81	94			
cM capacity (veh/h)	522	934	1427			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	10	181	90	175	114
Volume Left	10	0	90	0	0
Volume Right	0	181	0	0	1
cSH	522	934	1427	1700	1700
Volume to Capacity	0.02	0.19	0.06	0.10	0.07
Queue Length 95th (m)	0.4	5.4	1.5	0.0	0.0
Control Delay (s)	12.0	9.8	7.7	0.0	0.0
Lane LOS	B	A	A		
Approach Delay (s)	9.9		2.6		0.0
Approach LOS	A				

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	149	3	16	86	1	10
Future Volume (Veh/h)	149	3	16	86	1	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	149	3	16	86	1	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			152		226	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			152		226	76
tC, single (s)			4.9		6.8	7.8
tC, 2 stage (s)						
tF (s)			2.6		3.5	3.8
p0 queue free %			99		100	99
cM capacity (veh/h)			1200		738	844

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	99	53	45	57	11
Volume Left	0	0	16	0	1
Volume Right	0	3	0	0	10
cSH	1700	1700	1200	1700	833
Volume to Capacity	0.06	0.03	0.01	0.03	0.01
Queue Length 95th (m)	0.0	0.0	0.3	0.0	0.3
Control Delay (s)	0.0	0.0	3.0	0.0	9.4
Lane LOS			A		A
Approach Delay (s)	0.0		1.3		9.4
Approach LOS					A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	138	0	14	71	7	53
Future Volume (Veh/h)	138	0	14	71	7	53
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	138	0	14	71	7	53
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			138		202	69
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			138		202	69
tC, single (s)			4.4		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		99	95
cM capacity (veh/h)			1360		766	973

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	92	46	38	47	60
Volume Left	0	0	14	0	7
Volume Right	0	0	0	0	53
cSH	1700	1700	1360	1700	944
Volume to Capacity	0.05	0.03	0.01	0.03	0.06
Queue Length 95th (m)	0.0	0.0	0.2	0.0	1.5
Control Delay (s)	0.0	0.0	2.9	0.0	9.1
Lane LOS			A		A
Approach Delay (s)	0.0		1.3		9.1
Approach LOS					A

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix V

2033 Future Total Conditions– Warrant Analysis Results

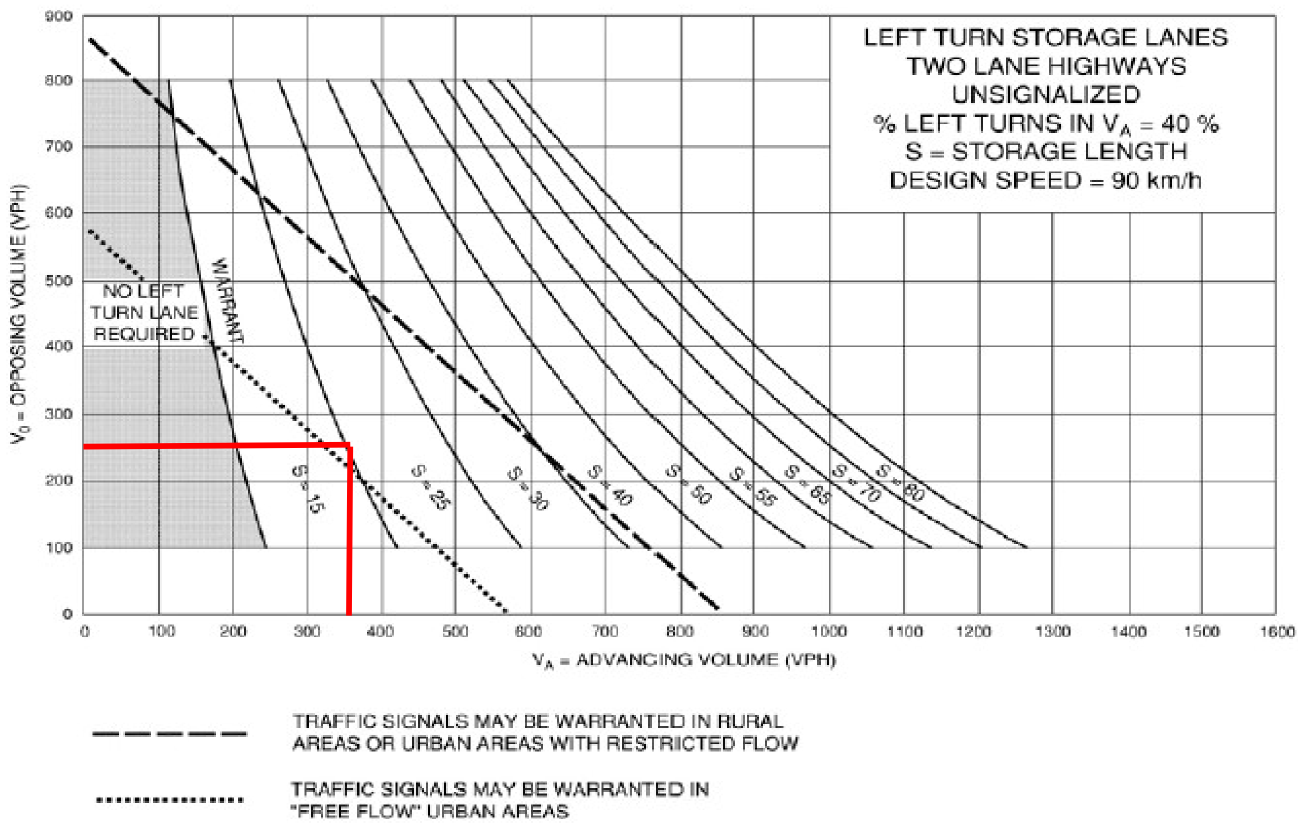
Left Turn Lane Warrant Calculation

(Left Turn Lane Warrant and Storage Length for Two-Lane Highways; Unsignalized Intersections)

Traffic Condition: **2033 Future Total Conditions**
Major Street: **Heart lake Road**
Minor Street: **Abbotside Way (Extension)**
Movement: **Northbound**
Peak Hour: **AM**
Design Speed = **90 km/h**
Advancing Traffic Volume, V_A = 357
Opposing Traffic Volume, V_O = 240
Left Turn Traffic Volume, V_L = 227

*All volumes have ben converted to passenger car dimensions

Percentage of Left Turn Traffic: 64%



Overall Warrant => Exclusive Left Turn Lane is warranted

Result=> An exclusive left turn lane is warranted with a minimum storage length of 25 m. Given the high percentage of trucks turning left, it is recommeded that an additional 10 m of storage length be provided.

Signal Warrant Calculation

Justification 7 - Projected Volumes

Major Street: Heart Lake Road — North/South

Minor Street: Abbotside Way — East/West

Traffic Condition: 2033 Future Total

Number of Approach Lanes: 2

Tee Intersection: Yes

Existing Intersection: No

Flow Condition: Restricted Flow (Urban)

No. of Peak Hours: 2

Volume	1st Hour	2nd Hour	Factor	Average Hour
1A - All	645	559	4	301
1B - Minor	238	198	4	109
2A - Major	407	361	4	192
2B - Crossing	11	10	4	5

WARRANT 1 - MINIMUM VEHICULAR VOLUME => 33% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	301	33%
B.	Vehicle volume, along minor streets (average hour)	255	109	43%

WARRANT 2 - DELAY TO CROSS TRAFFIC => 3% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	192	21%
B.	Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	5	3%

Overall Warrant => 33% Satsified

Result => No signals are warranted nor provision for undergrounds needed.

Signal Warrant Calculation

Justification 7 - Projected Volumes

Major Street: Abbotside Way — East/West

Minor Street: Site Access 1 (BLDG 1) — North/South

Traffic Condition: 2033 Future Total

Number of Approach Lanes: 2

Tee Intersection: Yes

Existing Intersection: No

Flow Condition: Restricted Flow (Urban)

No. of Peak Hours: 2

Volume	1st Hour	2nd Hour	Factor	Average Hour
1A - All	385	277	4	165
1B - Minor	13	16	4	7
2A - Major	372	261	4	158
2B - Crossing	1	1	4	1

WARRANT 1 - MINIMUM VEHICULAR VOLUME => 3% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	165	18%
B.	Vehicle volume, along minor streets (average hour)	255	7	3%

WARRANT 2 - DELAY TO CROSS TRAFFIC => 1% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	900	158	18%
B.	Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	1	1%

Overall Warrant => 3% Satsified

Result => No signals are warranted nor provision for undergrounds needed.

Signal Warrant Calculation

Justification 7 - Projected Volumes

Major Street: Abbotside Way East/West

Minor Street: Site Access 2 (BLDG 1&2) North/South

Traffic Condition: 2033 Future Total

Number of Approach Lanes: 1

Tee Intersection: Yes

Existing Intersection: Yes

Flow Condition: Restricted Flow (Urban)

No. of Peak Hours: 2

Volume	1st Hour	2nd Hour	Factor	Average Hour
1A - All	364	300	4	166
1B - Minor	17	62	4	20
2A - Major	347	238	4	146
2B - Crossing	2	7	4	2

WARRANT 1 - MINIMUM VEHICULAR VOLUME => 8% Satisfied

		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	720	166	23%
B.	Vehicle volume, along minor streets (average hour)	255	20	8%

WARRANT 2 - DELAY TO CROSS TRAFFIC => 3% Satisfied

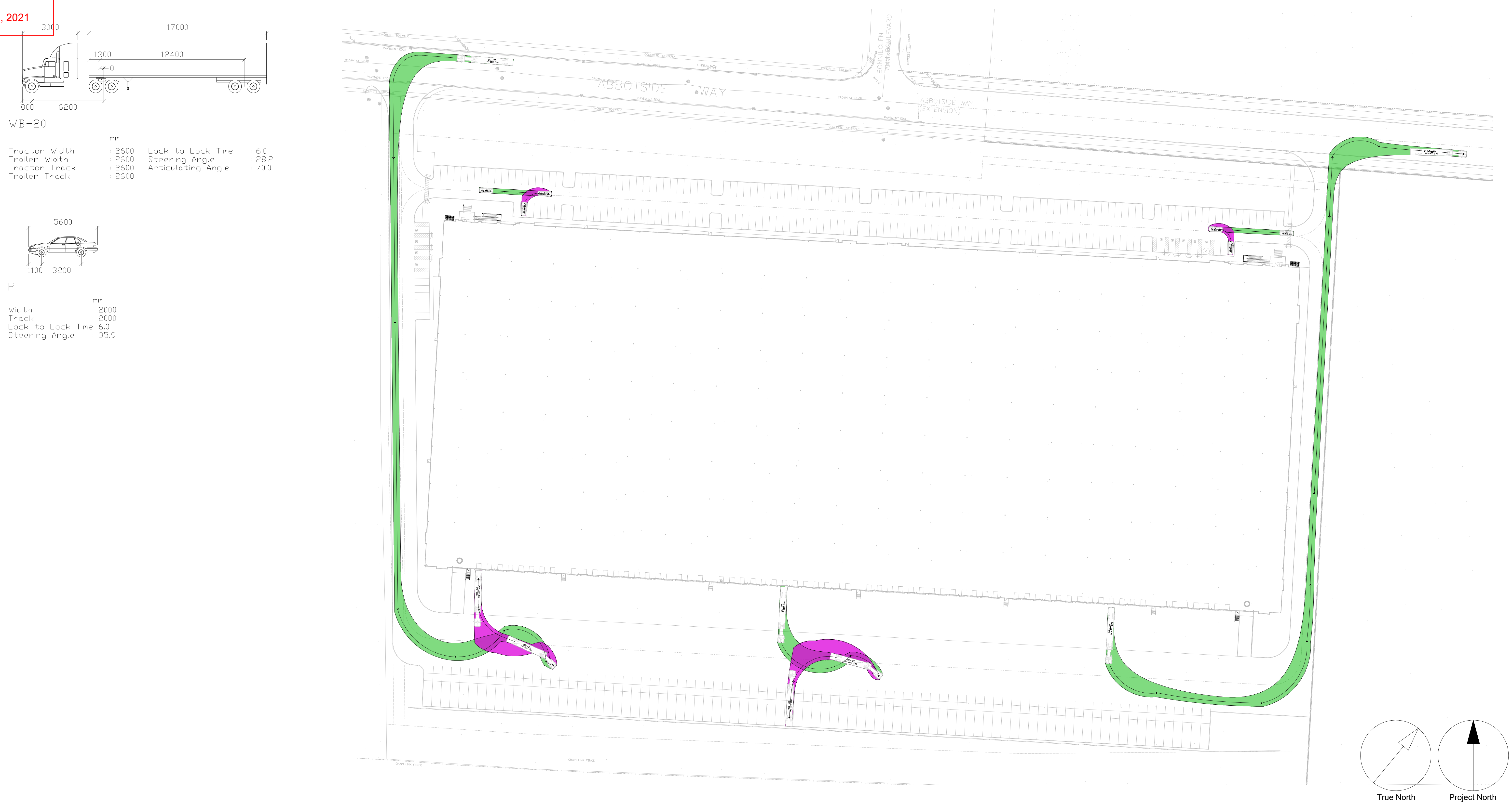
		Restricted Flow (Urban)	Average Hour	Percent Satisfied
A.	Vehicle volume all approaches (average hour)	720	146	20%
B.	Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	2	3%

Overall Warrant => 8% Satsified

Result => No signals are warranted nor provision for undergrounds needed.

Appendix W

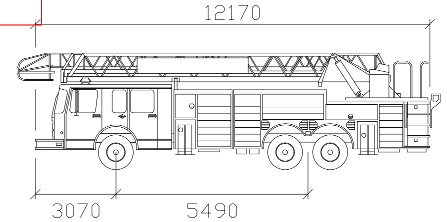
Vehicle Maneuvering Diagrams



CLIENT	PROJECT NAME				
Broccolini c/o Real Estate Development 5 Defries St, Toronto, ON M5A 3R4	Warehousing, Logistics and Distribution Centre 12304 Heart Lake Road, Caledon				
	SCALE: 1:1500	DATE: 2021-11-08	FIGURE NAME Vehicle Maneuvering Diagram - WB20 and PTAC	FIGURE NO. AT-1	REVISION 2
	PROJECT ENG: ####	DRAWN BY: DL			
	CHECKED BY: RM	APPROVED BY: RM			
	PROJECT NO: 135636				

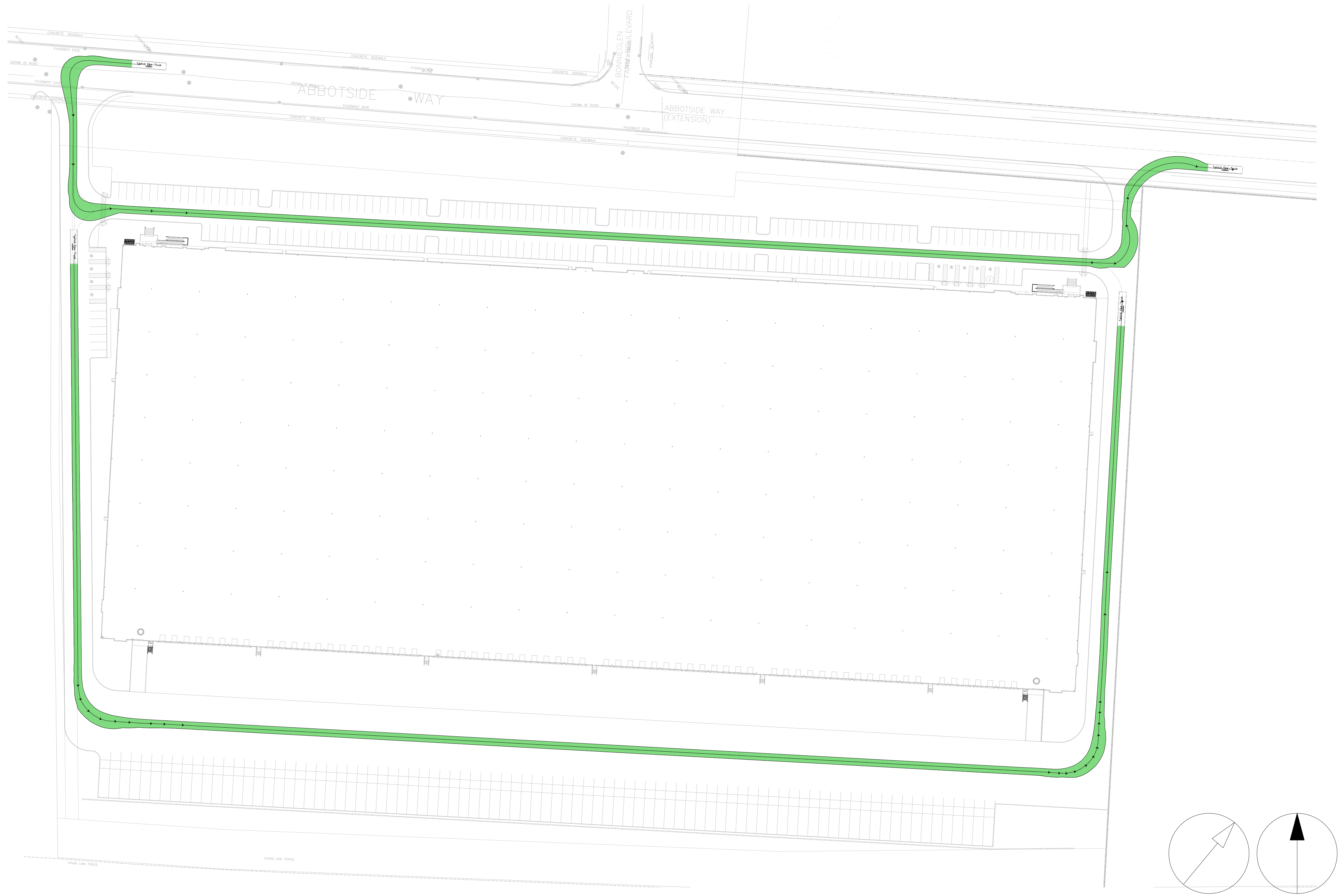
File Location: C:\Users\dumitru.lubeznii\BI Group\135636 12304 Heart Lake Road, Caledon - Internal Documents\6.0_Technical\6.23_Traffic\04_Design-Analysis\AutoTURN\002\TTY_135636_AutoTURN_v2.dwg
Last Saved: November 10, 2021, by dumitru.lubeznii Plotted: Thursday, November 11, 2021 11:09:16 AM by Dumitru Lubeznii

SCALE CHECK 10mm 1 in



Typical Fire-Truck

	mm
Width	: 2540
Track	: 2540
Lock to Lock Time	: 6.0
Steering Angle	: 45.0



CLIENT Broccolini c/o Real Estate Development 5 Defries St, Toronto, ON M5A 3R4	PROJECT NAME Warehousing, Logistics and Distribution Centre 12304 Heart Lake Road, Caledon			
	SCALE: 1:1500	DATE: 2021-11-08	FIGURE NAME Vehicle Maneuvering Diagram - Typical Aerial Firetruck	FIGURE NO. AT-2
	PROJECT ENG:	DRAWN BY: DL		REVISION 2
	CHECKED BY: RM	APPROVED BY: RM		
	PROJECT NO: 135636			

File Location: C:\Users\dumitru.liubeznii\IBI Group\135636 12304 Heart Lake Road, Caledon - Internal Documents\6.0_Technical\6.23_Traffic\04_Design-Analysis\AutoTURN\002\TTY_135636_AutoTURN_v2.dwg
Last Saved: November 10, 2021, by dumitru.liubeznii Plotted: Thursday, November 11, 2021 11:09:25 AM by Dumitru Liubeznii

10mm

SCALE CHECK
1 in

Appendix X

ITE Parking Rate Data Source

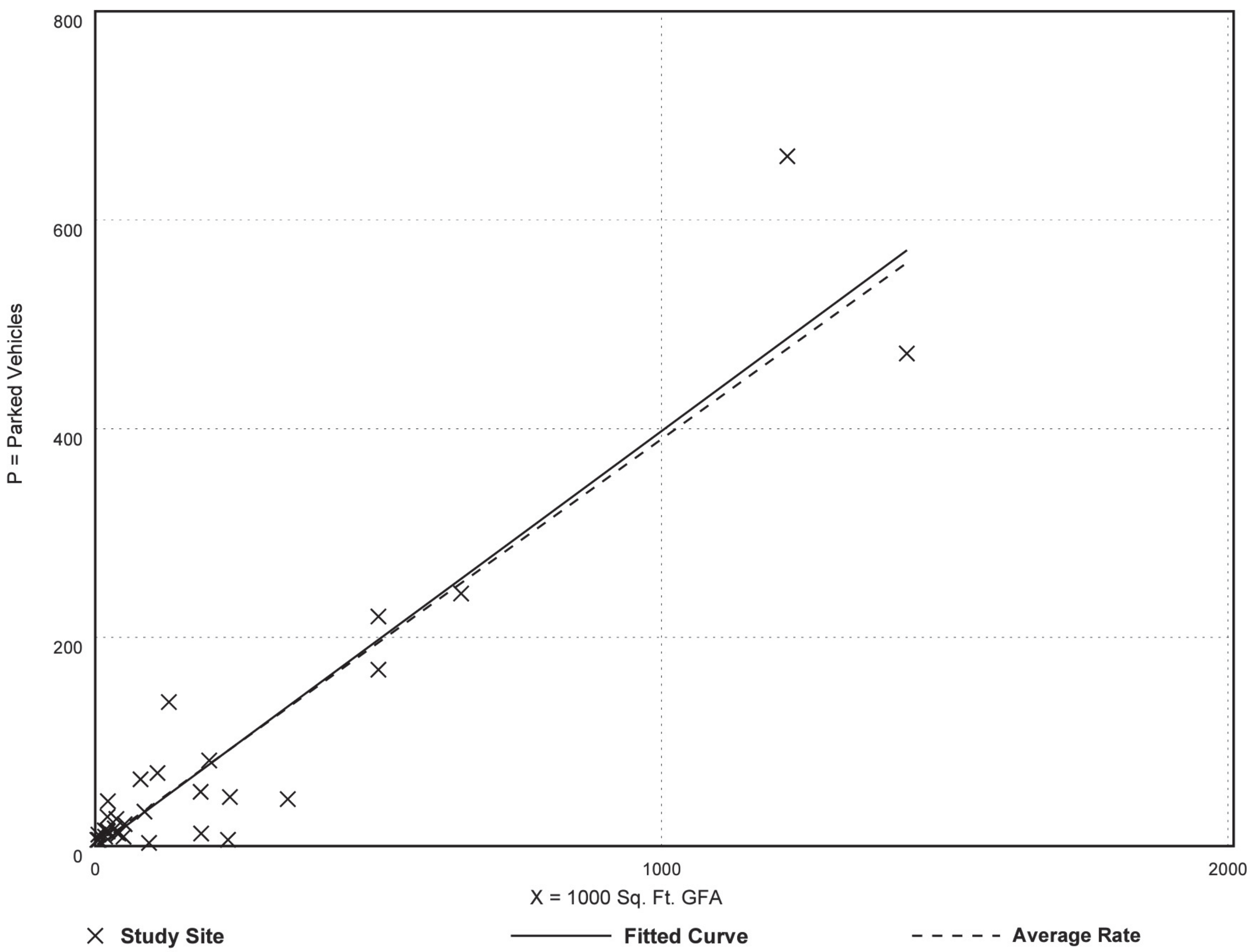
Warehousing
(150)

Peak Period Parking Demand vs: 1000 Sq. Ft. GFA
On a: Weekday (Monday - Friday)
Setting/Location: General Urban/Suburban
Peak Period of Parking Demand: 11:00 a.m. - 4:00 p.m.
Number of Studies: 31
Avg. 1000 Sq. Ft. GFA: 212

Peak Period Parking Demand per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
0.39	0.03 - 1.96	0.34 / 1.11	0.31 - 0.47	0.22 (56%)

Data Plot and Equation



Fitted Curve Equation: P = 0.40(X) - 2.30 **R^2= 0.88**