TRAFFIC IMPACT STUDY

441 MAPLE AVENUE

ZONING BY-LAW AMENDMENT
OFFICIAL PLAN AMENDMENT

CITY OF BURLINGTON

PREPARED FOR:

BETTER LIFE RETIREMENT RESIDENCE INC.

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4

DECEMBER 2018

CFCA FILE NO. 1609-5022

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CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev.1	December, 2018	Issued for First Submission

1.0 Executive Summary

C.F. Crozier & Associates Inc. (Crozier) was retained by Better Life Retirement Inc. to support a residential development located at 441 Maple Avenue, in the City of Burlington from a transportation perspective for Zoning By-Law and Local Official Plan Amendments.

The project proposal is for one 11-storey residential apartment building consisting of 153 units. One (1) full movement site access is proposed at Maple Avenue.

Under 2018 existing conditions the intersection of North Shore Boulevard/Lakeshore Road at Maple Avenue operates at a Level of Service "C" during the weekday a.m. and p.m. peak periods, with average delays per vehicle of 21.9 and 28.1 seconds, respectively. A maximum volume-to-capacity ratio of 0.88 is observed for the southbound right-turn movement during the weekday p.m. peak period. Queues for the eastbound and westbound left turn movements may occasionally extend into the tapers and adjacent through lanes during peak periods. The intersection of Maple Avenue at Bellview Street operates at a Level of Service "A" during the weekday a.m. and p.m. peak periods, with average delays per vehicle of 0.5 and 0.4 seconds, respectively.

Under 2023 future background conditions the intersection of North Shore Boulevard/Lakeshore Road at Maple Avenue operates at a Level of Service "C" during the weekday a.m. and p.m. peak periods, with average delays per vehicle of 25.2 and 30.7 seconds, respectively. A maximum volume-to-capacity ratio of 0.89 is observed for the southbound right-turn movement during the weekday p.m. peak period. Queues for the eastbound and westbound left turn movements may occasionally extend into the tapers and adjacent through lanes during peak periods. The intersection of Maple Avenue at Bellview Street operates at a Level of Service "A" during the weekday a.m. and p.m. peak periods, with average delays per vehicle of 0.5 and 0.4 seconds, respectively.

The proposed development is expected to generate 50 two-way (12 inbound and 38 outbound) trips during the weekday a.m. peak hour and 55 two-way (34 inbound and 21 outbound) trips during the weekday p.m. peak hour.

The addition of site generated traffic to the roadway system will have a minimal effect on the operations of North Shore Boulevard/Lakeshore Road at Maple Avenue intersection during the a.m. and p.m. peak periods. The Levels of Service will remain unchanged during the peak periods and average delay is expected to decrease by 2.0 seconds during the morning peak period, and increase by 1.2 seconds during the evening peak period.

The Zoning By-Law and Local Official Plan Amendments can be supported from a transportation perspective as the boundary road system can accommodate the minimal increase in traffic volumes attributable to the proposed redevelopment.

.

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY I

2.0 INTRODUCTION 1

3.0 EXISTING CONDITIONS 1

3.1 Development Lands 1
3.2 Boundary Road Network 1
3.3 Public Transit 2
3.4 Traffic Data 2
3.5 Traffic Modeling 2
3.6 Intersection Operations 2

4.0 FUTURE BACKGROUND CONDITIONS 3

4.1 Study Horizons 3
4.2 Background Developments 3
4.3 Traffic Growth Rates 4
4.4 Intersection Operations 4

5.0 DEVELOPMENT PROPOSAL 5

5.1 Site Generated Traffic 5
5.2 Trip Distribution and Assignment 5

6.0 FUTURE TOTAL CONDITIONS 6

6.1 Intersection Operations 6

7.0 TRANSPORTATION DEMAND MANAGEMENT (TDM) 7

7.1 TDM Strategies Identification 7
7.1.1 Walking / Cycling 7

7.2 TDM Strategies Implementation 8
7.2.1 Transit Incentive 8
7.2.2 Marketing 8

8.0 CONCLUSION 9

LIST OF APPENDICES

Appendix A: Correspondence

Appendix B: Traffic Data and Signal Timing Plans

Appendix C: Levels of Service Definitions

Appendix D: Detailed Capacity Analyses

Appendix E: Parson's Traffic Impact Study Excerpts

Appendix F: TTS Data

LIST OF FIGURES

Figure 1: Site Plan

Figure 2: 2018 Existing Traffic Volumes

Figure 3: 2023 Future Background Traffic Volumes

Figure 4: Site Trip Distribution

Figure 5: Site Trip Assignment

Figure 6: 2023 Future Total Traffic Volumes

2.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by MHBC Planning on behalf of Better Life Retirement Inc. in August 2018, to undertake a Traffic Impact Study in support of Zoning By-Law and Local Official Plan Amendments. The purpose of the study is to assess the impacts of the proposed development on the boundary road network and to recommend required mitigation measures, if warranted.

The study has been completed in accordance with the procedures set out in Halton Region's Transportation Impact Study Guidelines with the associated analysis and findings outlined herein. A scope of work outlining the workplan for the study was sent to City of Burlington Staff on August 7, 2018 and is provided in **Appendix A**.

3.0 Existing Conditions

3.1 Development Lands

The subject lands cover an area of approximately 0.28 ha and currently consists of 'Maple Villa'- Long Term Care Centre. There are currently two accesses, one ingress and one egress, onto Maple Avenue. The property, located in downtown Burlington, is bounded by Maple Avenue to the west, rental apartment buildings to the north and south, and a municipal parking lot with 74 spots to the east. Refer to **Figure 1** for the site location and **Figure 2** for the Site Plan prepared by Spaziani Architect Inc. in December 2018.

3.2 Boundary Road Network

With skewed directions, the directional orientation of the roadway system is ambiguous. To provide clarity throughout this report and in the supporting analysis, Maple Avenue has been assigned a north-south orientation. Bellview Street and North Shore Boulevard/Lakeshore Road have been assigned an east-west orientation.

Maple Avenue is a north-south roadway with a four-lane urban cross-section. Maple Avenue is under the jurisdiction of the City of Burlington and is defined as a major road. The roadway has sidewalks available on both sides and has a posted speed limit of 50 km/h throughout the study area. Maple Avenue is known as Lakeshore Road south of North Short Boulevard.

Bellview Street is an east-west roadway with a two-lane urban cross-section. Bellview Street is under the jurisdiction of the City of Burlington and is defined as a minor road. The roadway has sidewalks available on both sides and has a posted speed limit of 40 km/h throughout the study area.

North Shore Boulevard/Lakeshore Road is an east-west roadway with a four-lane urban cross-section. The roadway is under the jurisdiction of the City of Burlington and is defined as a major road with a posted speed limit of 60 km/h. The roadway is known as North Shore Boulevard East to the east of Maple Avenue and Lakeshore Road to the west of Maple Avenue.

The four-legged intersection of North Shore Boulevard/Lakeshore Road at Maple Avenue is signalized. All the approaches consist of a left-turn lane, a through lane and a shared through/right-turn lane, with the exception of the north approach which has an exclusive right turn lane. Pedestrian facilities are present on all legs of the intersection.

3.3 Public Transit

There are multiple transit stops located in the vicinity of the site. Two (2) bus stops are located at the intersection of Maple Avenue and Elgin Street which is located approximately 120 m north of the site. Two (2) bus stops are located approximately 100 meters south of the site at the intersection of Lakeshore Road and Maple Avenue.

The study area is serviced by three (3) buses. Burlington Transit Route 10 'New Maple', Route 50 'Burlington South', and Route 300 'Aldershot' operate on daily schedules and provide direct connections to the Appleby Mall, Lakeside Plaza, Mapleview Mall, Burlington Seniors', Burlington and Appleby GO stations, and many other employment and service nodes within Burlington.

3.4 Traffic Data

Turning movement counts at the intersections of North Shore Boulevard/Lakeshore Road at Maple Avenue and Maple Avenue at Bellview Street were conducted by Spectrum Traffic Inc. on Tuesday, August 21st, 2018, between the weekday a.m. peak hours of 6:00 a.m. and 10:00 a.m. and weekday p.m. peak hours of 3:00 p.m. and 7:00 p.m. Traffic data contained in **Appendix B** provides a summary of the turning movement counts. Refer to **Figure 3** for the existing traffic volumes. Peak hour factors used for analysis were calculated based on existing traffic.

3.5 Traffic Modeling

The assessment of intersections is based on the method outlined in the "Highway Capacity Manual, 2010" using Synchro 10 modeling software. Intersections are assessed using a Level of Service metric, with ranges of delay assigned a letter from "A" to "F". For stop-controlled intersections, a Level of Service "A" or "B" would typically be measured during off-peak hours when lesser traffic volumes are on the roadways. Levels of Service "C" through "F" would typically be measured in the commuter peak hours when greater vehicle volumes cause longer travel times. The Level of Service (LOS) definitions for signalized intersections is included in **Appendix C**.

The peak hour factors, heavy vehicle percentage and pedestrian movements for the study intersection were obtained from the existing traffic movement counts. The queueing analysis was done using SimTraffic simulations with 30 minutes recording time, 10 minutes seeding time, and an average of three runs.

3.6 Intersection Operations

The traffic operations at the study intersection were analyzed on the basis of the traffic volumes recorded. Detailed capacity analyses are included in **Appendix D**. The signal timings for the intersection of North Shore Boulevard/Lakeshore Road at Maple Avenue were provided by the City of Burlington and can be found in **Appendix B**. The intersection operation was analyzed on the basis of the traffic volumes illustrated in **Figure 3**. **Table 1** outlines the existing traffic Levels of Service.

Table 1: 2018 Existing Levels of Service

Intersection	Control	Peak Hour	Level of Service	Average Delay per Vehicle(s)	V/C Ratio(s) > 0.85 (Approach)	95th %ile Queues > Storage Length (m)
North Shore Boulevard/ Lakeshore Road at Maple Avenue	Signal	Weekday A.M.	C	21.9	None	42.3 > 30m (EBL) 38.7 > 30m (WBL)
		Weekday P.M.	C	28.1	0.88 (SBR)	49.3 > 30m (EBL) 49.9 > 30m (WBL)
Maple Avenue at Bellview Street	Stop	Weekday A.M.	A	0.5 s	None	None
		Weekday P.M.	A	0.4 s	None	None

Note: The Level of Service of a Stop-Controlled intersection is based on the delay associated with the critical approach. The Level of Service of a signalized intersection is based on the average control delay per vehicle. 95th percentile queue analysis was completed using SimTraffic with 30 minutes recording time, 10 minutes seeding time, and an average of three runs. Exiting Signal timing provided by City of Brantford was used.

As indicated in **Table 1**, the intersection of North Shore Boulevard/Lakeshore Road at Maple Avenue operates at a Level of Service "C" during the weekday a.m. and p.m. peak periods, with average delays per vehicle of 21.9 and 28.1 seconds, respectively. A maximum volume-to-capacity ratio of 0.88 is observed for the southbound right-turn movement during the weekday p.m. peak period. As illustrated by the 95th percentile queue lengths, some of the storage lengths are shown to be exceeding the available storage length during the weekday a.m. and p.m. peak hours. Therefore, queues may occasionally extend into the tapers and adjacent through lanes during peak periods.

The intersection of Maple Avenue at Bellview Street operates at a Level of Service "A" during the weekday a.m. and p.m. peak periods, with average delays per vehicle of 0.5 and 0.4 seconds, respectively. No individual movements are operating with a volume to capacity ratio above 0.85.

Operational analyses of existing traffic volumes indicate that reserve capacity is available for future traffic volume growth on the boundary road network.

4.0 Future Background Conditions

4.1 Study Horizons

Per the discussions with City Staff, a five-year horizon was considered for the analysis. A study horizon year of 2023 was selected to assess the full operations of the development on the boundary road network.

4.2 Background Developments

There is currently one active development application in the vicinity of the proposed site. The application is for a 21 storey, 170-unit condominium with 2,015 ft² of ground floor retail space that will operate as a Pharmacy. The development is located at 490-492 Brock Avenue and 1298 Ontario Street and will have access to Ontario Street. Parson's completed a Traffic Impact Study for this development in July 2017. Per the report, it is estimated that the development will generate 84 two-way trips in the AM peak hour and 90 two-way trips in the PM peak hour. The site generated trips figure from the Parson's report is provided in **Appendix E**.

4.3 Traffic Growth Rates

As agreed with the City, a 2.0% growth rate per annum was applied to all through traffic during the weekday peak periods along the road network in the study area. **Figure 4** illustrates the future background traffic volumes for the 2023 horizon year and reflects the traffic growth rate applied to the traffic volumes at the intersection in addition to the background development's traffic.

4.4 Intersection Operations

Traffic operations at the study intersections were analyzed with the growth rates and traffic from background developments. **Table 2** outlines the 2023 future background Levels of Service.

Detailed capacity analysis worksheets are included in **Appendix D**.

Table 2: 2023 Future Background Level of Service

Intersection	Control	Peak Hour	Level of Service	Average Delay per Vehicle(s)	V/C Ratio(s) > 0.85 (Approach)	95th %ile Queues > Storage Length (m)
North Shore Boulevard/ Lakeshore Road at Maple Avenue	Signal	Weekday A.M.	C	25.2	None	43.3 > 30m (EBL) 38.8 > 30m (WBL)
		Weekday P.M.	C	30.7	0.89 (SBR)	58.7 > 30m (EBL) 48.7 > 30m (WBL)
Maple Avenue at Bellview Street	Stop	Weekday A.M.	A	0.5 s	None	None
		Weekday P.M.	A	0.4 s	None	None

Note: The Level of Service of a Stop-Controlled intersection is based on the delay associated with the critical approach. The Level of Service of a signalized intersection is based on the average control delay per vehicle. 95th percentile queue analysis was completed using SimTraffic with 30 minutes recording time, 10 minutes seeding time, and an average of three runs. Exiting Signal timing provided by City of Brantford was used.

As indicated in **Table 2**, the intersection of North Shore Boulevard/Lakeshore Road at Maple Avenue is projected to operate at a Level of Service "C" during the weekday a.m. and p.m. peak periods. Overall, the intersection is projected to operate in a similar manner to existing conditions during the peak periods with no significant change in delay and Level of Service. During the a.m. peak period, the overall delay is projected to increase by 3.3 seconds and no change in the Level of Service. During the p.m. peak period, the overall delay is projected to increase by 2.6 seconds and no change in the Level of Service. A maximum volume-to-capacity ratio of 0.89 is observed for the southbound right-turn movement during the weekday p.m. peak period, an increase of 0.01 compared to the existing conditions.

Similar to the existing conditions, some of the storage lengths are shown to be exceeding the available storage length during the weekday a.m. and p.m. peak hours at the intersection of North Shore Boulevard/Lakeshore Road at Maple Avenue. Therefore, queues may occasionally extend into the tapers and adjacent through lanes during peak periods.

The intersection of Maple Avenue at Bellview Street operates at a Level of Service "A" during the weekday a.m. and p.m. peak periods, with average delays per vehicle of 0.5 and 0.4 seconds, respectively. No individual movements are operating with a volume to capacity ratio above 0.85.

Operational analyses of future background traffic volumes indicate that reserve capacity is available for future traffic volume growth on the boundary road network.

5.0 Development Proposal

The subject lands cover an area of approximately 0.28 ha and currently consists of 'Maple Villa'- Long Term Care Centre. There are currently two accesses, one ingress and one egress, onto Maple Avenue. The property, located in downtown Burlington, is bounded by Maple Avenue to the west, rental apartment buildings to the north and south, and a municipal parking lot with 74 spots to the east.

The project proposal is for a 11-storey residential apartment building consisting of 153 units. One (1) full movement site access is proposed at Maple Avenue. Refer to the Site Plan, prepared by Michael Spaziani Architect Inc., illustrated in **Figure 3** updated in December 2018, containing the keymap for the site location.

5.1 Site Generated Traffic

The proposed development will result in additional vehicles on the boundary road network that previously did not exist. The proposed development will also result in additional turning movements at the boundary road intersections.

The trip generation of the proposed development were forecasted using the rates provided in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition.

Land use Category 222 "Multifamily Housing (High Rise)" was used to forecast the trips generated by the development. The forecasted new trips are tabulated in **Table 3**.

As per the correspondence with the City Staff, a 10% non-auto modal split was applied to all trips generated by the proposed site.

Table 3: Trip Generation

ITE Category	Units	Roadway Peak Hour	Rate/Equation Used	Number of Trips		
				Inbound	Outbound	Total
Multifamily Housing-High Rise (LUC 222)	153	Weekday a.m.	T = 0.28(X) + 12.86	12	38	50
		Weekday p.m.	T = 0.34(X) + 8.56	34	21	55
New Trips		**Weekday a.m.**		**12**	**38**	**50**
		Weekday p.m.		**34**	**21**	**55**

Note: Number of trips reflect the 10% non-auto modal split reduction.

The proposed development is expected to generate 50 two-way (12 inbound and 38 outbound) trips during the weekday a.m. peak hour and 55 two-way (34 inbound and 21 outbound) trips during the weekday p.m. peak hour.

5.2 Trip Distribution and Assignment

2016 Transportation Tomorrow Survey (TTS) data, provided in **Appendix F**, was used to determine the trip distribution for the proposed development. **Table 4** below outlines the trip distribution for the proposed development, divided into time period and direction of travel.

Figure 5 illustrates the assumed trip distribution for the proposed development and **Figure 6** illustrates the assumed trip assignment for the proposed development.

Table 4: Site Distribution

	A.M. Peak Hour	P.M. Peak Hour
Direction	In (Out)	In (Out)
North	20% (25%)	20% (20%)
South	53% (48%)	53% (55%)
East	10% (15%)	15% (13%)
West	18% (13%)	13% (13%)

6.0 Future Total Conditions

6.1 Intersection Operations

Traffic operations at the study intersections were analyzed with the addition of the site generated traffic. The total traffic volumes are illustrated in **Figure 7**. **Table 5** outlines the 2023 total traffic Levels of Service.

Detailed capacity analysis worksheets are included in **Appendix D**.

Table 5: 2023 Future Total Level of Service

Intersection	Control	Peak Hour	Level of Service	Average Delay per Vehicle(s)	V/C Ratio(s) > 0.85 (Approach)	95th %ile Queues > Storage Length (m)
North Shore Boulevard/ Lakeshore Road at Maple Avenue	Signal	Weekday A.M.	C	23.2	None	42.5 > 30m (EBL) 36.2> 30m (WBL)
		Weekday P.M.	C	31.9	0.89 (SBR)	52.1 > 30m (EBL) 49.4 > 30m (WBL)
Maple Avenue at Bellview Street	Stop	Weekday A.M.	A	0.5 s	None	None
		Weekday P.M.	A	0.4 s	None	None
Maple Avenue at Site Access	Stop	Weekday A.M.	A	0.6 s	None	None
		Weekday P.M.	A	0.2 s	None	None

Note: The Level of Service of a Stop-Controlled intersection is based on the delay associated with the critical approach. The Level of Service of a signalized intersection is based on the average control delay per vehicle. 95th percentile queue analysis was completed using SimTraffic with 30 minutes recording time, 10 minutes seeding time, and an average of three runs. Exiting Signal timing provided by City of Brantford was used.

The addition of site generated traffic to the roadway system will have a minimal effect on the operations of North Shore Boulevard/Lakeshore Road at Maple Avenue intersection during the a.m. and p.m. peak periods. The Levels of Service will remain unchanged during the peak periods and average delay is expected to decrease by 2.0 seconds during the morning peak period, and increase by 1.1 seconds during the evening peak period. The average delay per vehicle is expected to decrease in future total conditions than future background conditions since there is a better utilization of green time for the through movements on the minor approach.

Similar to the existing conditions, some of the storage lengths are shown to be exceeding the available storage length during the weekday a.m. and p.m. peak hours at the intersection of North Shore Boulevard/Lakeshore Road at Maple Avenue. Therefore, queues may occasionally extend into the tapers and adjacent through lanes during peak periods.

The intersection of Maple Avenue at Bellview Street operates at a Level of Service "A" during the weekday a.m. and p.m. peak periods, with average delays per vehicle of 0.5 and 0.4 seconds, respectively. No individual movements are operating with a volume to capacity ratio above 0.85.

The intersection of Maple Avenue at the proposed site access will operate at Level of Service "A" during the weekday a.m. and p.m. peak periods, with average delays per vehicle of 0.6 and 0.2 seconds, respectively. No individual movements are operating with a volume to capacity ratio above 0.85.

Operational analyses of future total traffic volumes indicate that reserve capacity is available for future traffic volume growth on the boundary road network.

7.0 Transportation Demand Management (TDM)

Transportation Demand Management (TDM) refers to a variety of 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
- Support Provincial Smart Growth Objectives

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

7.1 TDM Strategies Identification

7.1.1 Walking / Cycling

The City of Burlington is a pedestrian and cycling supportive community that embraces the "complete streets" concept by encouraging both commuter and recreational travel by walking, cycling and using public transit through a safe and desirable Municipality-wide network of on-road and off-road pedestrian and cycling facilities.

Currently, there are sidewalks available on all roads in the vicinity of the site. Maple Avenue and Lakeshore Road have marked bike lanes in both directions and North Shore Boulevard East has sharrows marked on pavement.

Per the City of Burlington Zoning By-Law No. 2020, bicycle parking spaces are not required for residential uses. However, 24 bicycle parking spaces are provided for residents and visitors as shown in the Site Plan (See **Figure 2**).

7.2 TDM Strategies Implementation

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

7.2.1 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 (2) 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 much travelers use the transit service provided in a region. Local buses with few passengers, suggests 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 can result in better air quality and less congestion. Moreover, transit service level (i.e. network coverage and frequency) have strong positive correlation with transit demand (i.e. ridership).

As an incentive to encourage residents to use the Burlington transit service, the owner may provide and distribute (one (1) time) prepaid and fee-waived complimentary PRESTO cards. This subsidized transit card will provide a financial incentive to encourage the use of public transit, especially for 'first time' users to try local transit services as a primary mode of transportation. The amount and provision of PRESTO cards is subject to the owner's discretion.

7.2.2 Marketing

It is recommended that an information package be made available by the City/Owner to inform new / prospective residents with alternative traveling options. It is recommended that the Owner consult with the City to provide the following materials to promote active transportation:

- Burlington Transit Map
- Burlington Trails Map
- Burlington Cycling Map

In addition to the above noted materials, the information package may also include information on transit schedules (i.e. Burlington 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 center and library) within convenience and comfortable walking distance to further discourage vehicle dependency.

8.0 Conclusion

The findings and conclusions of our analysis are represented as follows:

- The study area intersections are operating at acceptable levels of service and below capacity in the existing traffic conditions during both the AM and PM peak hours;
- During both the AM and PM peak hours in the future background traffic conditions for horizon year 2023, all the key intersections are expected to function below-capacity and with acceptable level of service;
- The proposed development is expected to generate 50 two-way (12 inbound and 38 outbound) trips during the weekday a.m. peak hour and 55 two-way (34 inbound and 21 outbound) trips during the weekday p.m. peak hour;
- The proposed development is expected to have a negligible impact on the surrounding road network as future total traffic is expected to operate in a similar fashion to the future background scenario (below-capacity and with acceptable level of service) in horizon year 2023;
- The proposed full-movement access at Maple Avenue is anticipated to function at a good level of service and well below-capacity;
- The analysis undertaken herein was prepared using the most recent Site Plan. Any minor changes to the plan will not materially affect the conclusions contained within this report;
- The proposed development can be supported from a traffic operations perspective as the site generated traffic will have a negligible effect on the operations of the public roadway system;

We trust that this review satisfies any transportation concerns associated with the Site Plan for this development. Please feel free to contact the undersigned for any further information required.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



R. Aaron Wignall
Associate, Transportation

C.F. CROZIER & ASSOCIATES INC.



Kavleen Sachdeva
Engineering Intern, Transportation

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APPENDIX A

Correspondence

Kavleen Sachdeva

From: Ozimkovic , Danijel <Danijel.Ozimkovic@burlington.ca>
Sent: Monday, August 13, 2018 11:38 AM
To: Kavleen Sachdeva
Cc: Popovich, Bobby
Subject: RE: 441 Maple Avenue Terms of Reference

Hi Kavleen,
I reviewed the Terms of Reference and I am satisfied with your proposal.
I would just like to add that when it comes to on-site parking, please refer to the recommended rates from City's parking study:
https://www.burlington.ca/en/services-for-you/resources/Planning_and_Development/City-Wide-Parking-Study/Burlington-Parking-Standards-Final-Consolidated-Report_2017-09-22_Updated.pdf

- Please provide details of any planned roadway/transit improvement in the study area within the next five years Maple Avenue resurfacing is scheduled for 2019/2020. Same number of vehicle lanes will remain.
- Please provide the growth rate to be used for Maple Avenue, Bellview Street, and North Shore Boulevard East Please use 2% for growth rate
- Please provide the signal timing plan for the signalized intersection of Maple Avenue/Lakeshore Road at North Shore Boulevard East My coworker Bobby Popovich will be able to provide you with more info for signal timing plan
- Please provide us with any further background developments that are to be included in the analysis No other background developments.

Thanks,
Dan Ozimkovic, C.E.T
Transportation Planning Technologist
Transportation Services
City of Burlington
(905) 335-7671 ext. 7485
danijel.ozimkovic@burlington.ca

From: Minaji, Rosalind
Sent: Thursday, August 09, 2018 9:56 AM
To: 'Kavleen Sachdeva'
Cc: Edgcumbe, Kaylan; Ozimkovic , Danijel
Subject: RE: 441 Maple Avenue Terms of Reference

Hi Kavleen:
Please follow up with Transportation Services staff copied on this email. I only forwarded your email on Tuesday. I'm sure you can appreciate that in the summer months people are on vacation and it can take a little more time to receive a response.
-Rosalind

Rosalind Minaji MCIP RPP
Coordinator of Development Review

Department of City Building | Planning Section
City of Burlington
426 Brant Street, Burlington L7R 3Z6
Phone: 905-335-7600 Ext. 7809
Fax: 905-335-7880
Email: rosalind.minaji@burlington.ca

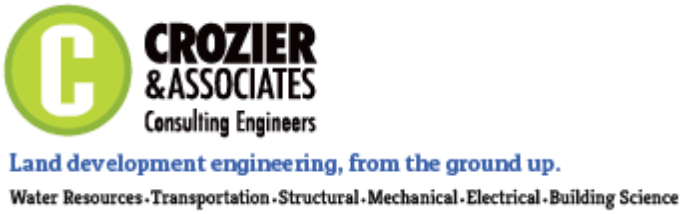
From: Kavleen Sachdeva [mailto:ksachdeva@cfcrozier.ca]
Sent: Thursday, August 09, 2018 9:33 AM
To: Minaji, Rosalind
Subject: RE: 441 Maple Avenue Terms of Reference

Hi Rosalind,

Just wanted to check in and ask when I can expect a reply regarding the workplan sent on Tuesday.

Thanks!

| **KAVLEEN SACHDEVA** | TRANSPORTATION E.I.T. | C.F. CROZIER & ASSOCIATES
| 2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
| cfcrozier.ca | ksachdeva@cfcrozier.ca | tel 905 875 0026



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From: Minaji, Rosalind <Rosalind.Minaji@burlington.ca>
Sent: Tuesday, August 7, 2018 12:02 PM
To: Kavleen Sachdeva <ksachdeva@cfcrozier.ca>
Cc: Aaron Wignall <awignall@cfcrozier.ca>
Subject: RE: 441 Maple Avenue Terms of Reference

Thank you Kavleen. John Zunic is no longer with the City.
I have forwarded your email to our current Transportation Services staff for a response.
Please do not proceed with the study until you hear from our staff.
Thank you.
-Rosalind

Rosalind Minaji MCIP RPP
Coordinator of Development Review
Department of City Building | Planning Section
City of Burlington
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From: Kavleen Sachdeva [mailto:ksachdeva@cfcrozier.ca]
Sent: Tuesday, August 07, 2018 11:52 AM
To: Minaji, Rosalind; John JZ. Zaloznik
Cc: Aaron Wignall
Subject: 441 Maple Avenue Terms of Reference

Hi all,

We have been retained to complete a **Transportation Impact Study** and **Parking Justification Study** to support Zoning By-Law and Local Official Plan Amendments for the proposed 11-story consisting 163 units residential building at 441 Maple Avenue in the City of Burlington. One full movement access onto Maple Avenue is proposed with three underground parking levels and above ground parking for a total of 163 parking spaces.

We request your feedback regarding our study assumptions. I have attached the working Site Plan for your reference.

Study Methodology for the Transportation Impact Study

Study Area and Intersections to Assess

- The following intersections will be analyzed:
    - Maple Avenue at Bellview Street (Unsignalized),
    - Maple Avenue/Lakeshore Road at North Shore Boulevard East (signalized), and
    - Maple Avenue at Site Access (Unsignalized).

We will collect the traffic counts at existing intersections on a typical weekday during the morning (6:00 AM to 10:00 AM) and evening (3:00 PM to 7:00 PM) peak periods.

Analysis Periods and Scenarios

The weekday AM and PM peak hours for 2018 existing conditions, considering a 5-year horizon (2023) year background and total traffic conditions will be analyzed.

Background Developments

We will include the following development as part of our background development:

- OPA: 505-02/17 (ZBA: 520-08/17): 490 - 492 Brock Ave. and 1298 Ontario St. Ward 2

If any further developments should be included in our analysis, please let us know.

Future Background Traffic Growth Rate

- Please provide the growth rate that can be used for Maple Avenue, Bellview Street, and North Shore Boulevard East. Should this information not be available, an industry standard of two percent will be applied to through movements along the study intersections.

Future background traffic volume will be estimated for the study area to ensure that the analysis includes background traffic growth and growth from other developments in the area.

Trip Generation

Trip generation for the proposed development will be based on Trip Generation Manual, 10th Edition prepared by the Institute of Transportation Engineers (ITE) for Multifamily Housing (High-Rise) (land use code 222). To be more conservative the fitted curve equation will be used.

The information contained in the 2016 Transportation Tomorrow Survey (TTS) for zone 4057(the Subject Zone) has been reviewed. The summary of the non-auto modal split calculation is provided in the attached table.

- The subject zone TTS Zone have an existing non-auto modal split of approximately 10%.
- Trip distribution, assignments, and the modal splits will be based on the latest 2016 Transportation Tomorrow Survey (TTS).

Roadway/Transit Improvements

- Please provide details of any planned roadway/transit improvement in the study area.

Analysis Procedures

- Weekday AM and PM peak hours will be analyzed using the Synchro 10.0 analysis package and Highway Capacity Manual (HCM) procedures.

Transportation Demand Management Plan

- We will also include several transportation demand management measures to support active transportation and transit as an attempt to reduce the number of auto trips to/from the proposed development.

Study Methodology for the Parking Justification Study

The key tasks are involved in this study are:

- Calculate the parking supply required by the City By-Law number 2020 for the site
- Conduct parking utilization surveys of one surrogate site with a residential building that has similar uses and characteristics to the project site between the weekday a.m. and p.m. peak hours (7:00 a.m.-10:00 a.m., 3:00 p.m.-7:00 p.m.)
- Forecast the peak parking demand using the Institute of Transportation Engineers' data.
- Compare the parking space demand with the parking spaces provided and determine whether the parking supply is sufficient to meet the calculated demand.

Could you please provide any comments you may have on the above ToR and provide the following information for inclusion in the study:

- Please provide details of any planned roadway/transit improvement in the study area within the next five years
- Please provide the growth rate to be used for Maple Avenue, Bellview Street, and North Shore Boulevard East
- Please provide the signal timing plan for the signalized intersection of Maple Avenue/Lakeshore Road at North Shore Boulevard East
- Please provide us with any further background developments that are to be included in the analysis

I hope the above is acceptable. Should you have any questions or concerns, please feel free to contact myself or my colleague Aaron Wignall copied on this email.

Regards,

| **KAVLEEN SACHDEVA** | TRANSPORTATION E.I.T. | C.F. CROZIER & ASSOCIATES

| 2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4

| cfcrozier.ca | ksachdeva@cfcrozier.ca | tel 905 875 0026



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APPENDIX B

Traffic Data and, Signal Timing Plans

Intersection Name:	TS ID:	Line No:	Model:	IP address:	Controller Make:
Lakeshore @ Maple	132	1	ACS/3	172.22.38.2	Econolite

Type of Operation: 8 Phase Semi-Actuated

*-Start from Main Menu

No	Date			Description	Prepared by
	Y	M	D		EN
6	2016	11	2	Revert back to original timings	

PHASE DESCRIPTION

Ph1	WBLT- Lakeshore Road	Ph5	EBLT - Lakeshore Road
Ph2	EB - Lakeshore Road	Ph6	WB - Lakeshore Road
Ph3	SBLT - Maple Avenue	Ph7	NBLT - Maple Avenue
Ph4	NB - Maple Avenue	Ph8	SB - Maple Avenue

PHASE IN USE/EXCLUSIVE PED (MM) *- 1 - 2

Phase:	1	2	3	4	5	6	7	8
Phase in Use	X	X	X	X	X	X	X	X
Exclusive PED								

CONTROLLER TIMING DATA - VEHICLE TIMING * - 2 - 1

Timing Plan: 1	Phase: 1	2	3	4	5	6	7	8
Minimum Green	6	8	6	8	6	8	6	8
Walk		12		8		12		8
Ped. Clearance		19		24		19		24
Pedestrian Carry Over								
Vehicle Extension	3	3	3	3	3	3	3	3
MAX 1	12	35	12	25	12	35	12	25
MAX 2	12	35	12	25	12	35	12	25
Yellow Change	3	4	3	4	3	4	3	4
Red Clearance	0	2	0	3	0	2	0	3
Phase Minimum:	10	38	10	40	10	38	10	40

PHASE DATA - VEHICLE AND PEDESTRIAN RECALLS * - 2 - 8

Phase:	1	2	3	4	5	6	7	8
Lock Detector								
Vehicle Recall								
Pedestrian Recall		X				X		
MAX Recall		X				X		
Min Recall								

COORDINATION: COORDINATOR PATTERN, SPLIT PATTERN * - 3 - 2, - 3 - 3

Coordinator Pattern (CP)	Cycle Length	Offset (sec)	Timing Plan	Split Pattern	Phases (sec)							
					1	2	3	4	5	6	7	8
1	110	25	1	1	10	48	10	42	18	40	10	42
2	100	10	1	2	10	38	10	42	10	38	10	42
3	120	110	1	3	15	49	12	44	15	49	12	44
4	100	44	1	4	10	38	10	42	10	38	10	42
10	0	0	1	10	0	0	0	0	0	0	0	0

TIME BASE: ACTION PLAN, DAY PLAN *** - 5 - 2, - 5 - 3, -5 - 4**

Day Plan	Sched. #	Action Plan	Time Period	Pattern	Timing Plan
1	1	1	07:00	1	1
1	1	2	09:00	2	1
1	1	3	15:30	3	1
1	1	4	19:00	4	1
1	1	10	22:00	254	1
2	2	1	07:00	1	1
2	2	10	23:00	254	1
3	3	1	08:30	1	1
3	3	10	22:00	254	1

Schedule 1 = Day Plan 1
Schedule 2 = Day Plan 2
Schedule 3 = Day Plan 3

Day Plan 1 (Weekday)
Day Plan 2 (Saturday)
Day Plan 3 (Sunday, Holidays)

Action Plan 10 = free (254)

Special Programming:

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

Events	Exception Day		MON/ MON	DOW/ DOW	WOM/ Year	Day Plan
New Year's Day	1	Fixed	1	1	0	3
Family Day	2	Float	2	2	3	3
Good Friday	3	Float	4	6	1	3
Victoria Day	4	Float	5	2	3	3
Canada Day	5	Fixed	7	1	0	3
Civic Day	6	Float	8	2	1	3
Labour Day	7	Float	9	2	1	3
Thanksgiving	8	Float	10	2	2	3
Christmas Day	9	Fixed	12	25	0	3

Turning Movement Count (1 . MAPLE AVE & BELLVIEW ST)

Start Time	N Approach MAPLE AVE					S Approach MAPLE AVE					W Approach BELLVIEW ST					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	U-Turn N:N	Peds N:	Approach Total	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Left W:N	U-Turn W:W	Peds W:	Approach Total		
06:00:00	1	23	1	0	25	14	0	0	0	14	1	0	0	1	1	40	
06:15:00	0	28	0	0	28	24	0	0	0	24	2	1	0	2	3	55	
06:30:00	0	33	0	0	33	42	0	0	0	42	0	1	0	1	1	76	
06:45:00	0	30	0	0	30	54	0	0	0	54	1	1	0	1	2	86	257
07:00:00	0	54	0	0	54	57	1	0	0	58	2	2	0	1	4	116	333
07:15:00	0	60	0	0	60	58	2	0	0	60	5	1	0	0	6	126	404
07:30:00	1	81	0	0	82	83	1	0	1	84	4	4	0	0	8	174	502
07:45:00	2	57	0	0	59	93	2	0	0	95	5	4	0	3	9	163	579
08:00:00	0	79	0	0	79	84	2	0	0	86	3	3	0	3	6	171	634
08:15:00	0	65	0	0	65	76	4	0	0	80	2	3	0	2	5	150	658
08:30:00	1	64	0	0	65	68	2	0	0	70	5	2	0	2	7	142	626
08:45:00	2	74	0	0	76	77	3	0	0	80	2	3	0	3	5	161	624
09:00:00	2	68	0	0	70	97	5	0	0	102	6	4	0	3	10	182	635
09:15:00	0	49	0	0	49	77	2	0	0	79	3	6	0	1	9	137	622
09:30:00	4	61	0	0	65	77	1	0	0	78	2	3	0	0	5	148	628
09:45:00	0	51	0	0	51	92	1	0	0	93	3	2	0	1	5	149	616
BREAK																	
15:00:00	1	126	0	0	127	90	5	0	0	95	0	4	0	5	4	226	
15:15:00	5	111	0	0	116	101	3	0	0	104	2	1	0	3	3	223	
15:30:00	3	125	0	0	128	123	2	0	0	125	3	5	0	2	8	261	
15:45:00	5	150	0	0	155	110	2	0	0	112	5	5	0	6	10	277	987
16:00:00	6	158	0	0	164	97	2	0	0	99	2	3	0	4	5	268	1029
16:15:00	7	178	0	0	185	99	3	0	0	102	5	2	0	1	7	294	1100
16:30:00	4	184	0	0	188	90	3	0	0	93	3	6	0	0	9	290	1129

16:45:00	4	223	0	0	227	96	4	0	0	100	3	4	0	1	7	334	1186
17:00:00	4	236	0	0	240	78	2	0	0	80	3	2	0	2	5	325	1243
17:15:00	6	192	0	0	198	69	5	0	0	74	3	5	0	0	8	280	1229
17:30:00	7	139	0	0	146	78	3	0	0	81	3	3	0	1	6	233	1172
17:45:00	5	133	0	0	138	59	3	0	0	62	4	1	0	3	5	205	1043
18:00:00	2	119	0	0	121	63	2	0	0	65	1	0	0	4	1	187	905
18:15:00	5	99	0	0	104	71	2	0	0	73	2	4	0	2	6	183	808
18:30:00	0	80	0	0	80	50	5	0	0	55	3	2	0	3	5	140	715
18:45:00	3	82	0	0	85	64	1	0	0	65	5	0	0	1	5	155	665
Grand Total	80	3212	1	0	3293	2411	73	0	1	2484	93	87	0	62	180	**5957**	-
Approach%	2.4%	97.5%	0%		-	97.1%	2.9%	0%		-	51.7%	48.3%	0%		-	**-**	-
Totals %	1.3%	53.9%	0%		55.3%	40.5%	1.2%	0%		41.7%	1.6%	1.5%	0%		3%	**-**	-
Heavy	1	2	0		-	1	0	0		-	1	0	0		-	**-**	-
Heavy %	1.3%	0.1%	0%		-	0%	0%	0%		-	1.1%	0%	0%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

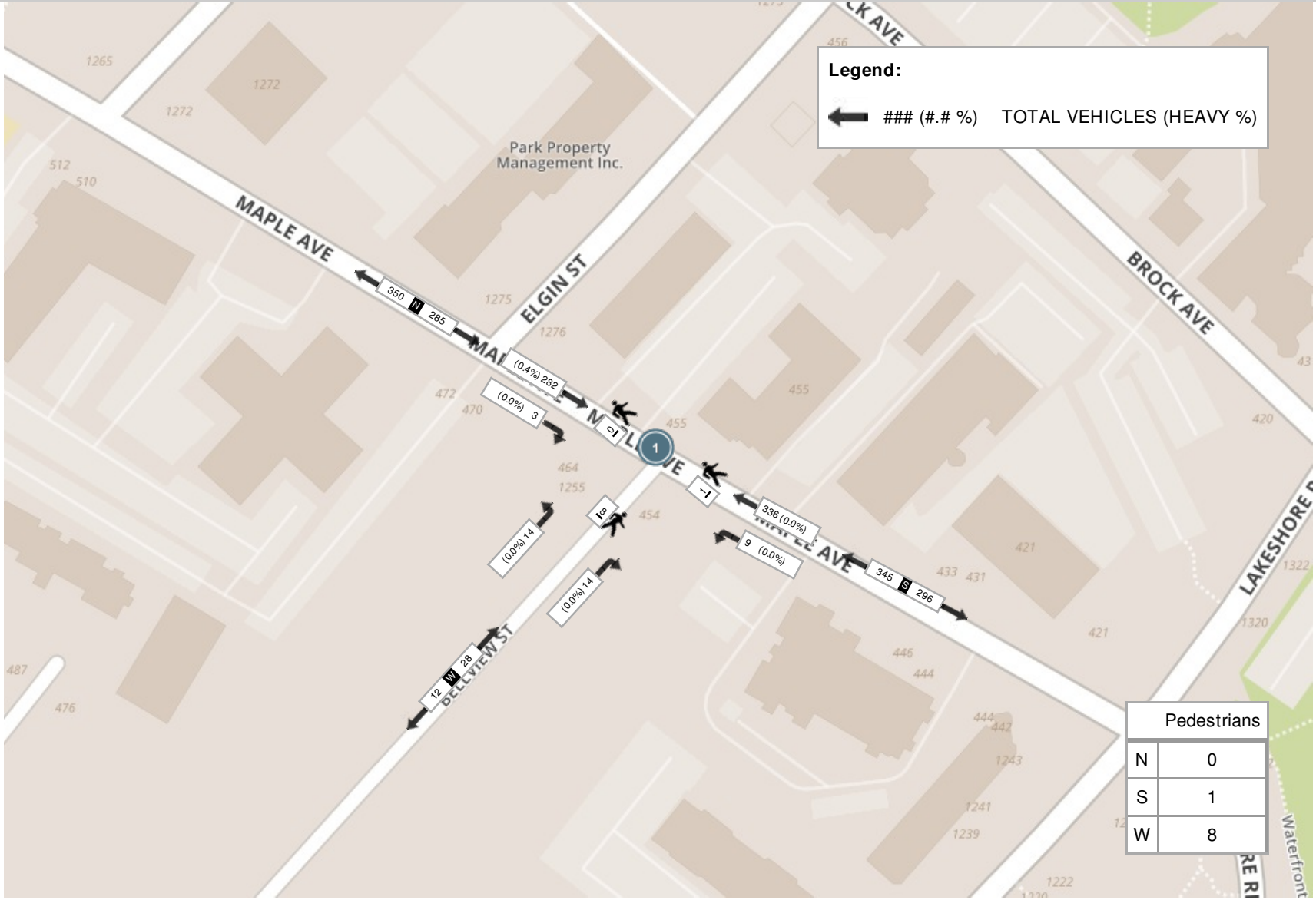
Peak Hour: 07:30 AM - 08:30 AM Weather: Unknown (22.8 °C)

Start Time	N Approach MAPLE AVE					S Approach MAPLE AVE					W Approach BELLVIEW ST					Int. Total (15 min)
	Right	Thru	U-Turn	Peds	Approach Total	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	
07:30:00	1	81	0	0	82	83	1	0	1	84	4	4	0	0	8	174
07:45:00	2	57	0	0	59	93	2	0	0	95	5	4	0	3	9	163
08:00:00	0	79	0	0	79	84	2	0	0	86	3	3	0	3	6	171
08:15:00	0	65	0	0	65	76	4	0	0	80	2	3	0	2	5	150
Grand Total	3	282	0	0	285	336	9	0	1	345	14	14	0	8	28	**658**
Approach%	1.1%	98.9%	0%		-	97.4%	2.6%	0%		-	50%	50%	0%		-	**-**
Totals %	0.5%	42.9%	0%		43.3%	51.1%	1.4%	0%		52.4%	2.1%	2.1%	0%		4.3%	**-**
PHF	0.38	0.87	0		0.87	0.9	0.56	0		0.91	0.7	0.88	0		0.78	**-**
Heavy	0	1	0		1	0	0	0		0	0	0	0		0	**-**
Heavy %	0%	0.4%	0%		0.4%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Lights	3	273	0		276	325	9	0		334	14	14	0		28	**-**
Lights %	100%	96.8%	0%		96.8%	96.7%	100%	0%		96.8%	100%	100%	0%		100%	**-**
Mediums	0	8	0		8	11	0	0		11	0	0	0		0	**-**
Mediums %	0%	2.8%	0%		2.8%	3.3%	0%	0%		3.2%	0%	0%	0%		0%	**-**
Articulated Trucks	0	1	0		1	0	0	0		0	0	0	0		0	**-**
Articulated Trucks %	0%	0.4%	0%		0.4%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	8	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	11.1%		-	-	-	88.9%		**-**

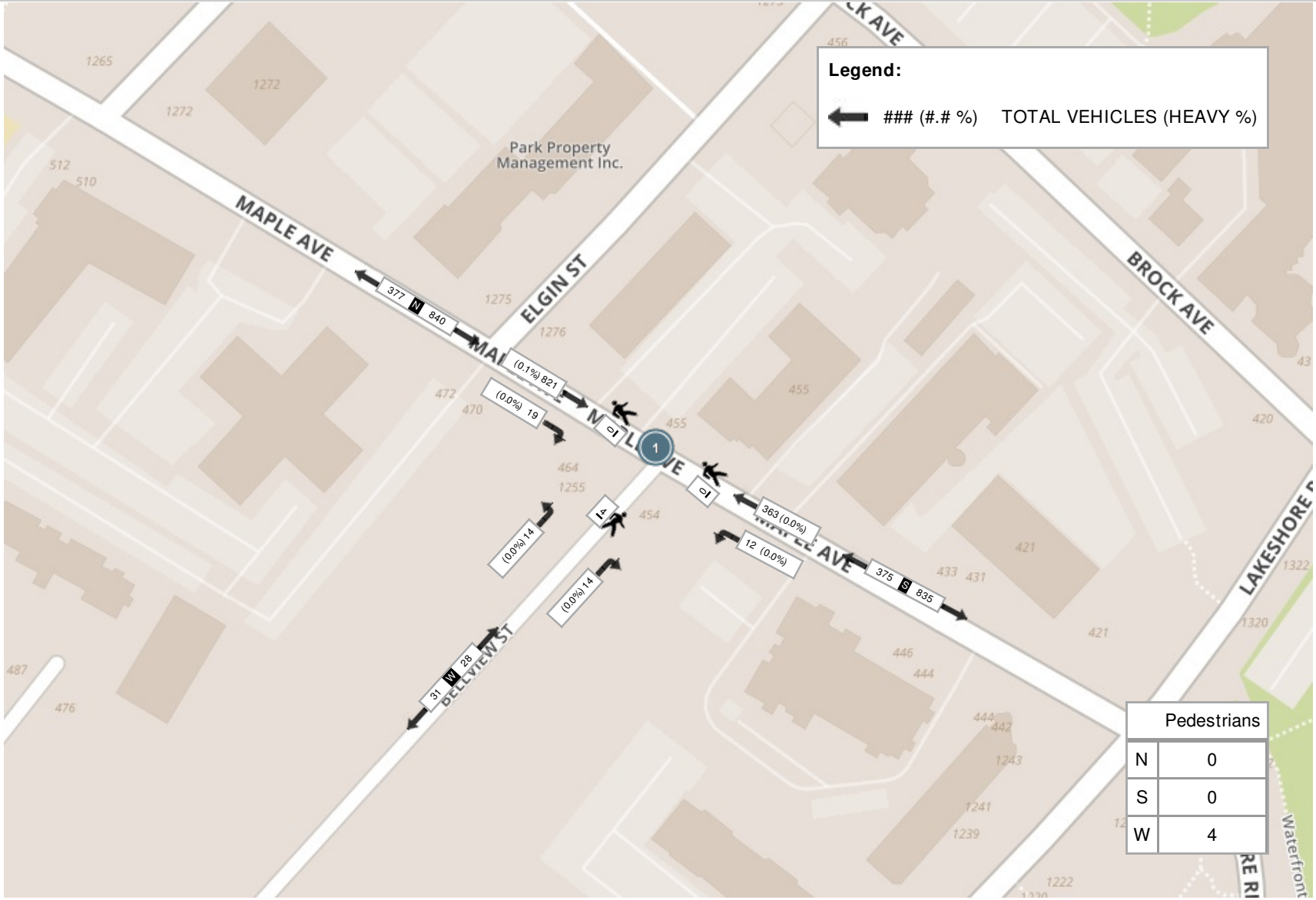
Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast (26.6 °C)

Start Time	N Approach MAPLE AVE					S Approach MAPLE AVE					W Approach BELLVIEW ST					Int. Total (15 min)
	Right	Thru	U-Turn	Peds	Approach Total	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	
16:15:00	7	178	0	0	185	99	3	0	0	102	5	2	0	1	7	294
16:30:00	4	184	0	0	188	90	3	0	0	93	3	6	0	0	9	290
16:45:00	4	223	0	0	227	96	4	0	0	100	3	4	0	1	7	334
17:00:00	4	236	0	0	240	78	2	0	0	80	3	2	0	2	5	325
Grand Total	19	821	0	0	840	363	12	0	0	375	14	14	0	4	28	**1243**
Approach%	2.3%	97.7%	0%		-	96.8%	3.2%	0%		-	50%	50%	0%		-	**-**
Totals %	1.5%	66%	0%		67.6%	29.2%	1%	0%		30.2%	1.1%	1.1%	0%		2.3%	**-**
PHF	0.68	0.87	0		0.88	0.92	0.75	0		0.92	0.7	0.58	0		0.78	**-**
Heavy	0	1	0		1	0	0	0		0	0	0	0		0	**-**
Heavy %	0%	0.1%	0%		0.1%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Lights	19	811	0		830	352	12	0		364	14	14	0		28	**-**
Lights %	100%	98.8%	0%		98.8%	97%	100%	0%		97.1%	100%	100%	0%		100%	**-**
Mediums	0	9	0		9	11	0	0		11	0	0	0		0	**-**
Mediums %	0%	1.1%	0%		1.1%	3%	0%	0%		2.9%	0%	0%	0%		0%	**-**
Articulated Trucks	0	1	0		1	0	0	0		0	0	0	0		0	**-**
Articulated Trucks %	0%	0.1%	0%		0.1%	0%	0%	0%		0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	4	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	100%		**-**

Peak Hour: 07:30 AM - 08:30 AM Weather: Unknown (22.8 °C)



Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast (26.6 °C)



Turning Movement Count (2 . MAPLE AVE & LAKESHORE RD AT NORTH SHORE BLVD E)

Start Time	N Approach MAPLE AVE						E Approach LAKESHORE RD						S Approach MAPLE AVE						W Approach NORTH SHORE BLVD E						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	U-Turn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	U-Turn W:W	Peds W:	Approach Total		
06:00:00	17	4	3	0	15	24	5	36	12	0	5	53	23	4	2	0	6	29	7	92	11	0	2	110	216	
06:15:00	19	6	8	0	6	33	7	48	6	0	5	61	51	8	0	0	4	59	5	127	15	0	4	147	300	
06:30:00	20	6	8	0	7	34	1	58	16	0	4	75	37	14	1	0	6	52	18	165	27	0	4	210	371	
06:45:00	22	9	6	0	5	37	8	63	13	0	5	84	53	14	1	0	7	68	30	123	35	0	5	188	377	1264
07:00:00	19	23	8	0	9	50	5	71	12	0	3	88	43	20	4	0	3	67	18	94	26	0	6	138	343	1391
07:15:00	47	14	9	0	7	70	7	89	16	0	3	112	46	24	10	0	0	80	34	168	35	0	1	237	499	1590
07:30:00	51	20	9	0	9	80	8	116	27	0	4	151	74	27	2	0	2	103	21	199	45	0	1	265	599	1818
07:45:00	45	17	9	0	12	71	9	118	29	0	3	156	59	34	4	0	2	97	33	173	44	0	7	250	574	2015
08:00:00	58	16	7	0	4	81	14	129	21	0	6	164	54	22	6	0	1	82	30	184	49	0	1	263	590	2262
08:15:00	45	18	6	0	8	69	15	123	35	0	9	173	63	18	7	0	3	88	28	177	47	0	3	252	582	2345
08:30:00	51	12	7	0	11	70	10	117	35	0	3	162	52	26	4	0	1	82	24	176	31	0	7	231	545	2291
08:45:00	45	11	21	0	5	77	11	106	34	0	2	151	55	21	9	0	2	85	19	176	48	0	3	243	556	2273
09:00:00	43	13	13	0	6	69	16	88	16	0	2	120	54	22	5	0	0	81	20	201	55	0	6	276	546	2229
09:15:00	34	14	8	0	6	56	13	117	32	0	7	162	39	17	10	0	4	66	17	203	49	0	2	269	553	2200
09:30:00	30	19	16	0	6	65	16	101	29	0	2	146	38	25	11	0	5	74	21	151	35	0	1	207	492	2147
09:45:00	26	13	11	0	1	50	23	94	29	0	0	146	37	23	17	0	1	77	18	150	43	0	1	211	484	2075
BREAK																										
15:00:00	59	34	34	0	10	127	21	186	32	0	13	239	48	29	26	0	9	103	11	117	36	0	5	164	633	
15:15:00	57	30	25	0	8	112	15	174	47	1	5	237	60	44	22	0	7	126	18	112	43	0	5	173	648	
15:30:00	73	23	23	0	9	119	20	226	51	0	9	297	74	47	43	0	6	164	17	119	62	0	2	198	778	
15:45:00	84	42	28	0	5	154	15	183	61	0	14	259	47	35	24	0	8	106	16	158	60	0	10	234	753	2812
16:00:00	89	30	28	0	5	147	14	238	51	0	5	303	53	30	37	0	10	120	17	149	54	0	2	220	790	2969
16:15:00	117	55	18	0	6	190	17	218	44	0	3	279	41	31	20	0	3	92	24	108	50	0	5	182	743	3064
16:30:00	115	43	26	0	5	184	20	228	63	0	3	311	55	41	19	0	1	115	23	137	37	0	2	197	807	3093
16:45:00	128	66	24	0	7	218	17	256	53	0	3	326	35	25	11	0	3	71	15	150	53	0	4	218	833	3173
17:00:00	163	57	18	0	11	238	13	270	54	0	6	337	37	20	6	0	5	63	26	130	41	0	0	197	835	3218
17:15:00	138	40	20	0	2	198	9	262	62	0	0	333	27	12	11	0	2	50	13	150	52	0	0	215	796	3271
17:30:00	90	29	19	0	12	138	19	242	56	0	4	317	26	13	15	0	0	54	11	138	42	0	5	191	700	3164
17:45:00	79	38	15	0	5	132	14	223	33	0	9	270	19	11	10	0	1	40	19	132	31	0	2	182	624	2955
18:00:00	63	26	29	0	6	118	14	179	39	0	6	232	24	15	11	0	3	50	9	108	38	1	7	156	556	2676
18:15:00	64	20	21	0	5	105	21	138	36	0	1	195	26	9	15	0	4	50	16	105	47	0	4	168	518	2398

18:30:00	52	17	19	0	13	88	10	127	42	0	17	179	23	8	16	0	7	47	11	99	31	0	3	141	455	2153
18:45:00	46	17	23	0	4	86	19	104	24	0	5	147	18	10	10	0	3	38	16	109	37	0	0	162	433	1962
Grand Total	1989	782	519	0	230	3290	426	4728	1110	1	166	6265	1391	699	389	0	119	2479	605	4580	1309	1	110	6495	**18529**	-
Approach%	60.5%	23.8%	15.8%	0%		-	6.8%	75.5%	17.7%	0%		-	56.1%	28.2%	15.7%	0%		-	9.3%	70.5%	20.2%	0%		-	**-**	-
Totals %	10.7%	4.2%	2.8%	0%		17.8%	2.3%	25.5%	6%	0%		33.8%	7.5%	3.8%	2.1%	0%		13.4%	3.3%	24.7%	7.1%	0%		35.1%	**-**	-
Heavy	0	0	2	0		-	0	6	1	0		-	1	0	2	0		-	2	5	1	0		-	**-**	-
Heavy %	0%	0%	0.4%	0%		-	0%	0.1%	0.1%	0%		-	0.1%	0%	0.5%	0%		-	0.3%	0.1%	0.1%	0%		-	**-**	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	**-**	-

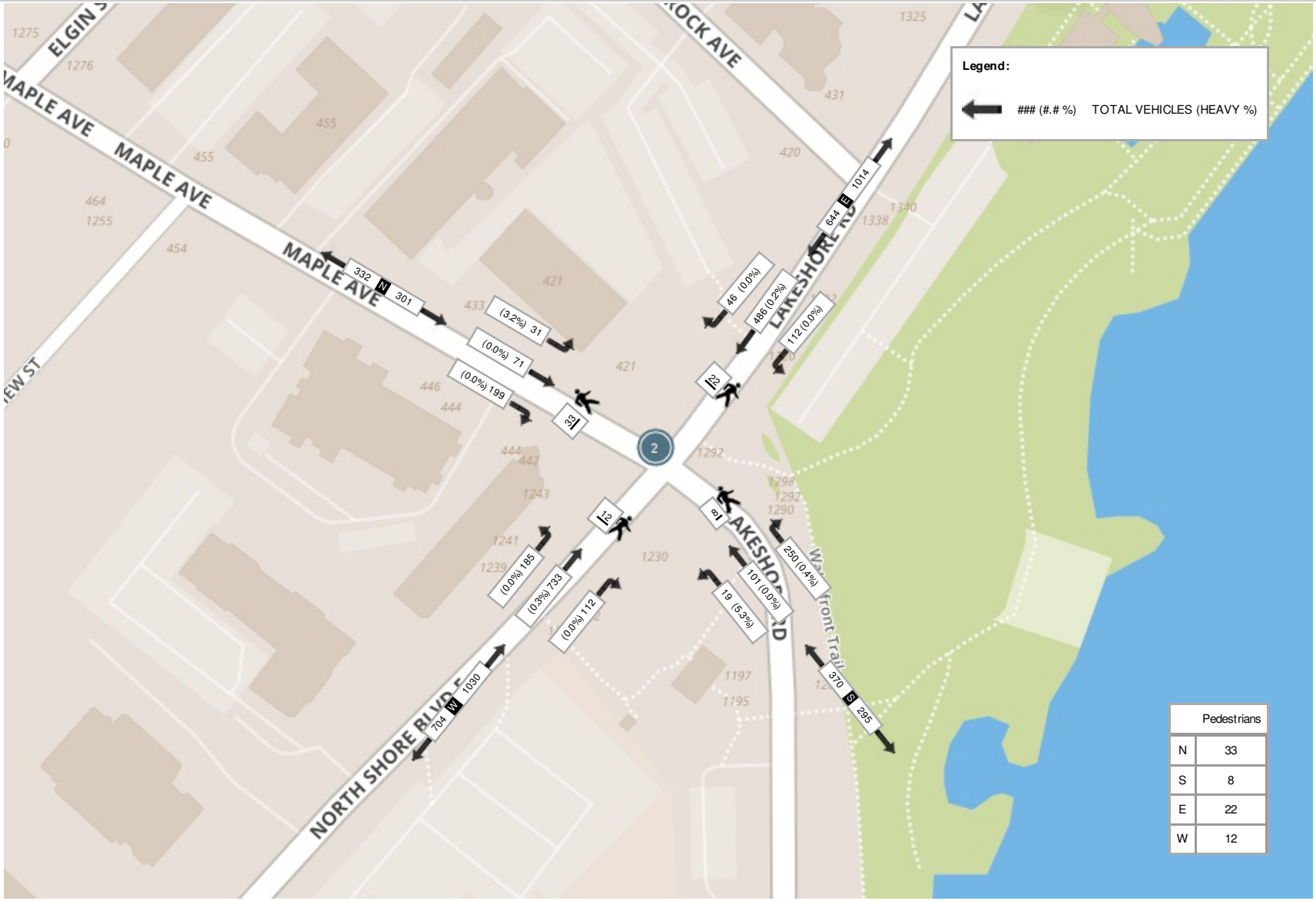
Peak Hour: 07:30 AM - 08:30 AM Weather: Unknown (22.8 °C)

Start Time	N Approach MAPLE AVE						E Approach LAKESHORE RD						S Approach MAPLE AVE						W Approach NORTH SHORE BLVD E						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
07:30:00	51	20	9	0	9	80	8	116	27	0	4	151	74	27	2	0	2	103	21	199	45	0	1	265	599
07:45:00	45	17	9	0	12	71	9	118	29	0	3	156	59	34	4	0	2	97	33	173	44	0	7	250	574
08:00:00	58	16	7	0	4	81	14	129	21	0	6	164	54	22	6	0	1	82	30	184	49	0	1	263	590
08:15:00	45	18	6	0	8	69	15	123	35	0	9	173	63	18	7	0	3	88	28	177	47	0	3	252	582
Grand Total	199	71	31	0	33	301	46	486	112	0	22	644	250	101	19	0	8	370	112	733	185	0	12	1030	**2345**
Approach%	66.1%	23.6%	10.3%	0%		-	7.1%	75.5%	17.4%	0%		-	67.6%	27.3%	5.1%	0%		-	10.9%	71.2%	18%	0%		-	**-**
Totals %	8.5%	3%	1.3%	0%		12.8%	2%	20.7%	4.8%	0%		27.5%	10.7%	4.3%	0.8%	0%		15.8%	4.8%	31.3%	7.9%	0%		43.9%	**-**
PHF	0.86	0.89	0.86	0		0.93	0.77	0.94	0.8	0		0.93	0.84	0.74	0.68	0		0.9	0.85	0.92	0.94	0		0.97	**-**
Heavy	0	0	1	0		1	0	1	0	0		1	1	0	1	0		2	0	2	0	0		2	**-**
Heavy %	0%	0%	3.2%	0%		0.3%	0%	0.2%	0%	0%		0.2%	0.4%	0%	5.3%	0%		0.5%	0%	0.3%	0%	0%		0.2%	**-**
Lights	197	69	26	0		292	40	476	107	0		623	238	100	17	0		355	110	719	182	0		1011	**-**
Lights %	99%	97.2%	83.9%	0%		97%	87%	97.9%	95.5%	0%		96.7%	95.2%	99%	89.5%	0%		95.9%	98.2%	98.1%	98.4%	0%		98.2%	**-**
Mediums	2	2	4	0		8	6	9	5	0		20	11	1	1	0		13	2	12	3	0		17	**-**
Mediums %	1%	2.8%	12.9%	0%		2.7%	13%	1.9%	4.5%	0%		3.1%	4.4%	1%	5.3%	0%		3.5%	1.8%	1.6%	1.6%	0%		1.7%	**-**
Articulated Trucks	0	0	1	0		1	0	1	0	0		1	1	0	1	0		2	0	2	0	0		2	**-**
Articulated Trucks %	0%	0%	3.2%	0%		0.3%	0%	0.2%	0%	0%		0.2%	0.4%	0%	5.3%	0%		0.5%	0%	0.3%	0%	0%		0.2%	**-**
Pedestrians	-	-	-	-	33	-	-	-	-	-	22	-	-	-	-	-	8	-	-	-	-	-	12	-	**-**
Pedestrians%	-	-	-	-	44%		-	-	-	-	29.3%		-	-	-	-	10.7%		-	-	-	-	16%		**-**

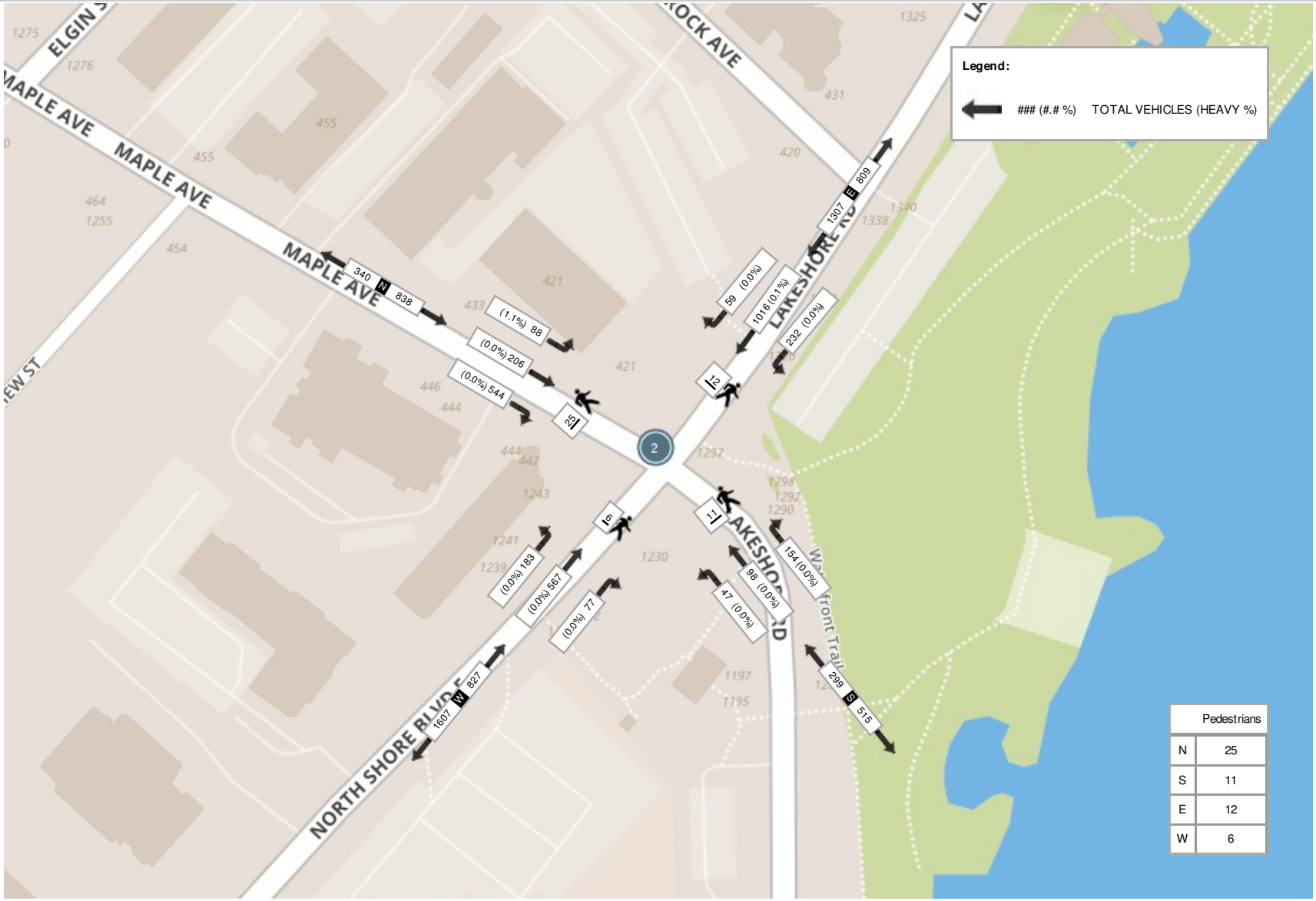
Peak Hour: 04:30 PM - 05:30 PM Weather: Overcast (26.6 °C)

Start Time	N Approach MAPLE AVE						E Approach LAKESHORE RD						S Approach MAPLE AVE						W Approach NORTH SHORE BLVD E						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
16:30:00	115	43	26	0	5	184	20	228	63	0	3	311	55	41	19	0	1	115	23	137	37	0	2	197	807
16:45:00	128	66	24	0	7	218	17	256	53	0	3	326	35	25	11	0	3	71	15	150	53	0	4	218	833
17:00:00	163	57	18	0	11	238	13	270	54	0	6	337	37	20	6	0	5	63	26	130	41	0	0	197	835
17:15:00	138	40	20	0	2	198	9	262	62	0	0	333	27	12	11	0	2	50	13	150	52	0	0	215	796
Grand Total	544	206	88	0	25	838	59	1016	232	0	12	1307	154	98	47	0	11	299	77	567	183	0	6	827	**3271**
Approach%	64.9%	24.6%	10.5%	0%		-	4.5%	77.7%	17.8%	0%		-	51.5%	32.8%	15.7%	0%		-	9.3%	68.6%	22.1%	0%		-	**-**
Totals %	16.6%	6.3%	2.7%	0%		25.6%	1.8%	31.1%	7.1%	0%		40%	4.7%	3%	1.4%	0%		9.1%	2.4%	17.3%	5.6%	0%		25.3%	**-**
PHF	0.83	0.78	0.85	0		0.88	0.74	0.94	0.92	0		0.97	0.7	0.6	0.62	0		0.65	0.74	0.95	0.86	0		0.95	**-**
Heavy	0	0	1	0		1	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	**-**
Heavy %	0%	0%	1.1%	0%		0.1%	0%	0.1%	0%	0%		0.1%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	**-**
Lights	542	204	84	0		830	53	1002	229	0		1284	147	97	47	0		291	75	564	181	0		820	**-**
Lights %	99.6%	99%	95.5%	0%		99%	89.8%	98.6%	98.7%	0%		98.2%	95.5%	99%	100%	0%		97.3%	97.4%	99.5%	98.9%	0%		99.2%	**-**
Mediums	2	2	3	0		7	6	13	3	0		22	7	1	0	0		8	2	3	2	0		7	**-**
Mediums %	0.4%	1%	3.4%	0%		0.8%	10.2%	1.3%	1.3%	0%		1.7%	4.5%	1%	0%	0%		2.7%	2.6%	0.5%	1.1%	0%		0.8%	**-**
Articulated Trucks	0	0	1	0		1	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	1.1%	0%		0.1%	0%	0.1%	0%	0%		0.1%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	25	-	-	-	-	-	12	-	-	-	-	-	11	-	-	-	-	-	6	-	**-**
Pedestrians%	-	-	-	-	46.3%		-	-	-	-	22.2%		-	-	-	-	20.4%		-	-	-	-	11.1%		**-**

Peak Hour: 07:30 AM - 08:30 AM Weather: Unknown (22.8 °C)



Peak Hour: 04:30 PM - 05:30 PM **Weather: Overcast (26.6 °C)**



APPENDIX C

Levels of Service Definitions

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Level of Service Definitions

Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Extremely favourable progression with most vehicles arriving during the green phase. Most vehicles do not stop and short cycle lengths may contribute to low delay.
B	> 10 and ≤ 20	VERY GOOD. Very good progression and/or short cycle lengths with slightly more vehicles stopping than LOS "A" causing slightly higher levels of average delay.
C	> 20 and ≤ 35	GOOD. Fair progression and longer cycle lengths lead to a greater number of vehicles stopping than LOS "B".
D	> 35 and ≤ 55	FAIR. Congestion becomes noticeable with higher average delays resulting from a combination of long cycle lengths, high volume-to-capacity ratios and unfavourable progression.
E	> 55 and ≤ 80	POOR. Lengthy delays values are indicative of poor progression, long cycle lengths and high volume-to-capacity ratios. Individual cycle failures are common with individual movement failures also common.
F	> 80	UNSATISFACTORY. Indicative of oversaturated conditions with vehicular demand greater than the capacity of the intersection.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

APPENDIX D

Detailed Capacity Analyses



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	14	9	336	282	3
Future Volume (Veh/h)	14	14	9	336	282	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	15	15	9	354	297	3
Pedestrians	8			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (m)				177		
pX, platoon unblocked						
vC, conflicting volume	502	159	308			
vC1, stage 1 conf vol	306					
vC2, stage 2 conf vol	195					
vCu, unblocked vol	502	159	308			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	99			
cM capacity (veh/h)	655	857	1254			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	30	9	177	177	198	102
Volume Left	15	9	0	0	0	0
Volume Right	15	0	0	0	0	3
cSH	742	1254	1700	1700	1700	1700
Volume to Capacity	0.04	0.01	0.10	0.10	0.12	0.06
Queue Length 95th (m)	1.0	0.2	0.0	0.0	0.0	0.0
Control Delay (s)	10.1	7.9	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	10.1	0.2			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	19.6%	ICU Level of Service	A
Analysis Period (min)	15		

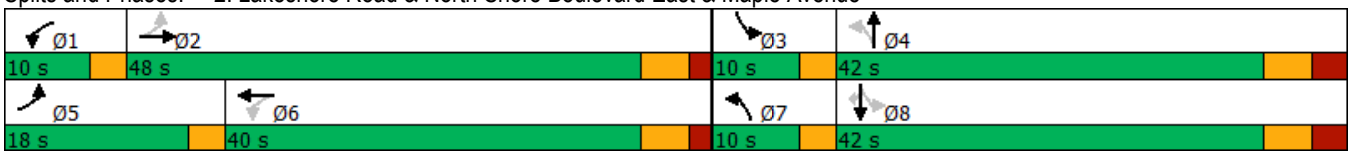
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	733	112	112	486	46	19	101	250	31	71	199
Future Volume (vph)	185	733	112	112	486	46	19	101	250	31	71	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	27.0		0.0	25.0		0.0	60.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00		0.99	0.98		0.99		0.98
Frt		0.980			0.987			0.893				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3561	0	1825	3588	0	1738	1674	0	1772	1921	1633
Flt Permitted	0.364			0.254			0.710			0.221		
Satd. Flow (perm)	690	3561	0	486	3588	0	1284	1674	0	408	1921	1594
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			9			119				203
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		140.4			120.6			116.3			177.3	
Travel Time (s)		8.4			7.2			7.0			12.8	
Confl. Peds. (#/hr)	33		8	8		33	12		22	22		12
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	5%	0%	0%	3%	0%	0%
Adj. Flow (vph)	189	748	114	114	496	47	19	103	255	32	72	203
Shared Lane Traffic (%)												
Lane Group Flow (vph)	189	862	0	114	543	0	19	358	0	32	72	203
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		3	8	8
Switch Phase												
Minimum Initial (s)	6.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.0	38.0		10.0	38.0		10.0	40.0		10.0	40.0	40.0
Total Split (s)	18.0	48.0		10.0	40.0		10.0	42.0		10.0	42.0	42.0
Total Split (%)	16.4%	43.6%		9.1%	36.4%		9.1%	38.2%		9.1%	38.2%	38.2%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	3.0		0.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	Max		None	Max		None	None		Max	None	None
Act Effct Green (s)	54.3	42.2		48.6	38.7		30.0	19.6		32.6	26.0	26.0
Actuated g/C Ratio	0.57	0.45		0.51	0.41		0.32	0.21		0.34	0.27	0.27
v/c Ratio	0.36	0.54		0.33	0.37		0.04	0.81		0.13	0.14	0.35
Control Delay	12.7	21.4		13.6	21.9		19.2	38.5		20.4	27.8	6.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	12.7	21.4		13.6	21.9		19.2	38.5		20.4	27.8	6.0
LOS	B	C		B	C		B	D		C	C	A
Approach Delay		19.8			20.5			37.5			12.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			C			D			B	
Queue Length 50th (m)	14.9	57.4		8.6	34.5		2.2	42.4		3.8	9.3	0.0
Queue Length 95th (m)	32.1	90.5		20.5	61.1		6.6	73.3		9.3	21.8	16.0
Internal Link Dist (m)		116.4			96.6			92.3			153.3	
Turn Bay Length (m)	27.0			25.0			60.0			45.0		
Base Capacity (vph)	581	1596		349	1471		449	696		241	713	719
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.33	0.54		0.33	0.37		0.04	0.51		0.13	0.10	0.28

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 94.8
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 21.9 — Intersection LOS: C
Intersection Capacity Utilization 76.9% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue



Intersection: 1: Maple Avenue & Bellview Street

Movement	EB	NB	NB	NB	SB
Directions Served	LR	L	T	T	T
Maximum Queue (m)	11.4	6.8	4.6	2.3	4.6
Average Queue (m)	5.2	0.4	0.2	0.1	0.2
95th Queue (m)	12.4	3.7	2.1	1.5	2.1
Link Distance (m)	175.3		154.8	154.8	144.1
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)		15.0			
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Intersection: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (m)	34.4	113.8	84.9	32.3	87.7	68.8	41.5	96.7	21.0	27.1	32.4
Average Queue (m)	26.2	61.3	47.6	22.2	48.6	34.6	5.3	47.4	6.5	9.6	15.1
95th Queue (m)	42.3	97.6	75.3	38.7	76.7	62.2	23.6	80.4	17.2	22.2	25.6
Link Distance (m)		123.0	123.0		107.6	107.6		101.1		154.8	154.8
Upstream Blk Time (%)		0			0			1			
Queuing Penalty (veh)		0			0			0			
Storage Bay Dist (m)	27.0			25.0			60.0		45.0		
Storage Blk Time (%)	6	27		3	27			6			
Queuing Penalty (veh)	21	50		7	30			1			

Network Summary

Network wide Queuing Penalty: 109



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	14	12	363	821	19
Future Volume (Veh/h)	14	14	12	363	821	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	15	15	13	390	883	20
Pedestrians	4					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (m)				177		
pX, platoon unblocked						
vC, conflicting volume	1118	456	907			
vC1, stage 1 conf vol	897					
vC2, stage 2 conf vol	221					
vCu, unblocked vol	1118	456	907			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	97	98			
cM capacity (veh/h)	344	555	756			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	30	13	195	195	589	314
Volume Left	15	13	0	0	0	0
Volume Right	15	0	0	0	0	20
cSH	425	756	1700	1700	1700	1700
Volume to Capacity	0.07	0.02	0.11	0.11	0.35	0.18
Queue Length 95th (m)	1.7	0.4	0.0	0.0	0.0	0.0
Control Delay (s)	14.1	9.8	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	14.1	0.3			0.0	
Approach LOS	B					

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	33.3%	ICU Level of Service	A	
Analysis Period (min)	15			

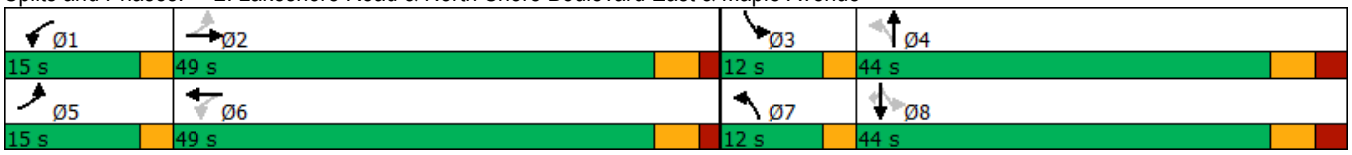
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	183	567	77	232	1016	59	47	98	154	88	206	544
Future Volume (vph)	183	567	77	232	1016	59	47	98	154	88	206	544
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	27.0		0.0	25.0		0.0	60.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	24.0			15.0			60.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	1.00		1.00	0.98		0.99		0.98
Frt		0.982			0.992			0.908				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3567	0	1825	3613	0	1825	1717	0	1807	1921	1633
Flt Permitted	0.131			0.326			0.550			0.422		
Satd. Flow (perm)	251	3567	0	622	3613	0	1052	1717	0	796	1921	1603
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			5			68				339
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		140.4			120.6			116.3			177.3	
Travel Time (s)		8.4			7.2			7.0			12.8	
Confl. Peds. (#/hr)	25		11	11		25	6		12	12		6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	187	579	79	237	1037	60	48	100	157	90	210	555
Shared Lane Traffic (%)												
Lane Group Flow (vph)	187	658	0	237	1097	0	48	257	0	90	210	555
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		3	8	8
Switch Phase												
Minimum Initial (s)	6.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.0	38.0		10.0	38.0		10.0	40.0		10.0	40.0	40.0
Total Split (s)	15.0	49.0		15.0	49.0		12.0	44.0		12.0	44.0	44.0
Total Split (%)	12.5%	40.8%		12.5%	40.8%		10.0%	36.7%		10.0%	36.7%	36.7%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	3.0		0.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	Max		None	Max		None	None		None	None	None
Act Effct Green (s)	57.8	44.1		57.9	44.1		33.2	23.2		34.5	23.8	23.8
Actuated g/C Ratio	0.56	0.43		0.56	0.43		0.32	0.22		0.33	0.23	0.23
v/c Ratio	0.62	0.43		0.50	0.71		0.12	0.59		0.26	0.47	0.88
Control Delay	24.2	24.1		16.9	30.3		21.2	31.3		23.1	37.7	30.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	24.2	24.1		16.9	30.3		21.2	31.3		23.1	37.7	30.8
LOS	C	C		B	C		C	C		C	D	C
Approach Delay		24.2			27.9			29.7			31.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			C			C	
Queue Length 50th (m)	17.2	50.0		22.5	99.4		6.4	35.2		12.2	37.5	46.1
Queue Length 95th (m)	#42.3	79.8		46.5	151.2		13.5	59.2		22.3	59.4	92.7
Internal Link Dist (m)		116.4			96.6			92.3			153.3	
Turn Bay Length (m)	27.0			25.0			60.0			45.0		
Base Capacity (vph)	331	1531		499	1548		416	673		358	705	803
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.56	0.43		0.47	0.71		0.12	0.38		0.25	0.30	0.69

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 103.2			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 28.1		Intersection LOS: C	
Intersection Capacity Utilization 83.6%		ICU Level of Service E	
Analysis Period (min) 15			

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

Splits and Phases: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue



Intersection: 1: Maple Avenue & Bellview Street

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (m)	12.6	9.3	1.8
Average Queue (m)	5.3	2.1	0.1
95th Queue (m)	12.0	8.4	1.2
Link Distance (m)	178.6		147.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		15.0	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (m)	50.8	75.5	69.5	39.9	115.4	115.4	41.0	68.2	32.0	57.4	129.9
Average Queue (m)	27.4	43.9	35.9	33.2	102.9	90.3	9.4	31.0	12.2	31.9	69.1
95th Queue (m)	49.3	69.3	62.8	49.9	135.7	129.0	26.5	56.7	24.5	52.8	112.7
Link Distance (m)		126.3	126.3		110.8	110.8		104.3		161.3	161.3
Upstream Blk Time (%)					18	5					
Queuing Penalty (veh)					0	0					
Storage Bay Dist (m)	27.0			25.0			60.0		45.0		
Storage Blk Time (%)	12	21		20	46			1	0	3	
Queuing Penalty (veh)	33	39		102	106			0	0	2	

Network Summary

Network wide Queuing Penalty: 283



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	15	9	375	317	3
Future Volume (Veh/h)	15	15	9	375	317	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	16	9	395	334	3
Pedestrians	8			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (m)				177		
pX, platoon unblocked						
vC, conflicting volume	559	178	345			
vC1, stage 1 conf vol	344					
vC2, stage 2 conf vol	216					
vCu, unblocked vol	559	178	345			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	99			
cM capacity (veh/h)	625	834	1216			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	32	9	198	198	223	114
Volume Left	16	9	0	0	0	0
Volume Right	16	0	0	0	0	3
cSH	714	1216	1700	1700	1700	1700
Volume to Capacity	0.04	0.01	0.12	0.12	0.13	0.07
Queue Length 95th (m)	1.1	0.2	0.0	0.0	0.0	0.0
Control Delay (s)	10.3	8.0	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	10.3	0.2			0.0	
Approach LOS	B					

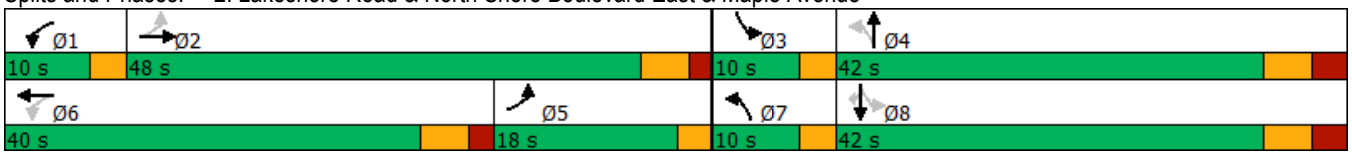
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	20.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	806	112	112	537	46	19	111	250	31	78	206
Future Volume (vph)	190	806	112	112	537	46	19	111	250	31	78	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	27.0		0.0	25.0		0.0	60.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	1.00		1.00	1.00		0.99	0.98		0.99		0.98
Frt		0.982			0.988			0.896				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3570	0	1825	3593	0	1738	1680	0	1772	1921	1633
Flt Permitted	0.427			0.147			0.705			0.220		
Satd. Flow (perm)	808	3570	0	282	3593	0	1276	1680	0	406	1921	1594
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			8			108				210
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		140.4			120.6			116.3			177.3	
Travel Time (s)		8.4			7.2			7.0			12.8	
Confl. Peds. (#/hr)	33		8	8		33	12		22	22		12
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	5%	0%	0%	3%	0%	0%
Adj. Flow (vph)	194	822	114	114	548	47	19	113	255	32	80	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	194	936	0	114	595	0	19	368	0	32	80	210
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		3	8	8
Switch Phase												
Minimum Initial (s)	6.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.0	38.0		10.0	38.0		10.0	40.0		10.0	40.0	40.0
Total Split (s)	18.0	48.0		10.0	40.0		10.0	42.0		10.0	42.0	42.0
Total Split (%)	16.4%	43.6%		9.1%	36.4%		9.1%	38.2%		9.1%	38.2%	38.2%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	3.0		0.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	Max		None	Max		None	None		Max	None	None
Act Effct Green (s)	45.2	42.2		37.2	34.2		31.3	20.9		34.0	27.3	27.3
Actuated g/C Ratio	0.47	0.44		0.39	0.36		0.33	0.22		0.35	0.28	0.28
v/c Ratio	0.36	0.59		0.52	0.46		0.04	0.82		0.13	0.15	0.35
Control Delay	22.8	23.1		30.4	26.2		18.8	39.9		20.1	27.5	5.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	22.8	23.1		30.4	26.2		18.8	39.9		20.1	27.5	5.8
LOS	C	C		C	C		B	D		C	C	A
Approach Delay		23.1			26.9			38.9			12.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			D			B	
Queue Length 50th (m)	20.5	66.0		13.6	43.5		2.2	46.7		3.8	10.4	0.0
Queue Length 95th (m)	41.4	103.4		29.3	69.1		6.6	78.2		9.3	23.5	16.1
Internal Link Dist (m)		116.4			96.6			92.3			153.3	
Turn Bay Length (m)	27.0			25.0			60.0			45.0		
Base Capacity (vph)	540	1575		222	1281		458	682		243	702	716
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.36	0.59		0.51	0.46		0.04	0.54		0.13	0.11	0.29

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 96.2			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 25.2		Intersection LOS: C	
Intersection Capacity Utilization 77.2%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue



Intersection: 1: Maple Avenue & Bellview Street

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	9.6	6.8
Average Queue (m)	5.4	0.7
95th Queue (m)	11.8	4.8
Link Distance (m)	175.3	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (m)	34.4	122.3	97.0	32.3	88.2	69.2	40.9	90.2	15.5	25.7	30.0
Average Queue (m)	29.1	74.0	56.8	24.6	53.0	37.1	7.2	52.5	5.6	10.3	15.7
95th Queue (m)	43.3	119.8	95.8	38.8	83.8	66.7	27.5	91.7	14.1	22.8	27.8
Link Distance (m)		123.0	123.0		107.6	107.6		101.1		154.8	154.8
Upstream Blk Time (%)		1	0		0			2			
Queuing Penalty (veh)		0	0		0			0			
Storage Bay Dist (m)	27.0			25.0			60.0		45.0		
Storage Blk Time (%)	11	31		16	29		0	9			
Queuing Penalty (veh)	45	59		44	33		0	2			

Network Summary

Network wide Queuing Penalty: 182



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	15	12	404	912	19
Future Volume (Veh/h)	15	15	12	404	912	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	16	16	13	434	981	20
Pedestrians	4					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (m)				177		
pX, platoon unblocked						
vC, conflicting volume	1238	504	1005			
vC1, stage 1 conf vol	995					
vC2, stage 2 conf vol	243					
vCu, unblocked vol	1238	504	1005			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	97	98			
cM capacity (veh/h)	307	516	694			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	32	13	217	217	654	347
Volume Left	16	13	0	0	0	0
Volume Right	16	0	0	0	0	20
cSH	385	694	1700	1700	1700	1700
Volume to Capacity	0.08	0.02	0.13	0.13	0.38	0.20
Queue Length 95th (m)	2.1	0.4	0.0	0.0	0.0	0.0
Control Delay (s)	15.2	10.3	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	15.2	0.3			0.0	
Approach LOS	C					

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

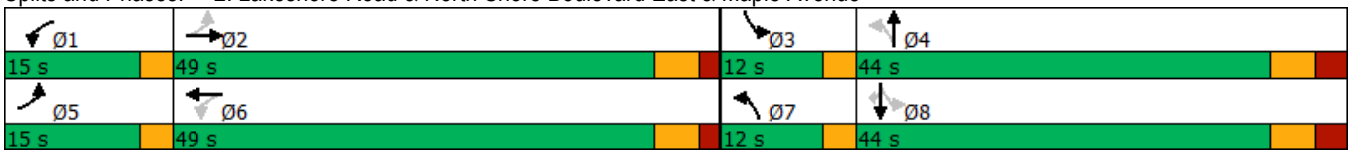
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	188	624	77	232	1119	59	47	108	154	88	227	553
Future Volume (vph)	188	624	77	232	1119	59	47	108	154	88	227	553
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	27.0		0.0	25.0		0.0	60.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	24.0			15.0			60.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		0.99	1.00		1.00	0.99		0.99		0.98
Frt		0.983			0.993			0.912				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3572	0	1825	3617	0	1825	1726	0	1807	1921	1633
Flt Permitted	0.091			0.293			0.511			0.413		
Satd. Flow (perm)	175	3572	0	559	3617	0	977	1726	0	779	1921	1603
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			5			62				333
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		140.4			120.6			116.3			177.3	
Travel Time (s)		8.4			7.2			7.0			12.8	
Confl. Peds. (#/hr)	25		11	11		25	6		12	12		6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	192	637	79	237	1142	60	48	110	157	90	232	564
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	716	0	237	1202	0	48	267	0	90	232	564
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		3	8	8
Switch Phase												
Minimum Initial (s)	6.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.0	38.0		10.0	38.0		10.0	40.0		10.0	40.0	40.0
Total Split (s)	15.0	49.0		15.0	49.0		12.0	44.0		12.0	44.0	44.0
Total Split (%)	12.5%	40.8%		12.5%	40.8%		10.0%	36.7%		10.0%	36.7%	36.7%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	3.0		0.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	Max		None	Max		None	None		None	None	None
Act Effct Green (s)	57.9	44.1		57.9	44.1		34.5	24.5		35.7	25.1	25.1
Actuated g/C Ratio	0.55	0.42		0.55	0.42		0.33	0.23		0.34	0.24	0.24
v/c Ratio	0.72	0.47		0.54	0.79		0.13	0.59		0.26	0.50	0.89
Control Delay	38.1	25.5		18.4	33.7		21.0	32.3		22.9	38.1	32.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	38.1	25.5		18.4	33.7		21.0	32.3		22.9	38.1	32.0
LOS	D	C		B	C		C	C		C	D	C
Approach Delay		28.2			31.1			30.6			32.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			C			C	
Queue Length 50th (m)	22.1	58.2		24.0	119.0		6.4	38.5		12.2	42.1	50.4
Queue Length 95th (m)	#61.8	88.2		46.5	#183.8		13.5	63.5		22.3	65.3	98.5
Internal Link Dist (m)		116.4			96.6			92.3			153.3	
Turn Bay Length (m)	27.0			25.0			60.0			45.0		
Base Capacity (vph)	293	1513		465	1528		405	665		359	696	793
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.66	0.47		0.51	0.79		0.12	0.40		0.25	0.33	0.71

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 104.5
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 30.7 — Intersection LOS: C
Intersection Capacity Utilization 87.0% — ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue



Intersection: 1: Maple Avenue & Bellview Street

Movement	EB	NB	SB	SB
Directions Served	LR	L	T	TR
Maximum Queue (m)	16.2	9.3	19.0	23.1
Average Queue (m)	6.2	1.9	1.2	2.5
95th Queue (m)	14.9	7.9	16.9	23.6
Link Distance (m)	178.6		147.3	147.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		15.0		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Intersection: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (m)	50.9	104.3	87.8	39.9	115.4	115.4	28.4	76.1	36.4	97.4	133.5
Average Queue (m)	36.1	55.4	42.2	35.0	112.4	103.7	10.1	35.3	12.7	38.7	83.0
95th Queue (m)	58.7	89.5	72.4	48.7	126.8	132.8	20.8	64.0	27.7	73.3	133.2
Link Distance (m)		126.3	126.3		110.8	110.8		104.3		161.3	161.3
Upstream Blk Time (%)		0			36	23				0	2
Queuing Penalty (veh)		0			0	0				1	8
Storage Bay Dist (m)	27.0			25.0			60.0		45.0		
Storage Blk Time (%)	22	26		22	54			1	0	5	
Queuing Penalty (veh)	68	48		126	124			1	0	5	

Network Summary

Network wide Queuing Penalty: 380



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	15	9	381	318	3
Future Volume (Veh/h)	15	15	9	381	318	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	16	16	9	401	335	3
Pedestrians	8			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (m)				177		
pX, platoon unblocked						
vC, conflicting volume	563	178	346			
vC1, stage 1 conf vol	344					
vC2, stage 2 conf vol	218					
vCu, unblocked vol	563	178	346			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	99			
cM capacity (veh/h)	623	833	1215			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	32	9	200	200	223	115
Volume Left	16	9	0	0	0	0
Volume Right	16	0	0	0	0	3
cSH	713	1215	1700	1700	1700	1700
Volume to Capacity	0.04	0.01	0.12	0.12	0.13	0.07
Queue Length 95th (m)	1.1	0.2	0.0	0.0	0.0	0.0
Control Delay (s)	10.3	8.0	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	10.3	0.2			0.0	
Approach LOS	B					

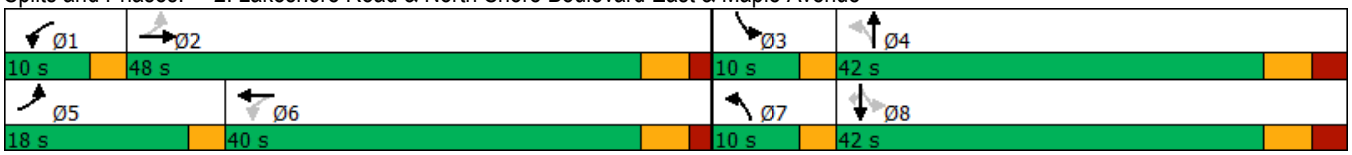
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	806	112	112	537	48	19	113	250	41	83	223
Future Volume (vph)	197	806	112	112	537	48	19	113	250	41	83	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	27.0		0.0	25.0		0.0	60.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00		0.99	0.98		0.99		0.98
Frt		0.982			0.988			0.897				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3570	0	1825	3593	0	1738	1683	0	1772	1921	1633
Flt Permitted	0.327			0.217			0.702			0.220		
Satd. Flow (perm)	621	3570	0	416	3593	0	1270	1683	0	406	1921	1594
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			9			106				228
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		140.4			120.6			116.3			102.0	
Travel Time (s)		8.4			7.2			7.0			7.3	
Confl. Peds. (#/hr)	33		8	8		33	12		22	22		12
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	5%	0%	0%	3%	0%	0%
Adj. Flow (vph)	201	822	114	114	548	49	19	115	255	42	85	228
Shared Lane Traffic (%)												
Lane Group Flow (vph)	201	936	0	114	597	0	19	370	0	42	85	228
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		3	8	8
Switch Phase												
Minimum Initial (s)	6.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.0	38.0		10.0	38.0		10.0	40.0		10.0	40.0	40.0
Total Split (s)	18.0	48.0		10.0	40.0		10.0	42.0		10.0	42.0	42.0
Total Split (%)	16.4%	43.6%		9.1%	36.4%		9.1%	38.2%		9.1%	38.2%	38.2%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	3.0		0.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	Max		None	Max		None	None		Max	None	None
Act Effct Green (s)	54.5	42.2		48.2	38.4		31.5	21.1		34.2	27.5	27.5
Actuated g/C Ratio	0.57	0.44		0.50	0.40		0.33	0.22		0.36	0.29	0.29
v/c Ratio	0.41	0.60		0.37	0.42		0.04	0.82		0.17	0.15	0.37
Control Delay	14.0	23.2		15.1	23.5		18.8	40.3		20.6	27.5	5.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	14.0	23.2		15.1	23.5		18.8	40.3		20.6	27.5	5.7
LOS	B	C		B	C		B	D		C	C	A
Approach Delay		21.6			22.2			39.2			12.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			D			B	
Queue Length 50th (m)	16.7	66.3		9.0	40.2		2.2	47.5		5.0	11.1	0.0
Queue Length 95th (m)	35.3	103.7		21.2	69.4		6.6	79.3		11.6	24.8	16.7
Internal Link Dist (m)		116.4			96.6			92.3			78.0	
Turn Bay Length (m)	27.0			25.0			60.0			45.0		
Base Capacity (vph)	543	1573		311	1436		458	682		243	701	727
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.37	0.60		0.37	0.42		0.04	0.54		0.17	0.12	0.31

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 96.3			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 23.2		Intersection LOS: C	
Intersection Capacity Utilization 85.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	32	6	378	11	1	336
Future Volume (Veh/h)	32	6	378	11	1	336
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	7	411	12	1	365
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			102			
pX, platoon unblocked						
vC, conflicting volume	602	212			423	
vC1, stage 1 conf vol	417					
vC2, stage 2 conf vol	184					
vCu, unblocked vol	602	212			423	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	99			100	
cM capacity (veh/h)	589	794			1133	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	42	274	149	1	182	182
Volume Left	35	0	0	1	0	0
Volume Right	7	0	12	0	0	0
cSH	616	1700	1700	1133	1700	1700
Volume to Capacity	0.07	0.16	0.09	0.00	0.11	0.11
Queue Length 95th (m)	1.7	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	11.3	0.0	0.0	8.2	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	11.3	0.0		0.0		
Approach LOS	B					

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Maple Avenue & Bellview Street

Movement	EB	NB	NB
Directions Served	LR	L	T
Maximum Queue (m)	8.1	6.6	2.1
Average Queue (m)	4.9	0.6	0.1
95th Queue (m)	11.4	4.2	2.0
Link Distance (m)	175.3		63.5
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		15.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (m)	34.4	114.8	90.6	32.3	76.9	60.2	54.0	97.6	18.7	30.3	34.9
Average Queue (m)	30.1	69.6	55.4	20.5	50.0	33.5	7.7	53.5	6.2	13.4	17.8
95th Queue (m)	42.5	112.8	88.5	36.2	76.2	58.2	35.2	96.2	15.6	27.5	31.4
Link Distance (m)		123.1	123.1		107.5	107.5		101.1		74.6	74.6
Upstream Blk Time (%)		1						1			
Queuing Penalty (veh)		0						0			
Storage Bay Dist (m)	27.0			25.0			60.0		45.0		
Storage Blk Time (%)	9	29		5	28		0	9			
Queuing Penalty (veh)	38	57		12	32		0	2			

Intersection: 3: Maple Avenue & Site Access

Movement	WB
Directions Served	LR
Maximum Queue (m)	16.0
Average Queue (m)	6.5
95th Queue (m)	15.1
Link Distance (m)	107.6
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 140



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	15	12	407	917	19
Future Volume (Veh/h)	15	15	12	407	917	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	16	16	13	438	986	20
Pedestrians	4					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	None	
Median storage veh)				2		
Upstream signal (m)				177		
pX, platoon unblocked						
vC, conflicting volume	1245	507	1010			
vC1, stage 1 conf vol	1000					
vC2, stage 2 conf vol	245					
vCu, unblocked vol	1245	507	1010			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	97	98			
cM capacity (veh/h)	305	514	691			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	32	13	219	219	657	349
Volume Left	16	13	0	0	0	0
Volume Right	16	0	0	0	0	20
cSH	383	691	1700	1700	1700	1700
Volume to Capacity	0.08	0.02	0.13	0.13	0.39	0.21
Queue Length 95th (m)	2.1	0.4	0.0	0.0	0.0	0.0
Control Delay (s)	15.3	10.3	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	15.3	0.3			0.0	
Approach LOS	C					

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	36.0%	ICU Level of Service	A	
Analysis Period (min)	15			

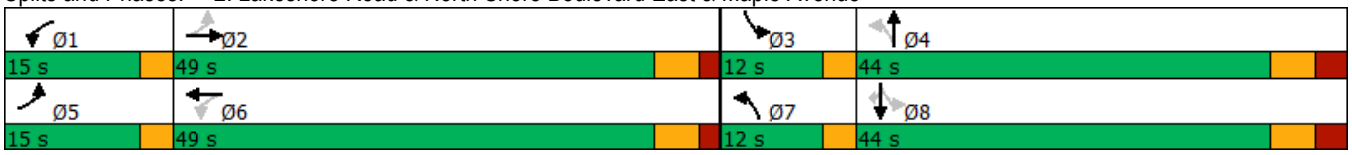
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	206	624	77	232	1119	66	47	112	154	92	230	564
Future Volume (vph)	206	624	77	232	1119	66	47	112	154	92	230	564
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	27.0		0.0	25.0		0.0	60.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	24.0			15.0			60.0			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		0.99	1.00		1.00	0.99		0.99		0.98
Frt		0.983			0.992			0.913				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1825	3572	0	1825	3613	0	1825	1728	0	1807	1921	1633
Flt Permitted	0.090			0.295			0.508			0.410		
Satd. Flow (perm)	173	3572	0	563	3613	0	972	1728	0	774	1921	1603
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			6			60				333
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		140.4			120.6			116.3			101.5	
Travel Time (s)		8.4			7.2			7.0			7.3	
Confl. Peds. (#/hr)	25		11	11		25	6		12	12		6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	210	637	79	237	1142	67	48	114	157	94	235	576
Shared Lane Traffic (%)												
Lane Group Flow (vph)	210	716	0	237	1209	0	48	271	0	94	235	576
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		7	4		3	8	8
Switch Phase												
Minimum Initial (s)	6.0	8.0		6.0	8.0		6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	10.0	38.0		10.0	38.0		10.0	40.0		10.0	40.0	40.0
Total Split (s)	15.0	49.0		15.0	49.0		12.0	44.0		12.0	44.0	44.0
Total Split (%)	12.5%	40.8%		12.5%	40.8%		10.0%	36.7%		10.0%	36.7%	36.7%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	3.0		0.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	Max		None	Max		None	None		None	None	None
Act Effct Green (s)	59.0	44.6		57.8	44.0		35.6	25.5		36.9	26.2	26.2
Actuated g/C Ratio	0.56	0.42		0.54	0.41		0.34	0.24		0.35	0.25	0.25
v/c Ratio	0.77	0.48		0.54	0.81		0.12	0.59		0.27	0.50	0.89
Control Delay	43.6	26.1		19.0	35.2		20.9	32.5		22.9	37.7	33.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	43.6	26.1		19.0	35.2		20.9	32.5		22.9	37.7	33.1
LOS	D	C		B	D		C	C		C	D	C
Approach Delay		30.0			32.5			30.7			33.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			C			C	
Queue Length 50th (m)	27.3	59.8		24.9	123.0		6.4	39.8		12.8	42.7	53.9
Queue Length 95th (m)	#73.2	88.2		46.5	#185.6		13.5	65.0		23.1	66.2	103.8
Internal Link Dist (m)		116.4			96.6			92.3			77.5	
Turn Bay Length (m)	27.0			25.0			60.0			45.0		
Base Capacity (vph)	288	1507		460	1501		407	655		360	685	786
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.73	0.48		0.52	0.81		0.12	0.41		0.26	0.34	0.73

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 106.1
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 31.9 — Intersection LOS: C
Intersection Capacity Utilization 87.9% — ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	3	399	29	5	930
Future Volume (Veh/h)	18	3	399	29	5	930
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	3	434	32	5	1011
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			TWLTL
Median storage veh)			2			2
Upstream signal (m)			101			
pX, platoon unblocked						
vC, conflicting volume	966	233			466	
vC1, stage 1 conf vol	450					
vC2, stage 2 conf vol	516					
vCu, unblocked vol	966	233			466	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	461	769			1092	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	23	289	177	5	506	506
Volume Left	20	0	0	5	0	0
Volume Right	3	0	32	0	0	0
cSH	487	1700	1700	1092	1700	1700
Volume to Capacity	0.05	0.17	0.10	0.00	0.30	0.30
Queue Length 95th (m)	1.1	0.0	0.0	0.1	0.0	0.0
Control Delay (s)	12.8	0.0	0.0	8.3	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	12.8	0.0		0.0		
Approach LOS	B					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Maple Avenue & Bellview Street

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	9.8	10.9
Average Queue (m)	4.5	3.1
95th Queue (m)	11.7	10.5
Link Distance (m)	178.6	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 2: Lakeshore Road & North Shore Boulevard East & Maple Avenue

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	T	R
Maximum Queue (m)	47.6	70.3	68.3	39.8	115.5	112.6	25.7	67.5	38.9	62.5	79.5
Average Queue (m)	28.7	41.7	37.8	33.1	90.7	84.9	10.5	34.6	13.0	31.7	53.5
95th Queue (m)	52.1	67.2	63.1	49.4	128.2	121.2	22.3	62.2	31.3	55.3	83.1
Link Distance (m)		126.0	126.0		110.9	110.9		104.3		77.2	77.2
Upstream Blk Time (%)					6	3				0	2
Queuing Penalty (veh)					0	0				1	9
Storage Bay Dist (m)	27.0			25.0			60.0		45.0		
Storage Blk Time (%)	15	16		12	43			2		3	
Queuing Penalty (veh)	46	32		69	99			1		3	

Intersection: 3: Maple Avenue & Site Access

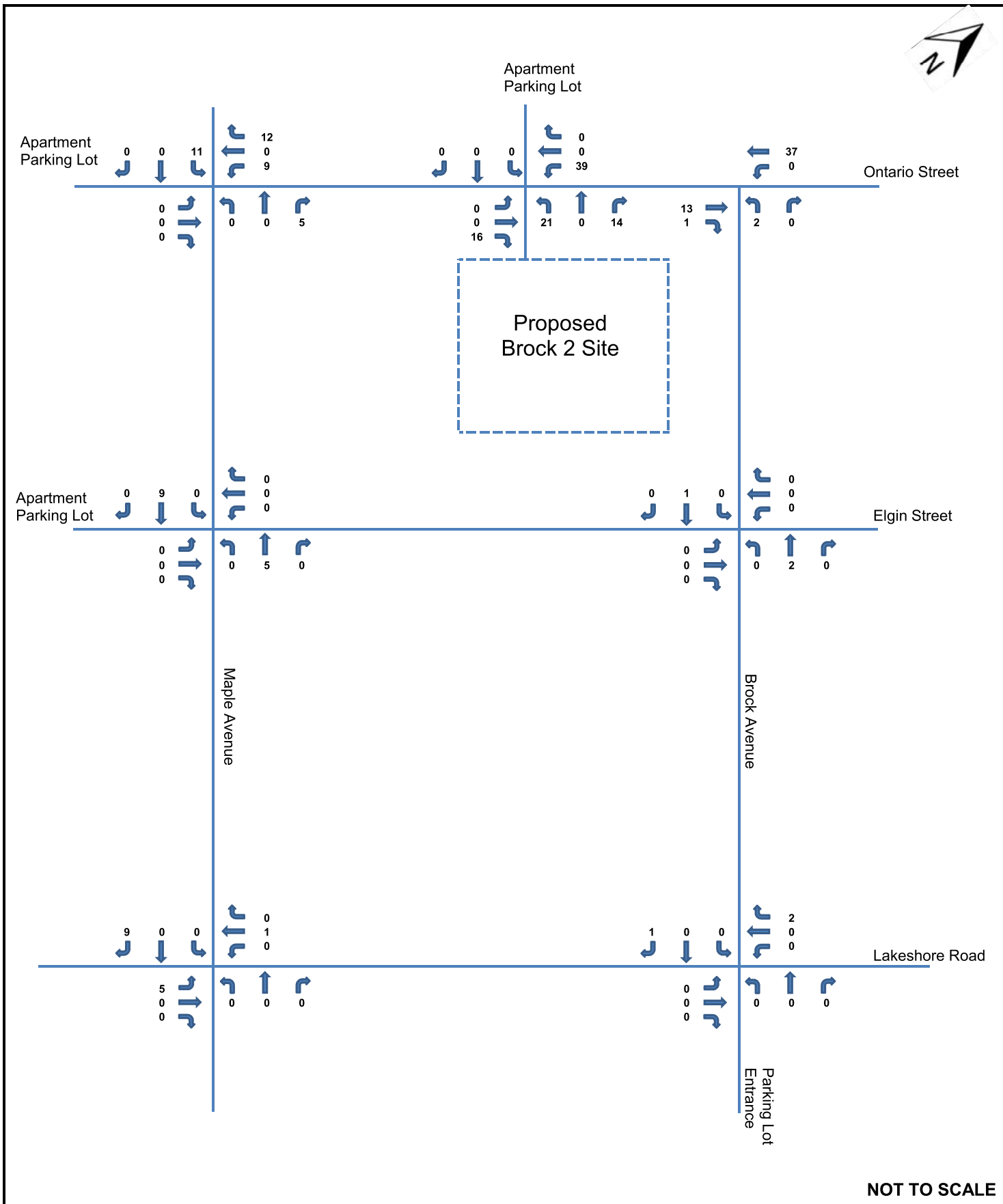
Movement	WB	SB	SB	SB
Directions Served	LR	L	T	T
Maximum Queue (m)	12.2	4.4	23.4	34.6
Average Queue (m)	4.2	0.3	1.6	3.7
95th Queue (m)	11.2	2.9	17.3	21.2
Link Distance (m)	37.0		71.6	71.6
Upstream Blk Time (%)			0	0
Queuing Penalty (veh)			0	1
Storage Bay Dist (m)		10.0		
Storage Blk Time (%)		0	0	
Queuing Penalty (veh)		0	0	

Network Summary

Network wide Queuing Penalty: 261

APPENDIX E

Parson's Traffic Impact Study Excerpts



Total PM Site Trips

Brock 2 Development Traffic Impact Study

PARSONS

APPENDIX F

TTS Data

MT-0400 (Eastern Daylight Time) - Run Time: 2042ms

m - Trip - 2016 v1.1				North		South		East		West		
		Auto drive	%	#	%	#	%	#	%	#		
gin - pd_orig	PD 13 of Toronto	14	75%	11		0	25%	4		0	1	
le of trip - mode_prime	Mississauga	29	75%	22		0	25%	7		0	0	
	Oakville	42	50%	21		0	50%	21		0	0	
	Burlington	399	25%	100	25%	100	25%	100	25%	100	1	
	Flamborough	53	20%	11		0		0	80%	42	0	
on - gta06_dest In 4057	Ancaster	21		0		0		0	100%	21	0	
	Stoney Creek	114		0	100%	114		0		0	0	
In 700-899	Hamilton	129		0	50%	65		0	50%	65	1	
	West Lincoln	12		0	100%	12		0		0	0	
mode_prime In D,	City of Guelph	19	100%	19		0		0		0	0	
		832	22%	184	35%	291	16%	132	27%	228	3	

	AS-IS	ROUNDED
North	22%	20%
South	35%	35%
East	16%	15%
West	27%	25%
		95%

Time) - Run Time: 2131ms

	Auto drive	%	North #	%	South #	%	East #	%	West #	
PD 1 of Toror	21	75%	16		0	25%	5			0
PD 11 of Torc	19	75%	14		0	25%	5			0
Brampton	100	75%	75		0	25%	25			0
Mississauga	108	75%	81		0	25%	27			0
Oakville	209	50%	105		0	50%	105			0
Burlington	1054	25%	264	25%	264	25%	264	25%		264
Flamborough	37	20%	7		0		0	80%		30
Dundas	24	20%	5		0		0	80%		19
Stoney Creek	133		0	100%	133		0			0
Hamilton	240		0	50%	120		0	50%		120
Niagara Falls	30		0	100%	30		0			0
Fort Erie	19		0	100%	19		0			0
Kitchener	36	50%	18		0		0	50%		18
City of Guelpl	48	100%	48		0		0			0
	2078	30%	633	27%	566	21%	431	22%		451

	AS-IS	ROUNDED
North	30%	30%
South	27%	25%
East	21%	20%
West	22%	20%
	100%	95%

tern Daylight Time) - Run Time: 1725ms

			North		South		East		West		
6 v1.1		Auto drive	%	#	%	#	%	#	%	#	
	PD 1 of Toror	31	75%	23		0	25%	8		0	0
le_prime	PD 8 of Toror	10	75%	8		0	25%	3		0	1
	PD 9 of Toror	39	75%	29		0	25%	10		0	0
	Mississauga	137	75%	103		0	25%	34		0	0
	Halton Hills	14	100%	14		0		0		0	0
st In 4057	Milton	82	100%	82		0		0		0	0
	Oakville	263	50%	132		0	50%	132		0	1
	Burlington	1455	25%	364	25%	364	25%	364	25%	364	1
	Flamborough	51	20%	10		0		0	80%	41	0
In D,	Hamilton	494		0	50%	247		0	50%	247	0
	Grimsby	8		0	100%	8		0		0	0
	Niagara Falls	21		0	100%	21		0		0	0
	Fort Erie	19		0	100%	19		0		0	0
	Kitchener	36	50%	18		0		0	50%	18	0
	Cambridge	25		0		0		0	100%	25	0
		2685	29%	783	25%	659	21%	551	26%	695	3

	AS-IS	ROUNDED
North	29%	30%
South	25%	25%
East	21%	20%
West	26%	25%
	100%	100%

Fri Aug 10 2018 14:10:03 GMT-0400 (Eastern Daylight Time) - Run Time: 2105ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of destination - pd_dest

Column: Primary travel mode of trip - mode_prime

Filters:

2006 GTA zone of origin - gta06_orig In 4057

and

Start time of trip - start_time In 1600-1799

and

Primary travel mode of trip - mode_prime In D,

Trip 2016

Table:

		North		South		East		West			
	Auto drive	%	#	%	#	%	#	%	#		
	Brampton	45	75%	34		0	25%	11		0	0
	Mississauga	15	75%	11		0	25%	4		0	0
	Milton	81	100%	81		0		0		0	0
	Oakville	80	50%	40		0	50%	40		0	0
	Burlington	1313	25%	328	25%	328	25%	328	25%	328	1
	Flamborough	73	20%	15		0		0	80%	58	0
	Ancaster	36		0		0		0	100%	36	0
	Hamilton	234		0	50%	117		0	50%	117	0
	Lincoln	17		0	100%	17		0		0	0
	West Lincoln	12		0	100%	12		0		0	0
	Cambridge	4		0		0		0	100%	4	0
	Wilmot	22	50%	11		0		0	50%	11	0
	Kawartha Lak	19	80%	15		0	20%	4		0	0
	Brantford	32		0		0	100%	32		0	0
,Auto driver		1983	27%	535	24%	474	21%	419	28%	554	1

Brampton,45
Mississauga,15
Milton,81
Oakville,80
Burlington,1313
Flamborough,73
Ancaster,36
Hamilton,234
Lincoln,17
West Lincoln,12
Cambridge,4
Wilmot,22
Kawartha Lakes,19
Brantford,32

	AS-IS	ROUNDED
North	27%	25%
South	24%	25%
East	21%	20%
West	28%	30%
	100%	100%

8/10/2018

3:44 PM

	A.M. Peak Hour	P.M. Peak Hour
Direction	In (Out)	In (Out)
North	20% (30%)	30% (25%)
South	35% (25%)	25% (25%)
East	20% (25%)	20% (20%)
West	25% (20%)	25% (30%)

AM		PM	
IN	OUT	IN	OUT
20%	30%	30%	25%
35%	25%	25%	25%
20%	**25%**	**20%**	**20%**
25%	**20%**	**25%**	**30%**

		AM		PM	
DIRECTION	VIA	IN	OUT	IN	OUT
EAST	Lake Shore Road	20%	**25%**	20%	20%
WEST	North Shore Boul	**25%**	20%	**25%**	**30%**
NORTH	Maple Avenue	10%	15%	15%	13%
	QEW	10%	15%	15%	13%
SOUTH	Lake Shore Road	18%	13%	13%	13%
	QEW	**18%**	13%	13%	13%
		100%	100%	100%	100%

		AM		PM	
DIRECTION	VIA	IN	OUT	IN	OUT
EAST	Lake Shore Road	20%	25%	20%	20%
WEST	North Shore Boul	53%	48%	53%	**55%**
NORTH	Maple Avenue	10%	15%	15%	13%
SOUTH	Lake Shore Road	18%	13%	13%	13%
		100%	100%	100%	100%

Tue Aug 07 2018 10:46:04 GMT-0400 (Eastern Daylight Time) - Run Time: 1853ms

Cross Tabulation Query Form - Trip - 2016 v1.1

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

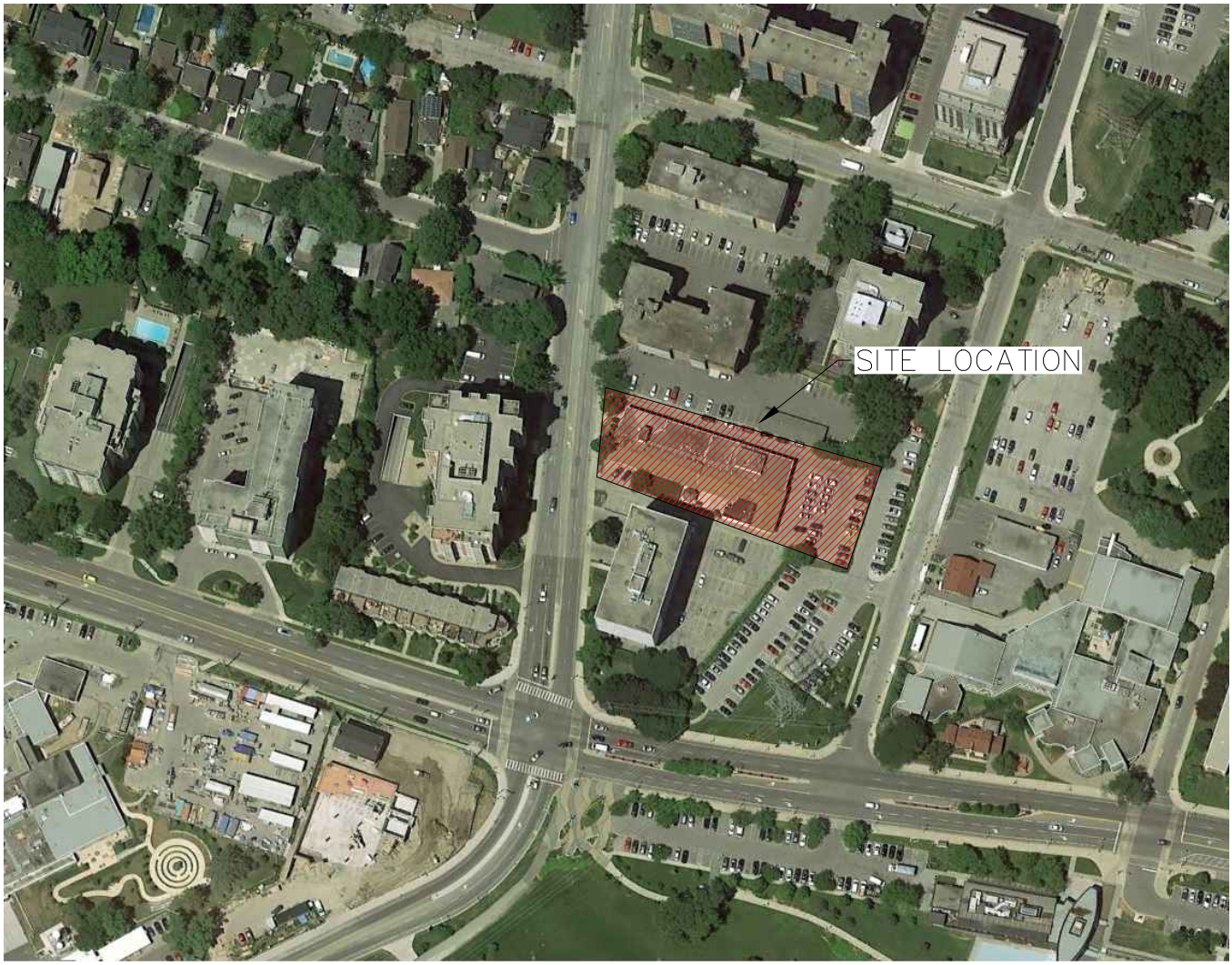
Traffic	Transit	Cycle	Auto	GO rail	Joint GO	Other	Auto	Walk	Total
4057	207	202	7358	66	92	16	759	315	9015
	2%	2%	82%	1%	1%	0%	8%	3%	100%
Non-Modal Split				10%					

Filters:
2006 GTA zone of household - gta06_hhld In 4057
and
Age of person - age In 18-99
and
Start time of trip - start_time In 1500-1900

Trip 2016
Table:

,Transit excluding GO rail,Cycle,Auto driver,GO rail only,Joint GO rail and local transit,Other,Auto passenger,Walk
4057,207,202,7358,66,92,16,759,315

FIGURES



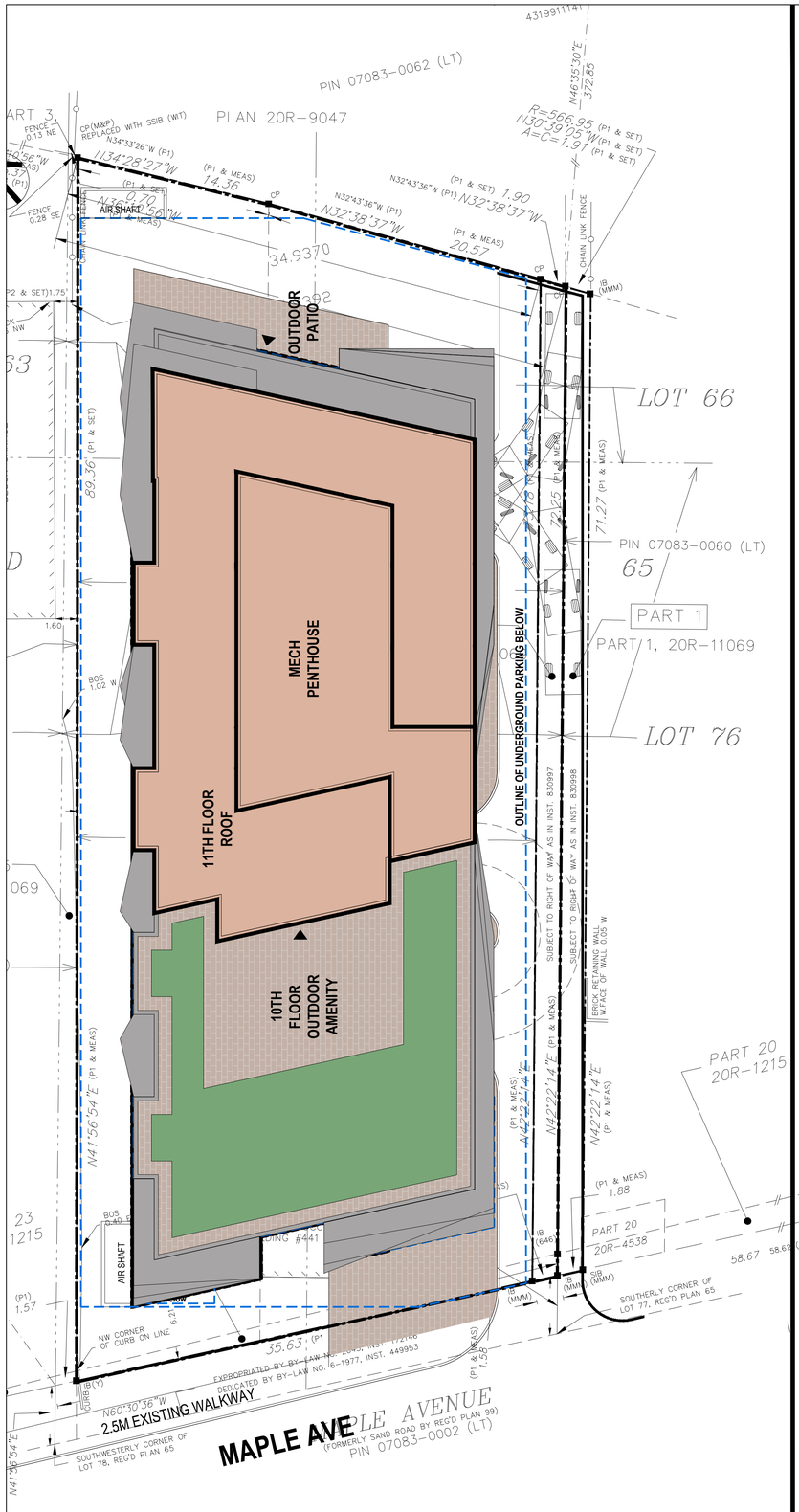
TRAFFIC IMPACT STUDY
441 MAPLE AVENUE
CITY OF BURLINGTON

SITE LOCATION

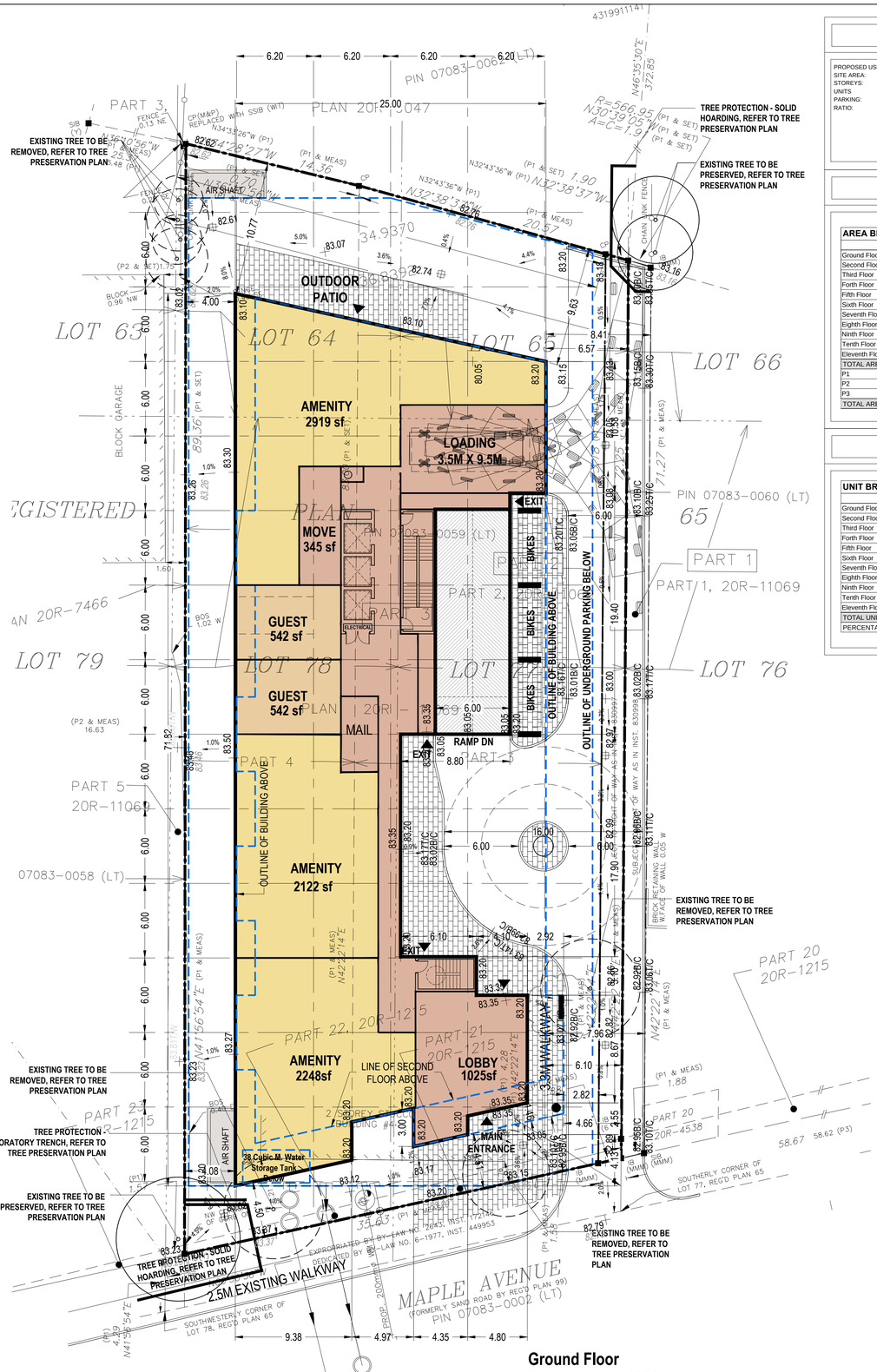
CROZIER & ASSOCIATES
Consulting Engineers

2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905 875-0026 T
905 875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.	
K.S.		1609–5022	
Check	Check	Scale	Dwg.
A.W.		N.T.S	FIG. 01



ROOF PLAN - 1:200



SITE PLAN SHOWING GROUND FLOOR - 1:200

Ground Floor
Area: 1230 sm

SITE STATISTICS

PROPOSED USE:	Multi - Residential
SITE AREA:	0.28 HA (2,863.19 sm)
STOREYS:	11 Storeys
UNITS	153 Units
PARKING:	179 (164 Cars on Site + 15 Offsite)
RATIO:	1.17

AREA CALCULATION

AREA BREAK DOWN PER FLOOR

	AREA (SQ.M)	AREA (SQ.FT)
Ground Floor	1,230	13,240
Second Floor	1,507	16,220
Third Floor	1,507	16,220
Forth Floor	1,507	16,220
Fifth Floor	1,507	16,220
Sixth Floor	1,507	16,220
Seventh Floor	1,507	16,220
Eighth Floor	1,507	16,220
Ninth Floor	1,507	16,220
Tenth Floor	866	9,322
Eleventh Floor	866	9,322
TOTAL AREA ABOVE GRADE:	15,018	161,644
P1	2,540	27,287
P2	2,540	27,287
P3	2,540	27,287
TOTAL AREA BELOW GRADE:	7,620	81,861

UNIT COUNT

UNIT BREAK DOWN PER FLOOR

	1 BED	1 BED + D	2 BED	3 BED	TOTAL
Ground Floor	-	-	-	-	-
Second Floor	3	7	4	3	17
Third Floor	3	7	4	3	17
Forth Floor	3	7	4	3	17
Fifth Floor	3	7	4	3	17
Sixth Floor	3	7	4	3	17
Seventh Floor	3	7	4	3	17
Eighth Floor	3	7	4	3	17
Ninth Floor	3	7	4	3	17
Tenth Floor	3	-	4	1	8
Eleventh Floor	3	-	4	2	9
TOTAL UNITS:	30	56	40	27	153
PERCENTAGE:	20%	37%	26%	17%	100%

MSAi
MICHAEL SPAZIANI ARCHITECT INC
6 Helene Street N, Suite 100
Port Credit, Mississauga ON L5G 3B2
T 905 891 0691 F 905 891 0514

Urban Design | Planning | Development | Architecture

ONTARIO ASSOCIATION OF ARCHITECTS
MICHAEL SPAZIANI LICENCE 3631

NO:	REVISIONS:	ISSUED:
6		
5		
4		
3		
2		
1	Issued for OPA / ZBA	Dec 07, '18

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CLIENT:
Better Life Retirement Residence Inc.

PROJECT:
441 Maple Street

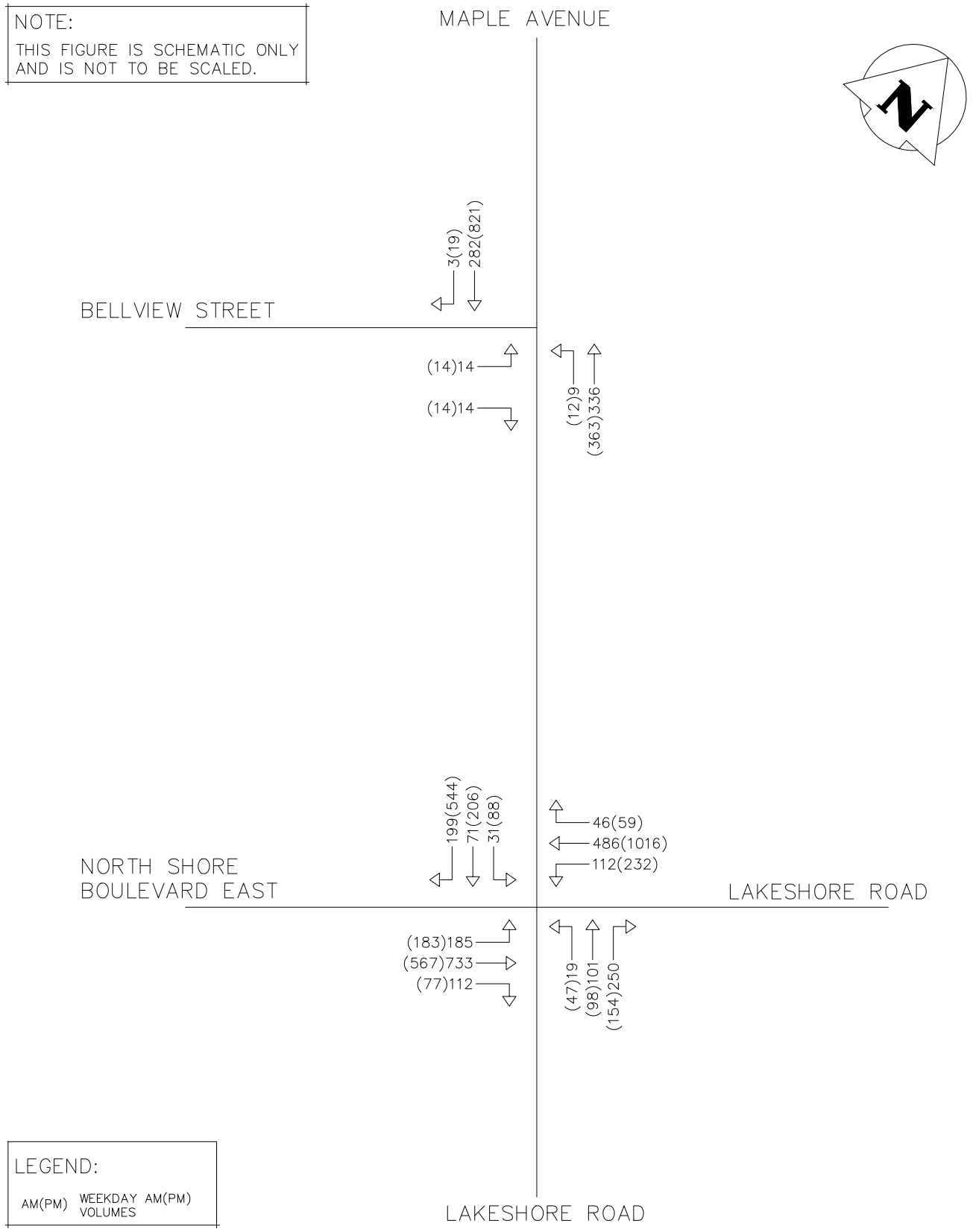
Burlington, ON

SHEET TITLE:
Proposed Site Plan

PROJECT NO.
C6075

SCALE: 1:200	DATE: Nov, '18
DRAWN: msai	SHEET NO: SP1
CHECKED: ms	
FILE NO.	

NOTE:
THIS FIGURE IS SCHEMATIC ONLY AND IS NOT TO BE SCALED.



LEGEND:

AM(PM) WEEKDAY AM(PM) VOLUMES

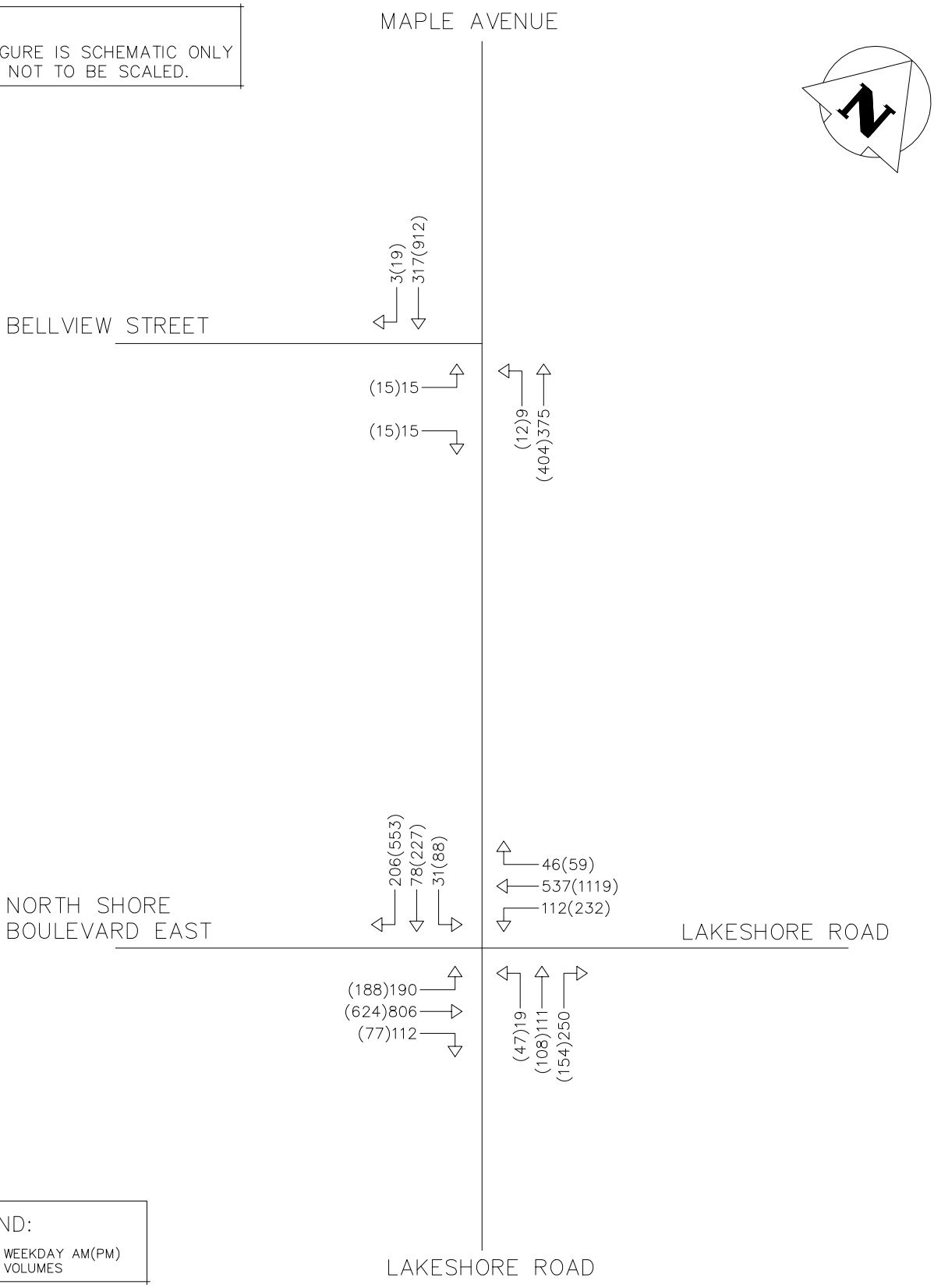
TRAFFIC IMPACT STUDY
441 MAPLE AVENUE
CITY OF BURLINGTON

2018 EXISTING TRAFFIC VOLUMES

CROZIER & ASSOCIATES Consulting Engineers
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905 875-0026 T
905 875-4915 F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
K.S.		1609–5022	
Check	Check	Scale	Dwg.
A.W.		N.T.S	FIG. 03

NOTE:
THIS FIGURE IS SCHEMATIC ONLY AND IS NOT TO BE SCALED.



LEGEND:
AM(PM) WEEKDAY AM(PM) VOLUMES

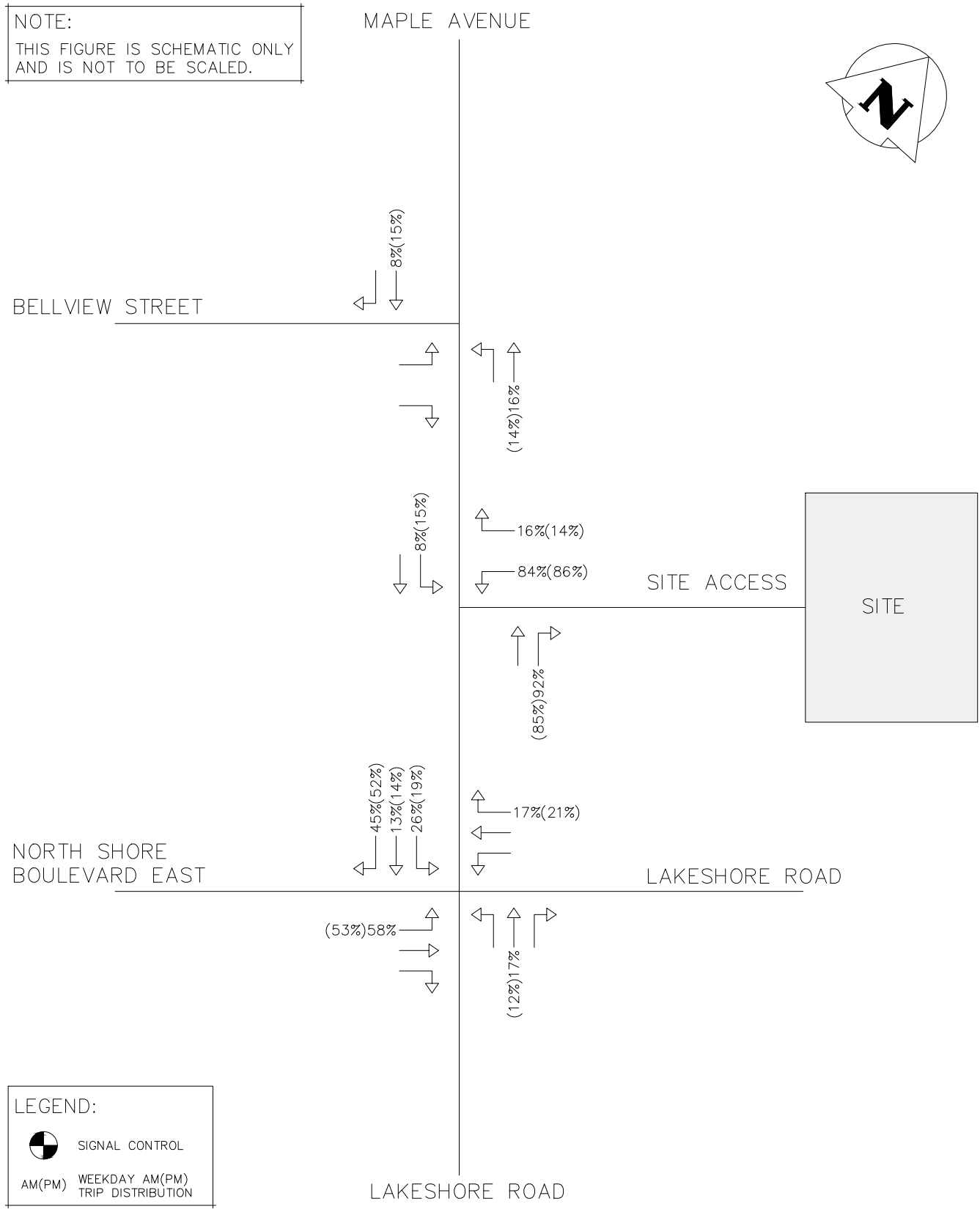
TRAFFIC IMPACT STUDY
441 MAPLE AVENUE
CITY OF BURLINGTON

2023 FUTURE BACKGROUND TRAFFIC VOLUMES

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Suite 100
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905 875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.	
K.S.			1609-5022
Check	Check	Scale	Dwg.
A.W.		N.T.S	FIG. 04

NOTE:
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LEGEND:

SIGNAL CONTROL

AM(PM) WEEKDAY AM(PM) TRIP DISTRIBUTION

TRAFFIC IMPACT STUDY
441 MAPLE AVENUE
CITY OF BURLINGTON

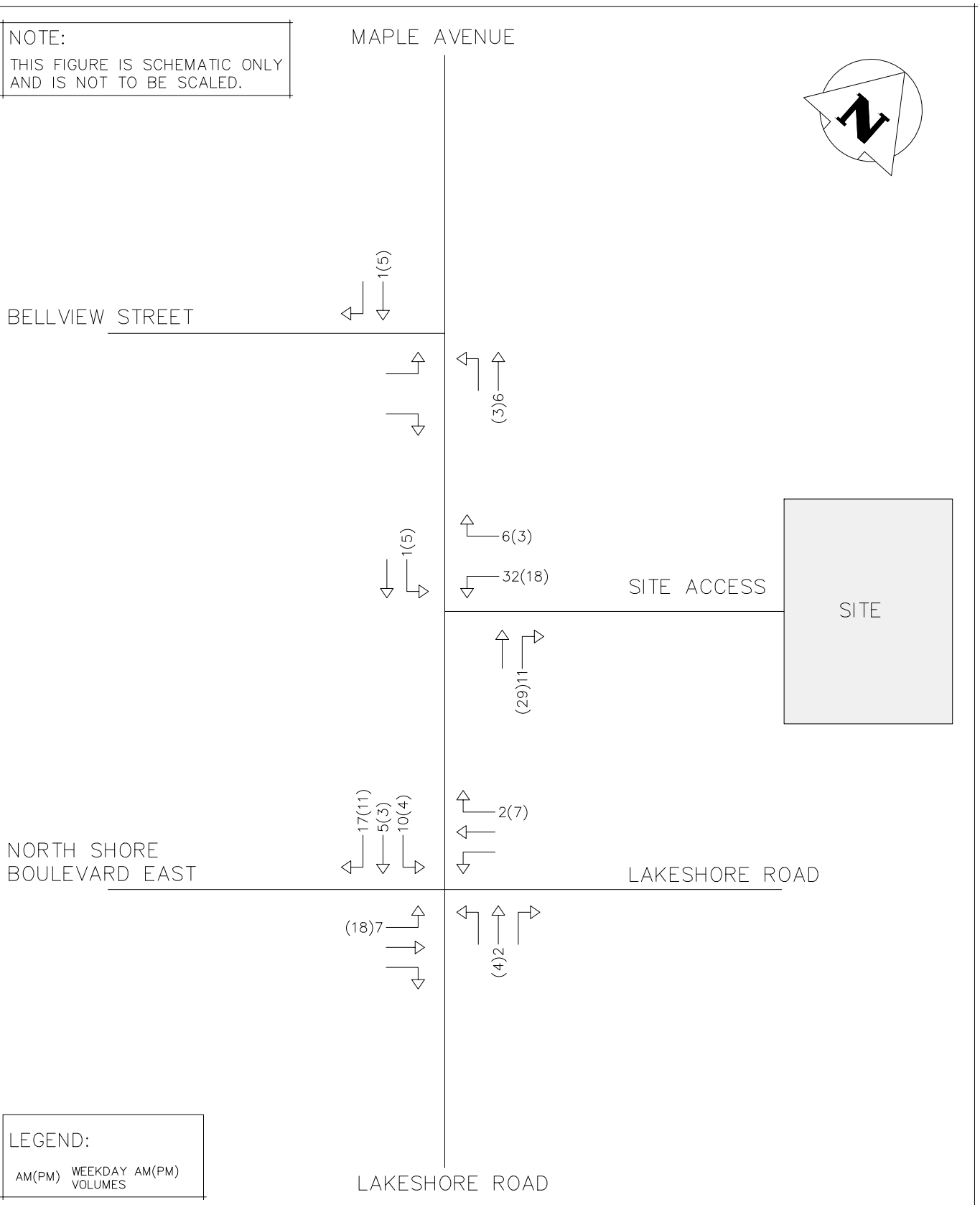
SITE TRIP DISTRIBUTION

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905 875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.	
K.S.			1609–5022
Check	Check	Scale	Dwg.
A.W.		N.T.S	FIG. 05

NOTE:
THIS FIGURE IS SCHEMATIC ONLY AND IS NOT TO BE SCALED.



LEGEND:

AM(PM) WEEKDAY AM(PM) VOLUMES

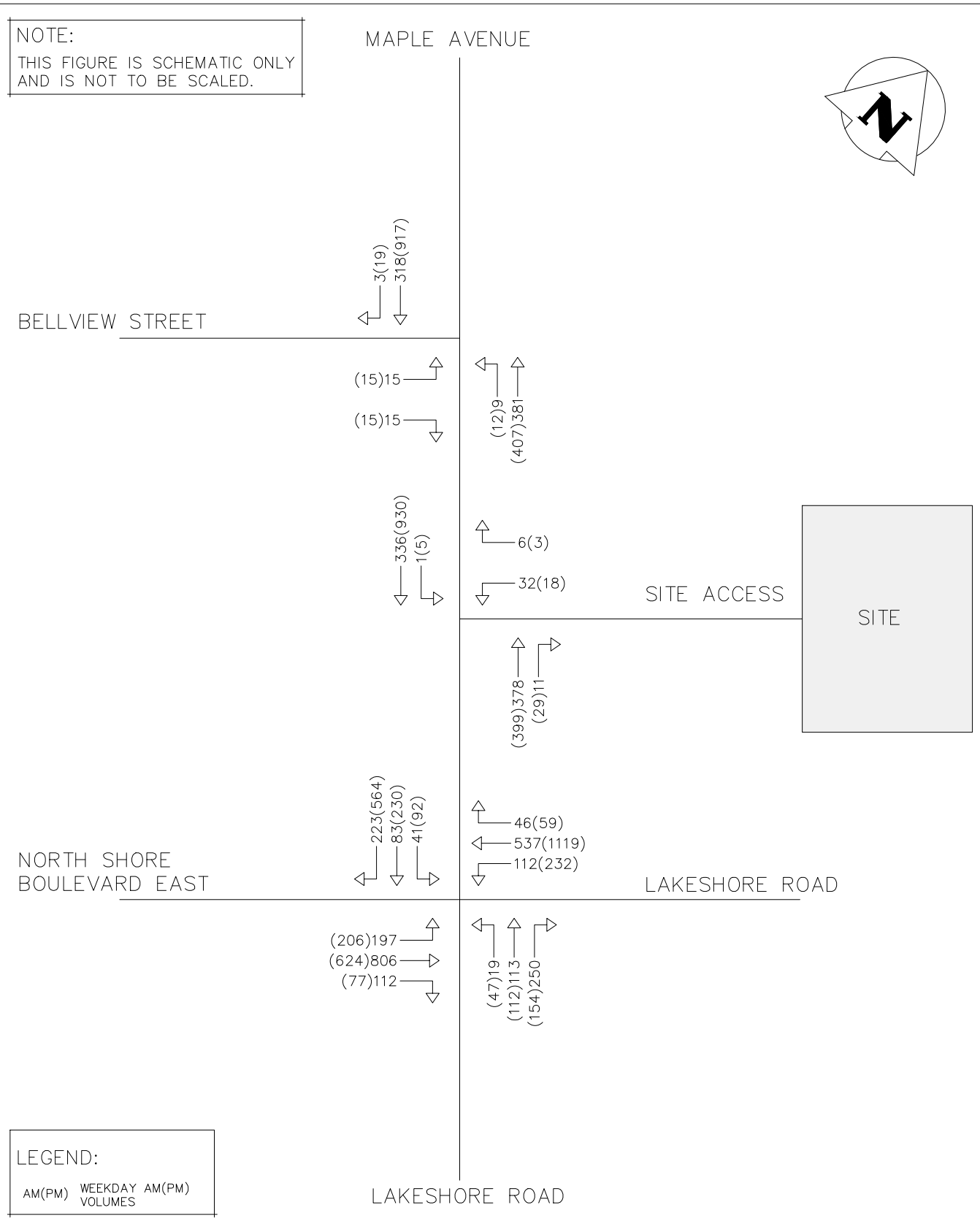
TRAFFIC IMPACT STUDY
441 MAPLE AVENUE
CITY OF BURLINGTON

SITE TRIP ASSIGNMENT

CROZIER & ASSOCIATES Consulting Engineers

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Drawn	Design	Project No.	
K.S.			1609-5022
Check	Check	Scale	Dwg.
A.W.		N.T.S	FIG. 06



TRAFFIC IMPACT STUDY
441 MAPLE AVENUE
CITY OF BURLINGTON

2023 FUTURE TOTAL TRAFFIC VOLUMES

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www.cfcrozier.ca

Drawn	Design	Project No.	
K.S.		1609–5022	
Check	Check	Scale	Dwg.
A.W.		N.T.S	FIG. 07