

TRAFFIC IMPACT STUDY

**3171 LAKESHORE ROAD WEST
TOWN OF OAKVILLE,
REGIONAL MUNICIPALITY OF HALTON**

**OFFICIAL PLAN AMENDMENT,
ZONING BY-LAW AMENDMENT &
DRAFT PLAN OF SUBDIVISION**

**PREPARED FOR:
VOGUE WYCLIFFE (OAKVILLE) LIMITED**

PREPARED BY:

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**ORIGINAL – DECEMBER 2017
ADDENDUM - JULY 2019**

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Revision Number	Date	Comments
Rev. 0	December 2017	First Submission
Rev. 1	July 2019	Second Submission – TIS Addendum to reflect updated development proposal

1.0 Executive Summary

C.F. Crozier & Associates Inc. (Crozier) was retained by Vogue Wycliffe (Oakville) Limited to undertake a Traffic Impact Study (TIS) in support of the Official Plan Amendment, Zoning By-Law Amendment and Draft Plan of Subdivision application for a residential development located at 3171 Lakeshore Road West in the Town of Oakville. The purpose of the study is to evaluate the transportation-related impacts of the proposed development on the boundary road network and to recommend any required mitigation measures, if warranted.

The original Traffic Impact Study was prepared by Crozier in December 2017 and concluded that the development proposal for 22 single-family detached dwelling units is supportable from a traffic operations perspective. This Addendum has been prepared to reflect the updated development proposal.

Per the Site Plan prepared by VA3 Design Inc. (updated May 1, 2019), the development proposes 8 semi-detached dwelling units, 13 standard townhouse dwelling units and 14 dual frontage townhouse dwelling units for a total of 35 dwelling units. The dwelling units will front an internal condo roadway, which is proposed to connect to the existing road network via the Victoria Street cul-de-sac east of Speyside Drive. The 14 dual frontage townhouse units will also front Lakeshore Road West, although the driveways will front the internal condo roadways. The development also proposes a public pedestrian access through the site to connect to West Street east of the subject property.

The previous development proposal included the extension of Victoria Street through the subject property to connect the east and west segments. However, as the updated development proposal does not include the Victoria Street extension, the scope of work from the previous study was revised accordingly for this Addendum. This Addendum examines the requirement of an extension of Victoria Street from a traffic operations perspective.

This Addendum analyzes the following intersections:

- Lakeshore Road West and Chalmers Street
- Victoria Street and Chalmers Street

Turning movement counts were conducted by Ontario Traffic Inc. (OTI) staff at the study intersections on Thursday May 23, 2019 between 7:00 a.m. - 10:00 a.m. and 4:00 p.m. - 7:00 p.m.

The boundary road network is currently operating at satisfactory levels of service with minor control delays and no critical movements nor 95th percentile queue lengths.

The previous study analyzed the 2022 horizon year to reflect a five-year horizon from the date of study (2017). For consistency, the five-year horizon from the date of study was analyzed in this Addendum. Therefore, the 2024 horizon year was analyzed.

Crozier was instructed by Town of Oakville staff to apply a compounded growth rate of 1% per annum to existing traffic volumes in the original study. For consistency, this growth rate was applied in this Addendum.

The boundary road network is expected to continue operating at satisfactory levels of service under 2024 future background conditions with minor control delays and no critical movements nor 95th percentile queue lengths.

The proposed development is expected to generate 24 and 27 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.

The boundary road network is expected to continue operating at satisfactory levels of service under 2024 future total conditions with minor control delays and no critical movements nor 95th percentile queue lengths. The maximum forecasted increase in control delay is 0.5 seconds compared to 2024 future background conditions. This indicates that the addition of site traffic to the boundary road network is expected to minimally impact traffic operations.

Given the forecasted satisfactory traffic operations on Chalmers Street at Victoria Street and Lakeshore Road West, the extension of Victoria Street through the subject property to connect to its easterly segment is not required from a traffic operations perspective.

The provision of public pedestrian access through the site will decrease the walking distance to and from Lakeshore Road West for nearby residents.

The proposed development will not obstruct or restrict the existing pedestrian connectivity between Victoria Street/West Street and Lakeshore Road West via the West Street unopened ROW. The existing pedestrian route will remain as-is for pedestrian use.

Analysis was conducted using the Site Plan prepared by VA3 Design Inc. (updated May 1, 2019). Any minor changes to the Site Plan will not materially affect the conclusions contained within this report.

In conclusion, the proposed development can be supported from a traffic operations perspective.

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2.0 Introduction

2.1 Background

C.F. Crozier & Associates Inc. (Crozier) was retained by Vogue Wycliffe (Oakville) Limited to undertake a Traffic Impact Study (TIS) in support of the Official Plan Amendment, Zoning By-Law Amendment and Draft Plan of Subdivision application for a residential development located at 3171 Lakeshore Road West in the Town of Oakville.

The original Traffic Impact Study was prepared by Crozier in December 2017 and concluded that the development proposal of 22 single-family detached dwelling units is supportable from a traffic operations perspective. This Addendum has been prepared to reflect the updated development proposal.

2.2 Development Proposal

Per the Site Plan prepared by VA3 Design Inc. (updated May 1, 2019), the development proposes 8 semi-detached dwelling units, 13 standard townhouse dwelling units and 14 dual frontage townhouse dwelling units for a total of 35 dwelling units.

The dwelling units will front an internal condo roadway, which is proposed to connect to the existing road network via the Victoria Street cul-de-sac east of Speyside Drive. The 14 dual frontage townhouse units will also front Lakeshore Road West, although the driveways will front the internal condo roadways. The development also proposes a public pedestrian access through the site to connect to West Street east of the subject property. **Figure 1** illustrates the Site Plan.

It is unknown when the full build-out of the development is expected to occur. However, it is expected that full build-out will occur on a short-term scale (i.e. within two years).

The previous development proposal consisted of 25 single-detached dwelling units with adjoining lands considered and the extension of Victoria Street to connect the segments east and west of the subject property.

2.3 Purpose and Scope

The purpose of the study is to evaluate the transportation-related impacts of the proposed development on the boundary road network and to recommend any required mitigation measures, if warranted.

The study reviews the following main aspects of the proposed development from a transportation engineering perspective:

- Existing, future background, and future total traffic operations on the boundary road network during the weekday a.m. and p.m. peak hours;
- Forecasted trip generation and distribution of the proposed development;
- Mitigation measures to support the proposed development, if required;
- The need for the extension of Victoria Street through the subject property from a traffic operations perspective; and
- Impacts to the unopened West Street right-of-way (ROW) east of the subject property.

The study has been completed in accordance with the procedures set out in the Region of Halton's "Transportation Impact Study Guidelines" (January 2015). The scope of work in this Addendum is similar to the scope of work in the previous study, which was based on agreed-upon Terms of Reference with Town of Oakville staff (Phone call, Syed Rizvi/Alexander Fleming, May 10, 2017).

The previous study accounted for traffic diversions resulting from the Victoria Street extension. However, as the updated development proposal does not include the Victoria Street extension, traffic diversions were not accounted for in this Addendum.

The previous study also analyzed sight distance requirements for the proposed driveways fronting Lakeshore Road West. However, as the updated development proposal does not include driveways fronting Lakeshore Road West, sight distance requirements were not analyzed in this Addendum.

3.0 Existing Conditions

3.1 Development Lands

The subject property covers an area of approximately 1.00 ha. Cudmore's Garden Centre currently exists on the subject lands with two existing accesses to Lakeshore Road West. The subject property is zoned as RL3-0 and RL8 "Residential Low" per Town of Oakville Zoning By-Law 2014-014. **Appendix A** contains the zoning information for the subject property.

The subject property is bound by existing residential developments to the north, Lakeshore Road West to the south, existing residential developments and the existing Victoria Street alignment to the west, and existing residential developments and Victoria Street to the east. The unopened West Street ROW is also located at the easterly limit of the subject property.

Figure 2 illustrates the site location.

3.2 Study Intersections

The previous Traffic Impact Study analyzed the following intersections as confirmed by Town staff:

- Lakeshore Road West and Mississauga Street
- Victoria Street and Mississauga Street

Analysis of these intersections assumed that the main ingress and egress route for the development to and from Lakeshore Road West was via Victoria Street (east) and Mississauga Street. The previous study concluded that these intersections are expected to operate at satisfactory levels of service under future total conditions.

However, the updated development proposal does not include the extension of Victoria Street to connect to its east segment. Therefore, the main ingress and egress route for the development from Lakeshore Road West is now via Victoria Street (west) and Chalmers Street.

Therefore, this Addendum analyzes the following intersections:

- Lakeshore Road West and Chalmers Street
- Victoria Street and Chalmers Street

Analysis of traffic operations at the intersections listed above will determine if the extension of Victoria Street through the subject property is required from a traffic operations perspective.

3.3 Boundary Road Network

Lakeshore Road West is an east-west minor arterial roadway with an urban cross-section. Lakeshore Road West is under the jurisdiction of the Town of Oakville with a posted speed limit of 50 km/h. The roadway consists of two approximate 3.3 metre travel lanes and an approximate 3.0 metre centre two-way left-turn lane (TWLTL). Bicycle lanes exist on both sides of the roadway, separated from the travel lanes by a solid white line. An approximate 2.0 metre concrete sidewalk exists directly adjacent to the north side of the roadway. An approximate 1.5 metre concrete sidewalk exists on the south side of the roadway, separated by an in-grass boulevard.

Chalmers Street is a north-south local roadway with an urban cross-section. Chalmers Street is under the jurisdiction of the Town of Oakville with an assumed speed limit of 50 km/h per municipal regulation. The roadway consists of two approximate 4.0 metre travel lanes. An approximate 1.5 metre concrete sidewalk exists on both sides of the roadway, separated by an in-grass boulevard on both sides of the roadway. The roadway is designated as a future "signed bike route" per the Town of Oakville's Official Plan.

Victoria Street is an east-west local roadway with an urban cross-section west of the site. Victoria Street is under the jurisdiction of the Town of Oakville with an assumed speed limit of 50 km/h per municipal regulation. The segment west of the subject property consists of two approximate 3.2 metre travel lanes. An approximate 1.5 metre sidewalk exists on both sides of the roadway, separated by an in-grass boulevard. There are no cycling facilities on the roadway.

The intersection of Lakeshore Road West and Chalmers Street is signalized and operates under a semi-actuated mode of control, with Lakeshore Road West operating as the major street. The intersection of Victoria Street and Chalmers Street is unsignalized, with stop control at the east and west approaches on Victoria Street.

3.4 Transit Operations

Oakville Transit operates Bus Route 14 (Lakeshore Road West) within the study area. The route connects GO Appleby to GO Oakville and spans east-west on Lakeshore Road West. The route operates from Monday to Sunday with peak hour transit headways of 15 minutes during the weekday. There are bus stops located at the north-east and south-west corners of the intersection of Lakeshore Road West and Chalmers Street.

Appendix B contains relevant transit information.

3.5 Traffic Data

Turning movement counts were conducted by Ontario Traffic Inc. (OTI) staff at the study intersections on Thursday May 23, 2019 between 7:00 a.m. - 10:00 a.m. and 4:00 p.m. - 7:00 p.m. These time periods are reflective of commuter peak hours and thus were considered appropriate for traffic analysis of the proposed development.

Intersection analysis was conducted utilizing peak hour factors (PHFs) as calculated for each intersection during each peak period. Signal timing plans were also made available to Crozier for

modelling purposes.

The traffic count data and signal timing plans are contained in **Appendix C**. PHFs as calculated for each intersection are included in the traffic count data. **Figure 3** illustrates the 2019 existing traffic volumes.

3.6 Traffic Modelling

The boundary road network was modelled in Synchro 9.2 using existing roadway geometrics, collected traffic data and signal timings from the provided timing plans.

The results for signalized intersection operations were derived from Synchro. The results for unsignalized intersection operations were derived using HCM2000 methodology. 95th percentile queue lengths were derived from Synchro.

Intersections are assessed using a Level of Service (LOS) metric with ranges of delay assigned a letter from “A” to “F”; “A” representing low delays and “F” representing heavy delays. The LOS definitions for signalized and unsignalized intersections are included in **Appendix D**.

3.7 Intersection Operations

The existing intersection operations at the study intersections were analyzed using the existing traffic volumes illustrated in **Figure 3**. Detailed capacity analysis worksheets are included in **Appendix E**.

Table 1 outlines the 2019 existing traffic operations.

Table 1: 2019 Existing Traffic Operations

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Critical v/c ratio ²	95 th Percentile Queue Length > Storage Length
Lakeshore Road West and Chalmers Street	Signal	A.M.	A	8.9 s	0.60 (EBTR)	None
		P.M.	A	8.3 s	0.65 (WBTR)	None
Victoria Street and Chalmers Street	Stop (Minor Street)	A.M.	A	9.5 s (WBLTR)	0.03 (EBLTR)	None
		P.M.	A	9.5 s (WBLTR)	0.02 (EBLTR)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU). The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection where the maximum v/c ratio does not exceed the critical thresholds. All v/c ratios for through or shared through/turning movements exceeding 0.85 and all v/c ratios for exclusive turning movements exceeding 0.95 are listed and highlighted per the Region's TIS Guidelines.

The boundary road network is currently operating at LOS “A” during the weekday a.m. and p.m. peak hours with minor control delays and no critical volume-to-capacity ratios or 95th percentile queue lengths. These operations indicate that there is reserve capacity on the boundary road network for future traffic growth. The excellent levels of service indicate that the extension of Victoria Street is not required to alleviate traffic operations on Chalmers Street.

4.0 Future Background Conditions

4.1 Horizon Years

Per the Region's Transportation Impact Study guidelines, horizon years consisting of five years and potentially ten years from the date of full build-out must be analyzed. As mentioned in Section 2.2, the year of full build-out is unknown but it is expected to occur on a short-term scale (ie. within two years).

The previous study analyzed the 2022 horizon year to reflect a five-year horizon from the date of study (2017). For consistency, the five-year horizon from the date of study was analyzed in this Addendum. Therefore, the 2024 horizon year was analyzed.

4.2 Growth Rate

Crozier was instructed by Town of Oakville staff to apply a compounded growth rate of 1% per annum to existing traffic volumes in the original study. For consistency, this growth rate was applied in this Addendum. **Figure 4** illustrates the 2024 future background traffic volumes.

4.3 Intersection Operations

The 2024 future background intersection operations at the study intersections were analyzed using the 2024 future background traffic volumes illustrated in **Figure 4**. Detailed capacity analysis worksheets are included in **Appendix E**.

Table 2 outlines the 2024 future background traffic operations.

Table 2: 2024 Future Background Traffic Operations

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Critical v/c ratio ²	95 th Percentile Queue Length > Storage Length
Lakeshore Road West and Chalmers Street	Signal	A.M.	A	9.5 s	0.63 (EBTR)	None
		P.M.	A	9.0 s	0.68 (WBTR)	None
Victoria Street and Chalmers Street	Stop (Minor Street)	A.M.	A	9.5 s (WBLTR)	0.03 (EBLTR)	None
		P.M.	A	9.5 s (WBLTR)	0.02 (EBLTR)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU).

The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection where the maximum v/c ratio does not exceed the critical thresholds. All v/c ratios for through or shared through/turning movements exceeding 0.85 and all v/c ratios for exclusive turning movements exceeding 0.95 are listed and highlighted per the Region's TIS Guidelines.

The boundary road network is expected to continue operating at LOS "A" during the weekday a.m. and p.m. peak hours under 2024 future background conditions, with minor control delays and no critical volume-to-capacity ratios or 95th percentile queue lengths. These operations indicate that there is reserve capacity on the boundary road network for site generated traffic, and that the extension of Victoria Street is not required to alleviate traffic operations on Chalmers Street.

5.0 Site Generated Traffic

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

5.1 Trip Generation

Trip generation for the proposed development was forecasted using published data from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, which has been released since the preparation of the previous Traffic Impact Study. The ITE Trip Generation Manual is a compendium of industry collected trip generation data across North America for a variety of land uses and is used industry-wide as a source for trip generation forecasts.

The following Land Use Categories (LUC) were applied to the proposed residential development:

- LUC 210 "Single-Family Detached Housing" was applied to the 8 semi-detached dwelling units (as ITE does not provide a land use for semi-detached dwelling units); and
- LUC 220 "Multifamily Housing (Low-Rise)" was applied to the 27 townhouse units.

A fitted curve equation is provided for all land use categories outlined above, and the number of data plot points exceeds 20 data points. Therefore, the fitted curve equation was used to forecast trip generation for the proposed development.

While the dual frontage townhouse units front both the internal condo roadway and Lakeshore Road West, the driveways are proposed to front the internal condo road. Therefore, all site generated traffic will enter and exit the site via the proposed connection to the Victoria Street cul-se-sac.

Table 3 outlines the trip generation for the proposed development.

Table 3: Trip Generation

ITE Land Use Category	Units	Peak Hour	Trips Generated		
			Inbound	Outbound	Total
LUC 210 "Single-Family Detached Housing"	8	A.M.	2	8	10
		P.M.	6	3	9
LUC 220 "Multifamily Housing (Low-Rise)"	27	A.M.	3	11	14
		P.M.	11	7	18
Total	35	A.M.	5	19	24
		P.M.	17	10	27

The proposed development is expected to generate 24 and 27 total two-way trips during the weekday a.m. and p.m. peak hours, respectively. Given the sole residential land use, no internal synergy trips or pass-by trips are expected for the proposed development.

The previous development proposal was forecasted to generate 41 and 40 total two-way trips during the weekday a.m. and p.m. peak hours, respectively. These forecasts were based on all dwelling units being proposed as single-detached units (which typically generate more traffic than low-rise townhouse units) and using a previous edition of the ITE Trip Generation Manual.

5.2 Trip Distribution and Assignment

The trips generated by the development were distributed to the boundary roadways in the previous Traffic Impact Study based on 2011 Transportation Tomorrow Survey (TTS) data. TTS is a comprehensive survey of transportation characteristics of households in the Greater Toronto Area (GTA) and surrounding areas.

However, 2016 TTS data has been released since the preparation of the previous Traffic Impact Study, and thus was used for trip distribution forecasts in this Addendum.

TTS results were filtered to reflect auto trips exiting from the 2006 GTA zone that the subject property is currently located in (4001) between 7:00 a.m. - 10:00 a.m. The zone is residential in nature, and thus the TTS results will be appropriate for the proposed residential development. Trip distribution was determined based on the most convenient route of travel between each origin-destination pair. Refer to **Appendix F** for the TTS data.

The resulting trip distribution is as follows:

- 75% to the east (e.g. Toronto, Mississauga, Oakville, etc.)
- 5% to the north (e.g. Milton, etc.)
- 20% to the west (e.g. Burlington, Hamilton, etc.)

Trips arriving from and departing to the east are expected to do so via Chalmers Street and Lakeshore Road West, where they will either use the Queen Elizabeth Way (QEW) via Bronte Road or Lakeshore Road West.

Trips arriving from and departing to the north are expected to do so via Chalmers Street, Lakeshore Road West and Bronte Road.

Trips arriving from and departing to the west are expected to do so via one of two routes: Lakeshore Road West or the QEW. Trips utilizing the QEW would be expected to access the highway from the site via Speyside Drive, Riverview Street, Mississauga Street, Rebecca Street, and Burloak Drive. It was assumed that of the 20% of trips expected to arrive from and depart to the west, approximately 10% would use Lakeshore Road West and 10% would use the QEW (and not travel through the study intersections).

The total trips generated by the development were assigned to the boundary road network based on the distribution outlined in **Figure 5** and assignment outlined in **Figure 6**.

It is noted that if the Victoria Street extension were implemented per the original development proposal, then trips assigned to the east and north would exit via Victoria Street (east) to Mississauga Road, thus reducing site traffic assigned to Chalmers Street. However, the Chalmers Street intersections at Victoria Street and Lakeshore Road West were analyzed assuming no Victoria Street extension to determine if traffic operations under future total conditions are supportable.

6.0 Future Total Conditions

6.1 Basis of Assessment

The traffic impacts arising from the proposed development were assessed based on the site generated traffic illustrated in **Figure 6**. The resulting total traffic volumes for the weekday a.m. and p.m. peak hours are illustrated in **Figure 7**.

6.2 Intersection Operations

The 2024 future total intersection operations at the study intersections were analyzed using the 2024 future total traffic volumes illustrated in **Figure 7**. Detailed capacity analysis worksheets are included in **Appendix E**.

Table 4 outlines the 2024 future background traffic operations.

Table 4: 2024 Future Total Traffic Operations

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Critical v/c ratio ²	95 th Percentile Queue Length > Storage Length
Lakeshore Road West and Chalmers Street	Signal	A.M.	A	9.9 s	0.64 (EBTR)	None
		P.M.	A	9.5 s	0.70 (WBTR)	None
Victoria Street and Chalmers Street	Stop (Minor Street)	A.M.	A	9.7 s (WBLTR)	0.05 (WBLTR)	None
		P.M.	A	9.7 s (WBLTR)	0.03 (WBLTR)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU). The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection where the maximum v/c ratio does not exceed the critical thresholds. All v/c ratios for through or shared through/turning movements exceeding 0.85 and all v/c ratios for exclusive turning movements exceeding 0.95 are listed and highlighted per the Region's TIS Guidelines.

The boundary road network is expected to continue operating at LOS "A" during the weekday a.m. and p.m. peak hours under 2024 future total conditions, with minor control delays and no critical volume-to-capacity ratios or 95th percentile queue lengths. The maximum forecasted increase in control delay is 0.5 seconds compared to 2024 future background conditions.

These operations indicate that the addition of site traffic to the boundary road network is expected to minimally impact traffic operations. These operations also indicate that the Victoria Street extension through the subject property is not required.

Therefore, the proposed development is supportable from a traffic operations perspective.

7.0 Victoria Street Extension

One of the key components of this TIS Addendum is to determine whether the Victoria Street Extension is required from a traffic operations perspective. This Addendum analyzed the intersections of Chalmers Street at Victoria Street and Lakeshore Road West under 2024 future total conditions without

the Victoria Street Extension, which would result in site traffic entering and exiting the site via the Chalmers Street intersections.

As outlined in Section 6.2, the Chalmers Street intersections are expected to operate at LOS "A" under 2024 future total conditions. These operations indicate that the Victoria Street extension through the subject property is not required.

It is noted that the Town does not plan to open the West Street ROW at the easterly limit of the subject property. Therefore, the Victoria Street extension through the subject property is not required on the basis of forming a complete road network within the neighbourhood.

It is also noted that public pedestrian access will be provided through the site, thereby decreasing the walking distance to and from Lakeshore Road West for nearby residents.

8.0 West Street Unopened Right-Of-Way

West Street is discontinuous with an unopened ROW between Victoria Street and Lakeshore Road West east of the subject property. It is understood that this existing ROW is currently used by pedestrians as a shortcut from Victoria Street/West Street to Lakeshore Road West. The proposed development will not obstruct or restrict the existing pedestrian connectivity between Victoria Street/West Street and Lakeshore Road West via the West Street unopened ROW. The existing unopened West Street ROW pedestrian route will remain as-is for pedestrian use. Should the Town deem the ROW as surplus, any redevelopment can incorporate a public trail or path to maintain the pedestrian connection.

9.0 Conclusions

The analysis contained within this report has resulted in the following key findings:

- Analysis of 2019 existing traffic conditions indicate that the study intersections are operating at LOS "A" or better during the weekday a.m. and p.m. peak hour.
- Analysis of 2024 future background traffic operations indicate that the study intersections are anticipated to continue operating at LOS "A" or better during the weekday a.m. and p.m. peak hour.
- The proposed development is anticipated to add 24 and 27 trips to the boundary road network during the weekday a.m. and p.m. peak hours, respectively.
- Analysis of 2024 future total traffic operations indicate that the study intersections are anticipated to operate at unchanged levels of service compared to 2024 future background conditions.
- It is anticipated that the addition of development site traffic to the boundary road network will minimally impact the road network from a traffic operations perspective.
- The forecasted satisfactory traffic operations on Chalmers Street at Victoria Street and Lakeshore Road West indicate that the extension of Victoria Street is not required from a traffic operations perspective.

- The proposed development will not obstruct or restrict the existing unopened ROW and pedestrian route between Victoria Street/West Street and Lakeshore Road West, allowing the existing unopened West Street right-of-way pedestrian route to remain as-is for pedestrian use.

Analysis was conducted using the Site Plan prepared by VA3 Design Inc. (updated May 1, 2019). Any minor changes to the Site Plan will not materially affect the conclusions contained within this report.

In conclusion, the proposed development can be supported from a traffic operations perspective.

Respectfully submitted by,

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APPENDIX A

Town of Oakville Zoning By-Law 2014-014 Excerpts



Consolidated to January 27, 2017

— ZONING BOUNDARY

TOWN OF OAKVILLE
Zoning By-law 2014-014
 Community Development Commission
 Strategic Business Support

APPENDIX B

Transit Data

OAKVILLE TRANSIT

Weekday Route Map

3
Solid line indicates regular service route.

10
Dashed line indicates rush hour or limited service route, or change in routing pattern.

Please note that not all routes operate on Saturday, Sunday/Holidays.

Saturday Routes:

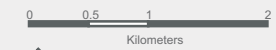
3 4 5 5A 6 13 14 14A 15 18
19 20 24 26 28

Sunday/Holidays Routes:

3 4 5 6 13 14 14A 15 18 19
20 24 28

- 1 Centennial Pool
- 2 Central Library
- 3 Church and Dunn bus stop
- 4 Erchless Estates
- 5 George's Square
- 6 Lakeside Park
- 7 Oakville Centre for the Performing Arts
- 8 Oakville Museum
- 9 Tannery Park
- 10 Towne Square
- 11 Trafalgar Park Community Centre

Map effective March 3, 2019



South Common Centre
24

Uptown Core
5 5A 19 20 24

Laird & Ridgeway
6 12 120

Oakville Trafalgar Memorial Hospital
3 5 5A

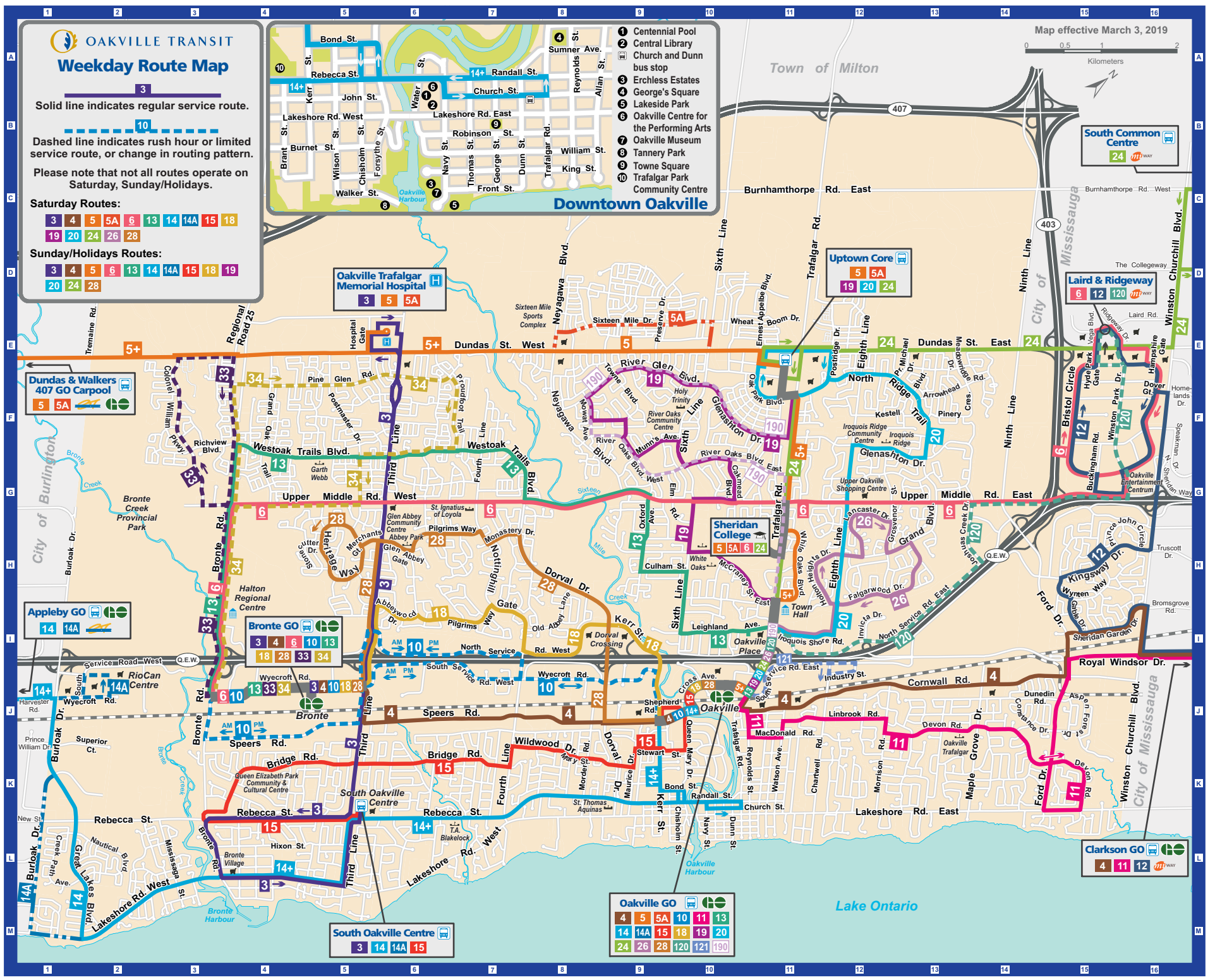
Dundas & Walkers 407 GO Carpool
5 5A

Appleby GO
14 14A

Bronte GO
3 4 6 10 13 18 28 33 34

Oakville GO
4 5 5A 10 11 13 14 14A 15 18 19 20 24 26 28 120 121 190

South Oakville Centre
3 14 14A 15



APPENDIX C

Traffic Data

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00
To: 10:00:00

One Hour Peak

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

Municipality: Oakville
Site #: 1917600001
Intersection: Chalmers St & Victoria St
TFR File #: 1
Count date: 23-May-19

Weather conditions:
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Chalmers St runs W/E

North Leg Total: 23
North Entering: 14
North Peds: 6
Peds Cross: \times

Cyclists	0	0	0	0
Trucks	0	0	0	0
Cars	1	0	13	14
Totals	1	0	13	



Cyclists	0
Trucks	2
Cars	7
Totals	9

East Leg Total: 89
East Entering: 29
East Peds: 12
Peds Cross: \times

Cyclists	0
Trucks	1
Cars	25
Totals	26

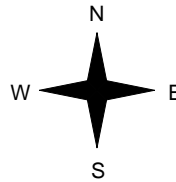


Victoria St

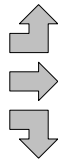
Cars	7	Trucks	1	Cyclists	0	Totals	8
17	1	0	18				
2	1	0	3				
26	3	0					



Chalmers St



Cyclists	0		
Trucks	1		
Cars	0		
Totals	1		
0	2	32	34
0	0	2	2
0	3	34	



Chalmers St



Peds Cross: \times
West Peds: 7
West Entering: 37
West Leg Total: 63

Cars	4	Cars	7	0	13	20
Trucks	1	Trucks	0	0	0	0
Cyclists	0	Cyclists	0	0	0	0
Totals	5	Totals	7	0	13	



Victoria St



Peds Cross: \times
South Peds: 14
South Entering: 20
South Leg Total: 25

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 16:00:00

To: 19:00:00

One Hour Peak

From: 17:30:00

To: 18:30:00

Municipality: Oakville
Site #: 1917600001
Intersection: Chalmers St & Victoria St
TFR File #: 1
Count date: 23-May-19

Weather conditions:
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Chalmers St runs W/E

North Leg Total: 14
 North Entering: 7
 North Peds: 8
 Peds Cross: \bowtie

Cyclists	0	0	0	0
Trucks	0	0	0	0
Cars	0	0	7	7
Totals	0	0	7	



Cyclists	0
Trucks	1
Cars	6
Totals	7

East Leg Total: 82
 East Entering: 42
 East Peds: 7
 Peds Cross: \bowtie

Cyclists	Trucks	Cars	Totals
0	0	26	26

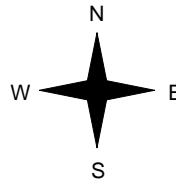


Victoria St

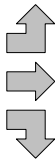
Cars	Trucks	Cyclists	Totals
5	1	0	6
21	0	0	21
15	0	0	15
41	1	0	



Chalmers St



Cyclists	Trucks	Cars	Totals
0	0	1	1
0	0	24	24
0	0	7	7
0	0	32	



Victoria St



Chalmers St



Cars	Trucks	Cyclists	Totals
40	0	0	40

Peds Cross: \bowtie
 West Peds: 2
 West Entering: 32
 West Leg Total: 58

Cars	22
Trucks	0
Cyclists	0
Totals	22



Cars	5	0	9	14
Trucks	0	0	0	0
Cyclists	0	0	0	0
Totals	5	0	9	

Peds Cross: \bowtie
 South Peds: 12
 South Entering: 14
 South Leg Total: 36

Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Oakville
Site #: 1917600001
Intersection: Chalmers St & Victoria St
TFR File #: 1
Count date: 23-May-19

Weather conditions:
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Chalmers St runs W/E

North Leg Total: 96
 North Entering: 50
 North Peds: 36
 Peds Cross: \bowtie

Cyclists	0	0	0	0
Trucks	0	0	0	0
Cars	5	1	44	50
Totals	5	1	44	



Cyclists	0
Trucks	3
Cars	43
Totals	46

East Leg Total: 458
 East Entering: 216
 East Peds: 31
 Peds Cross: \bowtie

Cyclists	Trucks	Cars	Totals
0	7	143	150

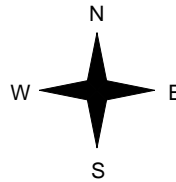


Victoria St

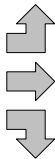
Cars	Trucks	Cyclists	Totals
37	2	0	39
112	7	0	119
56	2	0	58
205	11	0	



Chalmers St



Cyclists	Trucks	Cars	Totals
0	1	5	6
0	4	132	136
0	0	23	23
0	5	160	



Chalmers St



Peds Cross: \bowtie
 West Peds: 30
 West Entering: 165
 West Leg Total: 315

Cars	80
Trucks	2
Cyclists	0
Totals	82



Cars	26	1	61	88
Trucks	0	0	1	1
Cyclists	0	0	0	0
Totals	26	1	62	

Peds Cross: \bowtie
 South Peds: 57
 South Entering: 89
 South Leg Total: 171

Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Chalmers St & Victoria St

Count Date: 23-May-19

Municipality: Oakville

North Approach Totals						South Approach Totals						
Hour Ending	Includes Cars, Trucks, & Cyclists				Total Peds	North/South Total Approaches	Hour Ending	Includes Cars, Trucks, & Cyclists				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	7	0	2	9	7	30	8:00:00	6	1	14	21	6
9:00:00	13	0	1	14	6	34	9:00:00	7	0	13	20	14
10:00:00	8	0	0	8	7	24	10:00:00	4	0	12	16	4
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	7	0	0	7	4	13	17:00:00	0	0	6	6	11
18:00:00	5	0	0	5	4	14	18:00:00	2	0	7	9	11
19:00:00	4	1	2	7	8	24	19:00:00	7	0	10	17	11
Totals:	44	1	5	50	36	139		26	1	62	89	57
East Approach Totals						West Approach Totals						
Hour Ending	Includes Cars, Trucks, & Cyclists				Total Peds	East/West Total Approaches	Hour Ending	Includes Cars, Trucks, & Cyclists				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	5	14	1	20	2	43	8:00:00	1	22	0	23	7
9:00:00	3	18	8	29	12	66	9:00:00	1	34	2	37	7
10:00:00	11	15	6	32	4	57	10:00:00	1	22	2	25	4
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	11	23	6	40	2	71	17:00:00	1	21	9	31	1
18:00:00	15	28	13	56	6	77	18:00:00	1	16	4	21	7
19:00:00	13	21	5	39	5	67	19:00:00	1	21	6	28	4
Totals:	58	119	39	216	31	381		6	136	23	165	30
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	10:00			16:00	17:00	18:00	19:00		
Crossing Values:	0	23	39	20			0	10	20	21		

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period

From: 7:00:00
To: 10:00:00

One Hour Peak

From: 7:45:00
To: 8:45:00

Municipality: Oakville
Site #: 1917600002
Intersection: Lakeshore Rd W & Chalmers St-Sr
TFR File #: 12
Count date: 23-May-19

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Lakeshore Rd W runs N/S

North Leg Total: 1088
North Entering: 259
North Peds: 0
Peds Cross: \bowtie

Cyclists	0	0	0	0
Trucks	1	9	0	10
Cars	17	226	6	249
Totals	18	235	6	



Cyclists	0
Trucks	14
Cars	815
Totals	829

East Leg Total: 32
East Entering: 23
East Peds: 5
Peds Cross: \bowtie

Cyclists	Trucks	Cars	Totals
0	3	24	27

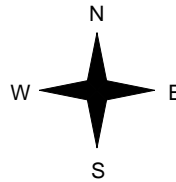


Lakeshore Rd W

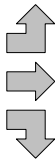
Cars	Trucks	Cyclists	Totals
14	0	0	14
0	0	0	0
9	0	0	9
23	0	0	



Chalmers St



Cyclists	Trucks	Cars	Totals
0	2	28	30
0	0	1	1
0	0	19	19
0	2	48	



Shore Gardens



Cars	Trucks	Cyclists	Totals
8	1	0	9

Peds Cross: \bowtie
West Peds: 14
West Entering: 50
West Leg Total: 77

Cars	254	Cars	7	773	1	781
Trucks	9	Trucks	2	12	1	15
Cyclists	0	Cyclists	0	0	0	0
Totals	263	Totals	9	785	2	



Peds Cross: \bowtie
South Peds: 10
South Entering: 796
South Leg Total: 1059

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period

From: 16:00:00

To: 19:00:00

One Hour Peak

From: 16:30:00

To: 17:30:00

Municipality: Oakville
Site #: 1917600002
Intersection: Lakeshore Rd W & Chalmers St-Sr
TFR File #: 12
Count date: 23-May-19

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Lakeshore Rd W runs N/S

North Leg Total: 1319
 North Entering: 924
 North Peds: 7
 Peds Cross: \bowtie

Cyclists	0	0	0	0
Trucks	0	6	0	6
Cars	19	893	6	918
Totals	19	899	6	



Cyclists	0
Trucks	4
Cars	391
Totals	395

East Leg Total: 24
 East Entering: 14
 East Peds: 10
 Peds Cross: \bowtie

Cyclists	Trucks	Cars	Totals
0	0	50	50

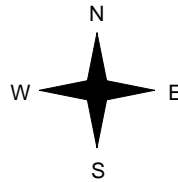


Lakeshore Rd W

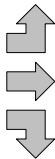
Cars	Trucks	Cyclists	Totals
4	0	0	4
1	0	0	1
9	0	0	9
14	0	0	



Chalmers St



Cyclists	Trucks	Cars	Totals
0	0	8	8
0	0	1	1
0	0	15	15
0	0	24	



Shore Gardens



Lakeshore Rd W



Cars	Trucks	Cyclists	Totals
10	0	0	10

Peds Cross: \bowtie
 West Peds: 11
 West Entering: 24
 West Leg Total: 74

Cars	917	Cars	30	379	3	412
Trucks	6	Trucks	0	4	0	4
Cyclists	0	Cyclists	0	0	0	0
Totals	923	Totals	30	383	3	



Peds Cross: \bowtie
 South Peds: 8
 South Entering: 416
 South Leg Total: 1339

Comments

Ontario Traffic Inc.

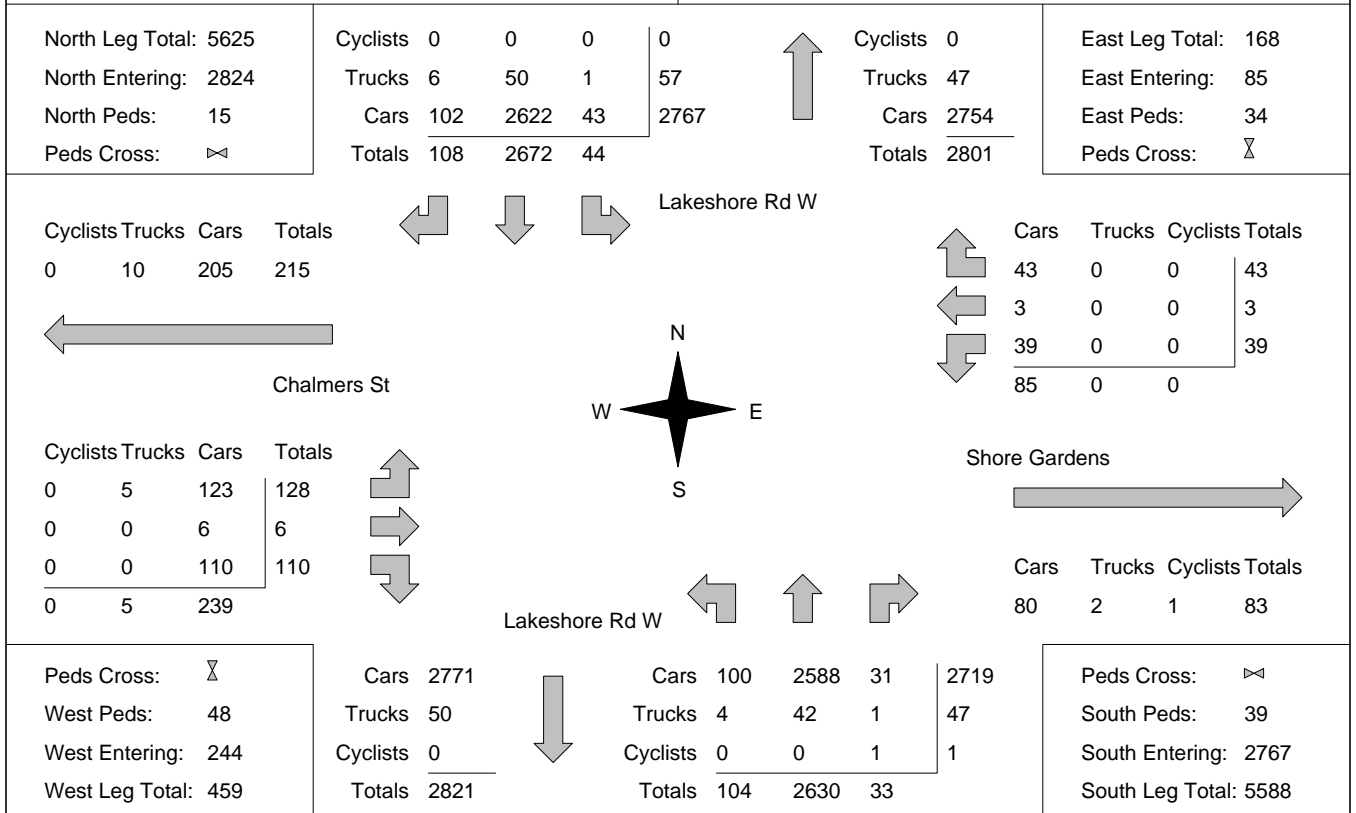
Total Count Diagram

Municipality: Oakville
Site #: 1917600002
Intersection: Lakeshore Rd W & Chalmers St-Sr
TFR File #: 12
Count date: 23-May-19

Weather conditions:
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Lakeshore Rd W runs N/S



Comments

Ontario Traffic Inc. Traffic Count Summary

Intersection: Lakeshore Rd W & Chalmers St-S Count Date: 23-May-19 Municipality: Oakville

North Approach Totals						South Approach Totals						
Hour Ending	Includes Cars, Trucks, & Cyclists				Total Peds	North/South Total Approaches	Hour Ending	Includes Cars, Trucks, & Cyclists				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	5	116	9	130	2	774	8:00:00	10	633	1	644	6
9:00:00	8	262	19	289	2	1010	9:00:00	9	707	5	721	9
10:00:00	12	234	11	257	0	663	10:00:00	21	374	11	406	3
16:00:00	0	1	0	1	0	4	16:00:00	0	3	0	3	0
17:00:00	4	893	22	919	6	1321	17:00:00	17	378	7	402	4
18:00:00	7	756	23	786	1	1153	18:00:00	32	332	3	367	6
19:00:00	8	410	24	442	4	666	19:00:00	15	203	6	224	11
Totals:	44	2672	108	2824	15	5591		104	2630	33	2767	39
East Approach Totals						West Approach Totals						
Hour Ending	Includes Cars, Trucks, & Cyclists				Total Peds	East/West Total Approaches	Hour Ending	Includes Cars, Trucks, & Cyclists				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	2	1	8	11	2	55	8:00:00	24	3	17	44	7
9:00:00	8	0	17	25	5	85	9:00:00	38	1	21	60	10
10:00:00	9	0	7	16	3	58	10:00:00	24	0	18	42	4
16:00:00	0	0	0	0	0	1	16:00:00	0	0	1	1	0
17:00:00	8	1	4	13	9	47	17:00:00	12	1	21	34	14
18:00:00	6	1	4	11	5	39	18:00:00	10	0	18	28	7
19:00:00	6	0	3	9	10	44	19:00:00	20	1	14	35	6
Totals:	39	3	43	85	34	329		128	6	110	244	48
Calculated Values for Traffic Crossing Major Street												
Hours Ending:	7:00	8:00	9:00	10:00			16:00	17:00	18:00	19:00		
Crossing Values:	0	37	58	36			0	31	24	42		

File: 1
 Site: 1917600001
 Facing: NORTH

NORTH APPROACH

EAST APPROACH

SOUTH APPROACH

WEST APPROACH

DATE	TIME	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL
		Right	Thru	Left		Right	Thru	Left		Right	Thru	Left		Right	Thru	Left		
***** Recording started at:06:58:00																		
23/05/2019	7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23/05/2019	7:15:00	0	0	1	0	1	3	1	0	3	0	0	2	0	4	1	1	14
23/05/2019	7:30:00	0	0	2	1	0	2	1	1	1	0	1	0	0	3	0	1	10
23/05/2019	7:45:00	1	0	2	5	0	4	1	1	5	0	1	2	0	9	0	3	23
23/05/2019	8:00:00	1	0	2	1	0	5	2	0	5	1	4	2	0	6	0	2	26
23/05/2019	8:15:00	1	0	3	2	1	5	0	1	4	0	4	2	0	7	0	0	25
23/05/2019	8:30:00	0	0	4	1	3	3	1	0	0	0	1	0	2	11	0	0	25
23/05/2019	8:45:00	0	0	2	1	1	5	1	10	1	0	2	10	0	4	1	7	17
23/05/2019	9:00:00	0	0	4	2	3	5	1	1	8	0	0	2	0	12	0	0	33
23/05/2019	9:15:00	0	0	3	1	4	5	2	0	3	0	0	1	1	5	0	1	23
23/05/2019	9:30:00	0	0	3	6	0	3	6	2	3	0	0	0	0	7	0	1	22
23/05/2019	9:45:00	0	0	1	0	0	4	2	1	3	0	3	2	1	7	0	0	21
23/05/2019	10:00:00	0	0	1	0	2	3	1	1	3	0	1	1	0	3	1	2	15
23/05/2019	10:00:02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***** Recording restarted at:15:59:15																		
23/05/2019	16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23/05/2019	16:15:00	0	0	1	2	1	8	3	0	1	0	0	5	4	8	0	0	26
23/05/2019	16:30:00	0	0	2	0	0	7	3	0	1	0	0	0	3	5	0	1	21
23/05/2019	16:45:00	0	0	1	2	3	7	2	0	1	0	0	3	1	4	1	0	20
23/05/2019	17:00:00	0	0	3	0	2	1	3	2	3	0	0	3	1	4	0	0	17
23/05/2019	17:15:00	0	0	1	2	6	9	5	2	0	0	0	3	0	2	0	3	23
23/05/2019	17:30:00	0	0	0	0	2	8	2	2	3	0	1	3	1	2	1	3	20
23/05/2019	17:45:00	0	0	1	0	2	4	3	0	2	0	0	4	1	6	0	0	19
23/05/2019	18:00:00	0	0	3	2	3	7	5	2	2	0	1	1	2	6	0	1	29
23/05/2019	18:15:00	0	0	2	4	0	8	4	3	2	0	2	1	2	5	0	1	25
23/05/2019	18:30:00	0	0	1	2	1	2	3	2	3	0	2	6	2	7	1	0	22
23/05/2019	18:45:00	0	0	0	1	1	4	1	0	1	0	1	4	1	5	0	2	14
23/05/2019	19:00:00	2	1	1	1	3	7	5	0	4	0	2	0	1	4	0	1	30
23/05/2019	19:00:07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0.76

0.82

File: 12
 Site: 1917600002
 Facing: NORTH

NORTH APPROACH

EAST APPROACH

SOUTH APPROACH

WEST APPROACH

DATE	TIME	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL			Pedestrians	TOTAL
		Right	Thru	Left		Right	Thru	Left		Right	Thru	Left						
***** Recording started at:06:59:22																		
23/05/2019	7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23/05/2019	7:15:00	2	10	0	0	1	1	0	0	0	70	2	0	4	0	4	1	94
23/05/2019	7:30:00	0	29	4	1	2	0	0	0	1	151	3	0	4	0	2	1	196
23/05/2019	7:45:00	3	40	1	1	4	0	0	2	0	191	2	5	4	2	10	1	257
23/05/2019	8:00:00	4	37	0	0	1	0	2	0	0	221	3	1	5	1	8	4	282
23/05/2019	8:15:00	4	42	2	0	7	0	4	1	0	183	2	5	6	0	8	7	258
23/05/2019	8:30:00	4	71	3	0	2	0	1	3	0	200	3	1	6	0	9	1	299
23/05/2019	8:45:00	6	85	1	0	4	0	2	1	2	181	1	3	2	0	5	2	289
23/05/2019	9:00:00	5	64	2	2	4	0	1	0	3	143	3	0	7	1	16	0	249
23/05/2019	9:15:00	3	60	4	0	1	0	0	0	3	124	8	1	5	0	6	3	214
23/05/2019	9:30:00	4	68	2	0	2	0	3	0	3	90	5	0	6	0	7	0	190
23/05/2019	9:45:00	2	65	2	0	0	0	2	1	1	87	4	1	4	0	7	0	174
23/05/2019	10:00:00	2	41	4	0	4	0	4	2	4	73	4	1	3	0	4	1	143
23/05/2019	10:00:39	0	1	0	0	0	0	0	0	0	3	0	0	1	0	0	0	5
***** Recording restarted at:15:46:08																		
23/05/2019	16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23/05/2019	16:15:00	3	200	1	0	1	1	3	0	3	86	8	0	4	0	6	6	316
23/05/2019	16:30:00	8	211	1	0	2	0	1	1	2	92	2	0	6	0	2	1	327
23/05/2019	16:45:00	8	231	1	5	0	0	1	5	1	98	4	1	4	1	1	5	350
23/05/2019	17:00:00	3	251	1	1	1	0	3	3	1	102	3	3	7	0	3	2	375
23/05/2019	17:15:00	5	204	1	0	1	0	2	1	1	79	15	4	1	0	2	2	311
23/05/2019	17:30:00	3	213	3	1	2	1	3	1	0	104	8	0	3	0	2	2	342
23/05/2019	17:45:00	6	179	2	0	0	0	0	0	2	69	3	0	6	0	3	2	270
23/05/2019	18:00:00	9	160	1	0	1	0	1	3	0	80	6	2	8	0	3	1	269
23/05/2019	18:15:00	6	114	5	2	0	0	2	2	3	40	6	4	4	0	5	0	185
23/05/2019	18:30:00	4	110	1	0	0	0	1	1	0	59	2	4	5	1	5	3	188
23/05/2019	18:45:00	3	95	1	2	1	0	2	4	1	52	3	3	1	0	5	1	164
23/05/2019	19:00:00	11	91	1	0	2	0	1	3	1	52	4	0	4	0	5	2	172
23/05/2019	19:05:24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0.94

0.92

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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Configuration Controller Sequence

Phase Ring Sequence and Assignment (MM) 1-1-1

Hardware Alternate Sequence Enable: No

Phase Ring Sequence.....(Note: Sequences identical to the prior one are not printed)

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
	B		B		B		B		B							
Sequence 1																
Ring 1	| 1	2	| 3	4	| 9	10	| 13	14	| .	.	.	.	.	.	.	.
Ring 2	| 5	6	| 7	8	| 11	12	| 15	16	| .	.	.	.	.	.	.	.
Sequence 2																
Ring 1	| 2	1	| 3	4	| 10	9	| 13	14	| .	.	.	.	.	.	.	.
Ring 2	| 5	6	| 7	8	| 11	12	| 15	16	| .	.	.	.	.	.	.	.
Sequence 3																
Ring 1	| 1	2	| 4	3	| 9	10	| 14	13	| .	.	.	.	.	.	.	.
Ring 2	| 5	6	| 7	8	| 11	12	| 15	16	| .	.	.	.	.	.	.	.
Sequence 4																
Ring 1	| 2	1	| 4	3	| 10	9	| 14	13	| .	.	.	.	.	.	.	.
Ring 2	| 5	6	| 7	8	| 11	12	| 15	16	| .	.	.	.	.	.	.	.
Sequence 5																
Ring 1	| 1	2	| 3	4	| 9	10	| 13	14	| .	.	.	.	.	.	.	.
Ring 2	| 6	5	| 7	8	| 12	11	| 15	16	| .	.	.	.	.	.	.	.
Sequence 6																
Ring 1	| 2	1	| 3	4	| 10	9	| 13	14	| .	.	.	.	.	.	.	.
Ring 2	| 6	5	| 7	8	| 12	11	| 15	16	| .	.	.	.	.	.	.	.
Sequence 7																
Ring 1	| 1	2	| 4	3	| 9	10	| 14	13	| .	.	.	.	.	.	.	.
Ring 2	| 6	5	| 7	8	| 12	11	| 15	16	| .	.	.	.	.	.	.	.
Sequence 8																
Ring 1	| 2	1	| 4	3	| 10	9	| 14	13	| .	.	.	.	.	.	.	.
Ring 2	| 6	5	| 7	8	| 12	11	| 15	16	| .	.	.	.	.	.	.	.
Sequence 9																
Ring 1	| 1	2	| 3	4	| 9	10	| 13	14	| .	.	.	.	.	.	.	.
Ring 2	| 5	6	| 8	7	| 11	12	| 16	15	| .	.	.	.	.	.	.	.
Sequence 10																

Ring 1	| 2	1	| 3	4	| 10	9	| 13	14	| .	.	.	.	.	.	.	.
Ring 2	| 5	6	| 8	7	| 11	12	| 16	15	| .	.	.	.	.	.	.	.
Sequence 11																
Ring 1	| 1	2	| 4	3	| 9	10	| 14	13	| .	.	.	.	.	.	.	.
Ring 2	| 5	6	| 8	7	| 11	12	| 16	15	| .	.	.	.	.	.	.	.
Sequence 12																
Ring 1	| 2	1	| 4	3	| 10	9	| 14	13	| .	.	.	.	.	.	.	.
Ring 2	| 5	6	| 8	7	| 11	12	| 16	15	| .	.	.	.	.	.	.	.
Sequence 13																
Ring 1	| 1	2	| 3	4	| 9	10	| 13	14	| .	.	.	.	.	.	.	.
Ring 2	| 6	5	| 8	7	| 12	11	| 16	15	| .	.	.	.	.	.	.	.
Sequence 14																
Ring 1	| 2	1	| 3	4	| 10	9	| 13	14	| .	.	.	.	.	.	.	.
Ring 2	| 6	5	| 8	7	| 12	11	| 16	15	| .	.	.	.	.	.	.	.
Sequence 15																
Ring 1	| 1	2	| 4	3	| 9	10	| 14	13	| .	.	.	.	.	.	.	.
Ring 2	| 6	5	| 8	7	| 12	11	| 16	15	| .	.	.	.	.	.	.	.
Sequence 16																
Ring 1	| 2	1	| 4	3	| 10	9	| 14	13	| .	.	.	.	.	.	.	.
Ring 2	| 6	5	| 8	7	| 12	11	| 16	15	| .	.	.	.	.	.	.	.

Phases In Use/Exclusive Ped (MM) 1-2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Phases In Use		X		X												
Exclusive Ped																

Phase Compatibility (MM) 1-1-2

n/a	Barrier Mode

Phase and Overlap Descriptions

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Description																
Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Description																

Administration (MM) 1-7-1

Enable Controller/Cabinet No
Interlock CRC
CRC (16 bit) EE75
Enable Automatic Backup No
to Datakey

Backup Prevent (MM) 1-1-3

Phases		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Timing	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Phases	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Simultaneous Gap (MM) 1-1-4

Phases		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Phase	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Must	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Gap	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
With	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Phase	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Disable		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Load Switch Assignments (MM) 1-3

Phase / Overlap	Type	Dimming				Power Up	Auto		Flash Together
		Red	Yellow	Green	Dark		Red	Yellow	

1	1	V				-	Auto	X		
2	2	V				-	Auto	X		X
3	3	V				-	Auto	X		
4	4	V				-	Auto	X		X
5	2	V				+	Auto	X		
6	4	V				+	Auto	X		X
7	2	P				+	Auto	X		
8	4	P				+	Auto	X		X
9	2	P				-	Auto			
10	4	P				-	Auto			
11	6	P				+	Auto			
12	8	P				+	Auto			
13	2	O				-	Auto	X		
14	6	O				+	Auto	X		X
15	3	O				-	Auto	X		
16	4	O				+	Auto	X		X

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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Configuration Port 1 (SDLC)**Port 1 SDLC (MM) 1-4-1**

	1	2	3	4	5	6	7	8
Term & Facility	X	X						
Detector Rack	X							

Enable TS2/MMU Type Cabinet: No
 Enable MMU Extended Status: No
 Enable SDLC Stop Time: No
 Enable 3 Critical RFE's Lockup: Yes

MMU Program (MM) 1-4-2

Channel 1	Channel 2

Color Check Enable (MM) 1-4-3

Enable Color Check: Yes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Green									X	X	X	X	X	X	X	X
Yellow									X	X	X	X	X	X	X	X
Red									X	X	X	X	X	X	X	X

Secondary Stations/Tests (MM) 1-4-4

	1	2	3	4	5	6	7	8	MMU
Term & Facility									

	1	2	3	4	5	6	7	8	Diag
Detector Rack									

Enable SDLC Diagnostic Test: No

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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Configuration Communications 1 (SDLC)**Ethernet Port Configuration (MM) 1-5-1**

DHCP
Enable: No

Controller IP: 10.70.10.51
Subnet Mask: 255.255.255.0
Default
Gateway IP: 10.70.10.1
Server IP: 10.70.10.1

NTCIP (MM) 1-5-5

NTCIP Backup Time (Sec): 0

NTCIP UDP Port: 501

Ethernet Priority: 1

Port 2 Priority (Port C50S for 2070): 4

Port 3A Priority (Port C21S for 2070): 2

Port 3B Priority (Port C22S for 2070): 3

Port Configuration (MM) 1-5-2 to 1-5-4

	2 (C50S)	3A (C21S)	3B (C22S)
Protocol	TERMINAL	NTCIP	ECPIP
Enable	No	No	No
Data Rate (BPS)	9600	19.2K	1200
Data, Parity, Stop	8 N 1	8 N 1	8 N 1
Address	0	0	0
Telemetry Response Delay	0.0	0.0	0.9
Duplex - Half or Full	Half	Full	Full
Flow Control	Yes	Yes	Yes
Group Address	0	0	0
Single Flag Enable	Yes	Yes	Yes
RTS to CTS Delay	n/a	n/a	14.0
RTS Turn Off Delay	n/a	n/a	2.0
Dropout Time	10	10	10
Early RTS	n/a	n/a	No
Telemetry Mode	n/a	n/a	FSK
ATCS Railroad	0	n/a	n/a
ATCS Railroad Line	0	n/a	n/a
ATCS Group	0	n/a	n/a
Wayside Device	0	n/a	n/a
ATC Device	0	n/a	n/a

Wayside Subnode	0	n/a	n/a
ATC Subnode	0	n/a	n/a

ECPIP (MM) 1-5-6

Controller Address: 0

Expanded System Detector Address: 0

**System Detector
Assignment**

	Local Detector
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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Controller Timing Plan (MM) 2-1

Plan 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Direction																
Min Green	0	20	0	10	0	0	0	0	5	5	5	5	5	5	5	5
Bk Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CS Min Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delay Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk	0	8	0	8	0	5	0	5	0	10	0	10	0	10	0	10
Walk2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear	0	10	0	11	0	7	0	7	0	16	0	16	0	16	0	16
Ped Clear 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped Clear Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ped CO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Ext	5.0	3.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Ext 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max1	0	45	0	25	35	35	35	35	35	35	35	35	35	35	35	35
Max2	0	0	0	0	40	40	40	40	40	40	40	40	40	40	40	40
Max3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DYM Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dym Step	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.0	3.5	3.0	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Red Clear	1.0	2.1	1.0	2.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Red Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Act B4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sec/Act	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Int	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Time B4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Cars Wt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STPTDuc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TTReduc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Min Gap	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Town of Oakville, ON



MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Controller Overlaps

Vehicle Overlaps (MM) 2-2

	Type	Lag Green	Yellow	Red	Adv. Green
A	Other/Econolite	5.0	3.0	1.0	0.0
B	Other/Econolite	5.0	3.0	1.0	0.0

Phases

	Phase	Included	Protect	Ped Protect	Not Overlap	Modifier	Lag X Phases	Lag 2 Phases	Flash Green
A	1	Yes	No	No	No		No	No	.
A	2	Yes	No	No	No		No	No	.
B	3	Yes	No	No	No		No	No	.
B	4	Yes	No	No	No		No	No	.

PPLT FYA

	Protected Phase (Left Turn)	Permissive Phase (Opposing Thru)	Flashing Arrow Output	Flashing Arrow Output CH	Delay Start of FYA	Delay Start of Clearance	Action Plan SF Bit Disable	Ped Protected Enable

Guaranteed Minimum Time Data (MM) 2-4

	Min Green	Walk	Ped Clear	Yellow	Red Clear	Overlap Green
A01	5	0	7	3.0	0.0	5
B02	5	0	7	3.0	0.0	5
C03	5	0	7	3.0	0.0	5
D04	5	0	7	3.0	0.0	5
E05	5	0	7	3.0	0.0	5
F06	5	0	7	3.0	0.0	5
G07	5	0	7	3.0	0.0	5
H08	5	0	7	3.0	0.0	5
I09	5	0	7	3.0	0.0	5
J10	5	0	7	3.0	0.0	5

K11	5	0	7	3.0	0.0	5
L12	5	0	7	3.0	0.0	5
M13	5	0	7	3.0	0.0	5
N14	5	0	7	3.0	0.0	5
O15	5	0	7	3.0	0.0	5
P16	5	0	7	3.0	0.0	5

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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Controller Pedestrian Overlaps

Vehicle / Pedestrian Overlaps (MM) 2-3

	Pedestrian Overlaps
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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Coordination Options**Options (MM) 3-1**

Manual Pattern	Auto	ECPI Coord	Yes
System Source	TBC	System Format	STD
Splits In	Seconds	Offsets In	Seconds
Transition	Smooth	Max Select	MAXINH
Dwell / Add Time	0		
Delay Coord Wk-LZ	No	Force Off	Float
Offset Reference	Lead	Use Ped Time	Yes
Ped Recall	No	Ped Reservice	No
Local Zero Override	No	FO Added Ini Green	No
Re-sync Count	0	Multisync	No

Auto Perm Minimum Green (Seconds) (MM) 3-4

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Minimum Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Split Demand (MM) 3-5

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Demand 1																
Demand 2																

	1	2
Detector	0	0
Call Time (Sec)	0	0
Cycle Count	0	0

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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Coordination Pattern Data
Coordinator Pattern Data (MM) 3-2

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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Coordination Split Pattern
Split Pattern Data (MM) 3-3

Town of Oakville, ON



MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Preempt Plan

Preempt Plan (MM) 4-1

Preempt Plan 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Trk Clr Veh	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trk Clr Overlap	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Trailing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dwell Veh	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dwell Ped																
Dwell Overlap	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cycling Veh	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cycling Ped																
Cycling Overlap	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Exit Phases		X														
Exit Calls																
Special Function																

Enable	Yes	Preempt Override	Yes	Interlock Enable	No
Det Lock	Yes	Delay	0	Inhibit	0
Override Flash	No	Duration	10	CLR > GRN	No
Term Ovlp	No	PC Through	Yes	Terminate	No
Asap		Yel		Phase	
Ped Dark	No	Track Clear	No	Dwell Flash	Off
Linked Pmt	0	Rsrv		Exit Options	Off
Exit Timing	0	FL Exit Color	Red	Fault Type	Hard
Plan		Reservice	0		

	1	2	3	4
Free During Pmt	No	No	No	No

	Walk	Ped Clr	Min Grn	Yellow	Red

Entrance	0	7	5	4.0	2.0
	Min Grn	Ext Grn	Max Grn	Yellow	Red
Track Clear	0	0	0	4.0	1.0
	Min Dwell	Pmt Ext	Max Time	Yellow	Red
Dwell / Cycle-Exit	0	0.0	0	4.0	1.0

Preemption Active On Preempt Act Dwell No
 Other - Priority Off Non-Priority Pmt Off
 Inhibit Extension 0.0 Ped Priority Return Off
 Veh Priority Return Off Queue Delay Off
 Conditional Delay Off

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Veh Pri Return %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Preempt Plan 2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Trk Clr Veh	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trk Clr Overlap	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Enable Trailing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dwell Veh	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.
Dwell Ped																
Dwell Overlap	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cycling Veh	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cycling Ped																
Cycling Overlap	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Exit Phases																
Exit Calls																
Special Function																

Enable Yes Preempt Override Yes Interlock Enable No
 Det Lock Yes Delay 0 Inhibit 0
 Override Flash No Duration 10 CLR > GRN No
 Term Ovp No PC Through Yes Terminate Phase No
 Asap No Yel Yes Dwell Flash Off
 Ped Dark No No Dwell Flash Off

Track Clear
 Rsrv
 Linked Pmt 0 FL Exit Color Grn Exit Options Off
 Exit Timing 0 Reservice 0 Fault Type Hard
 Plan

	1	2	3	4
Free During Pmt	No	No	No	No

	Walk	Ped Clr	Min Grn	Yellow	Red
Entrance	0	7	5	4.0	2.0
	Min Grn	Ext Grn	Max Grn	Yellow	Red
Track Clear	0	0	0	4.0	1.0
	Min Dwell	Pmt Ext	Max Time	Yellow	Red
Dwell / Cycle-Exit	0	0.0	0	4.0	1.0

Preemption Active Out On Preempt Act Dwell No
 Other - Priority Preempt Off Non-Priority Pmt Off
 Inhibit Extension Time 0.0 Ped Priority Return Off
 Veh Priority Return Off Queue Delay Off
 Conditional Delay Off

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Veh Pri Return %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Time Base Clock/Calendar**Clock/Calendar Data (MM) 5-1**

Manual Action Plan: 0
SYNC Reference Time: 03:15
SYNC Reference: Reference Time
Day Light Savings: No
Time Reset Input Set Time: 3:30:00
Standard Time From GMT: 0

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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Time Base Action Plan
Action Plan (MM) 5-2

Town of Oakville, ON



MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Time Base Day Plan/Schedule
Day Plan (MM) 5-3

Schedule (MM) 5-4

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MOVING TRAFFIC FORWARD

OAK0625 - Lakeshore Rd @ Chalmers St - Econolite Type - ASC/3

Time Base Exceptions**Exception Day Program (MM) 5-5**

	Float/Fixed	Mon/Mon	DOW/DOM	WOM/Year	Day Plan
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APPENDIX D

LOS 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 E

Detailed Capacity Analysis Worksheets

Lanes, Volumes, Timings
1: Shore Gardens/Chalmers Street & Lakeshore Road

2019 Existing Conditions AM

06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	785	2	6	235	18	9	0	14	30	1	19
Future Volume (vph)	9	785	2	6	235	18	9	0	14	30	1	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.3	3.3	3.1	3.3	3.3	3.5	3.5	3.5	4.0	4.0	4.0
Storage Length (m)	25.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			60.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	1.00			1.00			0.99			0.99	
Frt					0.989			0.919			0.949	
Flt Protected	0.950			0.950				0.980			0.971	
Satd. Flow (prot)	1397	1770	0	1705	1711	0	0	1692	0	0	1729	0
Flt Permitted	0.594			0.277				0.846			0.801	
Satd. Flow (perm)	857	1770	0	497	1711	0	0	1451	0	0	1427	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9			41			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		109.7			128.8			40.1			73.7	
Travel Time (s)		7.9			9.3			2.9			5.3	
Confl. Peds. (#/hr)	14		5	5		14	10					10
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	22%	2%	50%	0%	4%	6%	0%	0%	0%	7%	0%	0%
Bus Blockages (#/hr)	0	4	0	0	4	0	0	0	0	0	0	0
Adj. Flow (vph)	10	835	2	6	250	19	10	0	15	32	1	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	837	0	6	269	0	0	25	0	0	53	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.07	1.04	1.08	1.07	1.04	1.01	1.01	1.01	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
1: Shore Gardens/Chalmers Street & Lakeshore Road

2019 Existing Conditions AM
06/12/2019

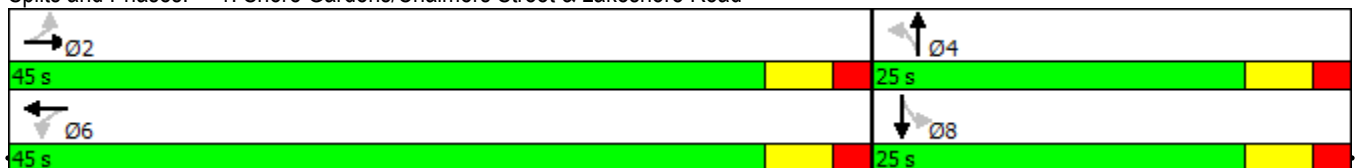


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	25.6	25.6		25.6	25.6		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.4	39.4		39.4	39.4		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		10	10		10	10	
Act Effct Green (s)	52.3	52.3		52.3	52.3			11.8			11.8	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.18			0.18	
v/c Ratio	0.01	0.60		0.02	0.20			0.09			0.20	
Control Delay	5.3	9.8		5.5	4.7			5.1			17.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.3	9.8		5.5	4.7			5.1			17.8	
LOS	A	A		A	A			A			B	
Approach Delay		9.8			4.7			5.1			17.8	
Approach LOS		A			A			A			B	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 66
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 8.9
 Intersection Capacity Utilization 61.2%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 1: Shore Gardens/Chalmers Street & Lakeshore Road



1: Shore Gardens/Chalmers Street & Lakeshore Road



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	10	837	6	269	25	53
v/c Ratio	0.01	0.60	0.02	0.20	0.09	0.20
Control Delay	5.3	9.8	5.5	4.7	5.1	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	9.8	5.5	4.7	5.1	17.8
Queue Length 50th (m)	0.3	51.2	0.2	9.9	0.0	4.2
Queue Length 95th (m)	2.3	#155.2	1.8	27.5	3.4	10.7
Internal Link Dist (m)		85.7		104.8	16.1	49.7
Turn Bay Length (m)	25.0		25.0			
Base Capacity (vph)	678	1401	393	1356	458	436
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.60	0.02	0.20	0.05	0.12

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
2: Chalmers Street & Victoria Street

2019 Existing Conditions AM

06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	7	0	13	13	0	1	3	18	8	1	34	2
Future Volume (vph)	7	0	13	13	0	1	3	18	8	1	34	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.912			0.992			0.962			0.992	
Flt Protected		0.983			0.955			0.995			0.999	
Satd. Flow (prot)	0	1684	0	0	1780	0	0	1715	0	0	1829	0
Flt Permitted		0.983			0.955			0.995			0.999	
Satd. Flow (perm)	0	1684	0	0	1780	0	0	1715	0	0	1829	0
Link Speed (k/h)		50			48			50			50	
Link Distance (m)		107.6			102.5			73.7			104.6	
Travel Time (s)		7.7			7.7			5.3			7.5	
Confl. Peds. (#/hr)	7		12	12		7	14		6	6		14
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	33%	6%	13%	100%	6%	0%
Adj. Flow (vph)	9	0	17	17	0	1	4	24	11	1	45	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	26	0	0	18	0	0	39	0	0	49	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	20.4%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
2: Chalmers Street & Victoria Street

2019 Existing Conditions AM
06/12/2019

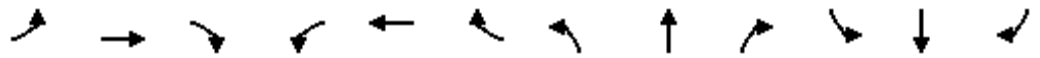


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕			↕		
Traffic Volume (veh/h)	7	0	13	13	0	1	3	18	8	1	34	2	
Future Volume (Veh/h)	7	0	13	13	0	1	3	18	8	1	34	2	
Sign Control		Stop				Stop				Free			
Grade		0%				0%				0%			
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	
Hourly flow rate (vph)	9	0	17	17	0	1	4	24	11	1	45	3	
Pedestrians		14				6				12			
Lane Width (m)		3.5				3.5				4.0			
Walking Speed (m/s)		1.1				1.1				1.1			
Percent Blockage		1				1				1			
Right turn flare (veh)													
Median type						None				None			
Median storage veh													
Upstream signal (m)						74							
pX, platoon unblocked													
vC, conflicting volume	108	112	72	121	108	42	62			41			
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	108	112	72	121	108	42	62			41			
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.4			5.1			
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.5			3.1			
p0 queue free %	99	100	98	98	100	100	100			100			
cM capacity (veh/h)	843	765	970	814	769	1020	1347			1109			
Direction, Lane #	EB 1	WB 1	NB 1	SB 1									
Volume Total	26	18	39	49									
Volume Left	9	17	4	1									
Volume Right	17	1	11	3									
cSH	922	824	1347	1109									
Volume to Capacity	0.03	0.02	0.00	0.00									
Queue Length 95th (m)	0.7	0.5	0.1	0.0									
Control Delay (s)	9.0	9.5	0.8	0.2									
Lane LOS	A	A	A	A									
Approach Delay (s)	9.0	9.5	0.8	0.2									
Approach LOS	A	A											
Intersection Summary													
Average Delay			3.4										
Intersection Capacity Utilization			20.4%	ICU Level of Service		A							
Analysis Period (min)			15										

Lanes, Volumes, Timings
1: Shore Gardens/Chalmers Street & Lakeshore Road

2019 Existing Conditions PM

06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	383	3	6	899	19	9	1	4	8	1	15
Future Volume (vph)	30	383	3	6	899	19	9	1	4	8	1	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.3	3.3	3.1	3.3	3.3	3.5	3.5	3.5	4.0	4.0	4.0
Storage Length (m)	25.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			60.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		0.99	1.00			0.98			0.97	
Frt		0.999			0.997			0.964			0.917	
Flt Protected	0.950			0.950				0.968			0.983	
Satd. Flow (prot)	1705	1787	0	1705	1783	0	0	1738	0	0	1751	0
Flt Permitted	0.218			0.517				0.784			0.879	
Satd. Flow (perm)	391	1787	0	919	1783	0	0	1394	0	0	1559	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			3			4			16	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		109.7			128.8			40.1			73.7	
Travel Time (s)		7.9			9.3			2.9			5.3	
Confl. Peds. (#/hr)	11		10	10		11	8		7	7		8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	4	0	0	4	0	0	0	0	0	0	0
Adj. Flow (vph)	33	416	3	7	977	21	10	1	4	9	1	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	419	0	7	998	0	0	15	0	0	26	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.07	1.04	1.08	1.07	1.04	1.01	1.01	1.01	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
1: Shore Gardens/Chalmers Street & Lakeshore Road

2019 Existing Conditions PM
06/12/2019

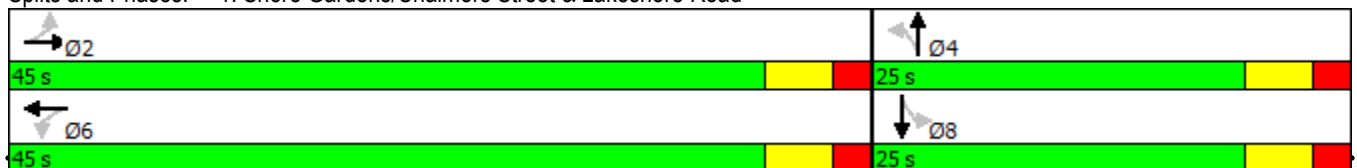


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	25.6	25.6		25.6	25.6		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.4	39.4		39.4	39.4		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		10	10		10	10	
Act Effct Green (s)	56.8	56.8		56.8	56.8			11.7			11.7	
Actuated g/C Ratio	0.86	0.86		0.86	0.86			0.18			0.18	
v/c Ratio	0.10	0.27		0.01	0.65			0.06			0.09	
Control Delay	5.3	4.1		4.5	9.9			20.9			15.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.3	4.1		4.5	9.9			20.9			15.6	
LOS	A	A		A	A			C			B	
Approach Delay		4.2			9.8			20.9			15.6	
Approach LOS		A			A			C			B	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 65.9
 Natural Cycle: 80
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 8.3
 Intersection Capacity Utilization 67.9%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service C

Splits and Phases: 1: Shore Gardens/Chalmers Street & Lakeshore Road





Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	33	419	7	998	15	26
v/c Ratio	0.10	0.27	0.01	0.65	0.06	0.09
Control Delay	5.3	4.1	4.5	9.9	20.9	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	4.1	4.5	9.9	20.9	15.6
Queue Length 50th (m)	0.0	0.0	0.0	0.0	1.0	0.9
Queue Length 95th (m)	5.9	44.9	1.8	#207.0	5.3	6.5
Internal Link Dist (m)		85.7		104.8	16.1	49.7
Turn Bay Length (m)	25.0		25.0			
Base Capacity (vph)	337	1541	792	1537	418	475
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.27	0.01	0.65	0.04	0.05

Intersection Summary

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

Lanes, Volumes, Timings
2: Chalmers Street & Victoria Street

2019 Existing Conditions PM
06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	0	9	7	0	0	15	21	6	1	24	7
Future Volume (vph)	5	0	9	7	0	0	15	21	6	1	24	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.913						0.981			0.969	
Flt Protected		0.983			0.950			0.983			0.999	
Satd. Flow (prot)	0	1686	0	0	1785	0	0	1870	0	0	1921	0
Flt Permitted		0.983			0.950			0.983			0.999	
Satd. Flow (perm)	0	1686	0	0	1785	0	0	1870	0	0	1921	0
Link Speed (k/h)		50			48			50			50	
Link Distance (m)		107.6			102.5			73.7			104.6	
Travel Time (s)		7.7			7.7			5.3			7.5	
Confl. Peds. (#/hr)	2		7	7		2	12		8	8		12
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	17%	0%	0%	0%
Adj. Flow (vph)	6	0	11	9	0	0	18	26	7	1	29	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	0	0	9	0	0	51	0	0	39	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	22.2%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
2: Chalmers Street & Victoria Street

2019 Existing Conditions PM
06/12/2019

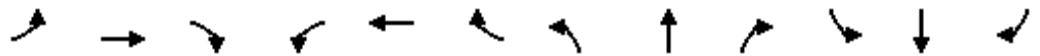


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	0	9	7	0	0	15	21	6	1	24	7
Future Volume (Veh/h)	5	0	9	7	0	0	15	21	6	1	24	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	0	11	9	0	0	18	26	7	1	29	9
Pedestrians		12			8			7			2	
Lane Width (m)		3.5			3.5			4.0			4.0	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)								74				
pX, platoon unblocked												
vC, conflicting volume	115	124	52	127	126	40	50			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115	124	52	127	126	40	50			41		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	99	100	100	99			100		
cM capacity (veh/h)	835	746	1002	810	745	1028	1552			1570		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	17	9	51	39								
Volume Left	6	9	18	1								
Volume Right	11	0	7	9								
cSH	936	810	1552	1570								
Volume to Capacity	0.02	0.01	0.01	0.00								
Queue Length 95th (m)	0.4	0.3	0.3	0.0								
Control Delay (s)	8.9	9.5	2.6	0.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	8.9	9.5	2.6	0.2								
Approach LOS	A	A										
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			22.2%		ICU Level of Service					A		
Analysis Period (min)			15									

Lanes, Volumes, Timings
1: Shore Gardens/Chalmers Street & Lakeshore Road

2024 Future Background AM

06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	825	2	6	247	19	9	0	15	32	1	20
Future Volume (vph)	9	825	2	6	247	19	9	0	15	32	1	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.3	3.3	3.1	3.3	3.3	3.5	3.5	3.5	4.0	4.0	4.0
Storage Length (m)	25.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			60.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	1.00			1.00			0.99			0.99	
Frt					0.989			0.917			0.949	
Flt Protected	0.950			0.950				0.981			0.971	
Satd. Flow (prot)	1397	1770	0	1705	1711	0	0	1690	0	0	1729	0
Flt Permitted	0.586			0.254				0.850			0.799	
Satd. Flow (perm)	846	1770	0	456	1711	0	0	1455	0	0	1423	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9			41			21	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		109.7			128.8			40.1			73.7	
Travel Time (s)		7.9			9.3			2.9			5.3	
Confl. Peds. (#/hr)	14		5	5		14	10					10
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	22%	2%	50%	0%	4%	6%	0%	0%	0%	7%	0%	0%
Bus Blockages (#/hr)	0	4	0	0	4	0	0	0	0	0	0	0
Adj. Flow (vph)	10	878	2	6	263	20	10	0	16	34	1	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	880	0	6	283	0	0	26	0	0	56	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.07	1.04	1.08	1.07	1.04	1.01	1.01	1.01	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
 1: Shore Gardens/Chalmers Street & Lakeshore Road

2024 Future Background AM
 06/12/2019

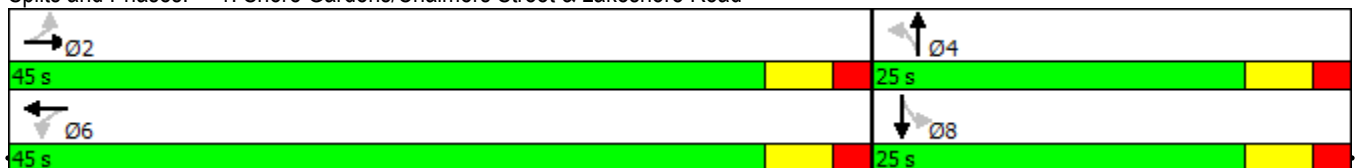


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	25.6	25.6		25.6	25.6		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.4	39.4		39.4	39.4		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		10	10		10	10	
Act Effct Green (s)	51.9	51.9		51.9	51.9			11.8			11.8	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.18			0.18	
v/c Ratio	0.01	0.63		0.02	0.21			0.09			0.21	
Control Delay	5.3	10.7		5.5	4.8			5.4			17.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.3	10.7		5.5	4.8			5.4			17.8	
LOS	A	B		A	A			A			B	
Approach Delay		10.7			4.8			5.4			17.8	
Approach LOS		B			A			A			B	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 65.7
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 9.5
 Intersection Capacity Utilization 63.3%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 1: Shore Gardens/Chalmers Street & Lakeshore Road





Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	10	880	6	283	26	56
v/c Ratio	0.01	0.63	0.02	0.21	0.09	0.21
Control Delay	5.3	10.7	5.5	4.8	5.4	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	10.7	5.5	4.8	5.4	17.8
Queue Length 50th (m)	0.3	56.2	0.2	10.5	0.0	4.5
Queue Length 95th (m)	2.3	#168.3	1.8	29.0	3.5	11.2
Internal Link Dist (m)		85.7		104.8	16.1	49.7
Turn Bay Length (m)	25.0		25.0			
Base Capacity (vph)	668	1399	360	1354	461	437
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.63	0.02	0.21	0.06	0.13

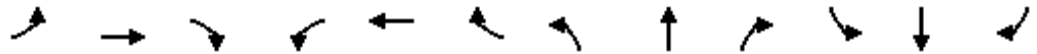
Intersection Summary

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

Lanes, Volumes, Timings
2: Chalmers Street & Victoria Street

2024 Future Background AM

06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	7	0	14	14	0	1	3	19	8	1	36	2
Future Volume (vph)	7	0	14	14	0	1	3	19	8	1	36	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.910			0.993			0.963			0.992	
Flt Protected		0.984			0.955			0.995			0.999	
Satd. Flow (prot)	0	1682	0	0	1782	0	0	1719	0	0	1830	0
Flt Permitted		0.984			0.955			0.995			0.999	
Satd. Flow (perm)	0	1682	0	0	1782	0	0	1719	0	0	1830	0
Link Speed (k/h)		50			48			50			50	
Link Distance (m)		107.6			102.5			73.7			104.6	
Travel Time (s)		7.7			7.7			5.3			7.5	
Confl. Peds. (#/hr)	7		12	12		7	14		6	6		14
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	33%	6%	13%	100%	6%	0%
Adj. Flow (vph)	9	0	18	18	0	1	4	25	11	1	47	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	19	0	0	40	0	0	51	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	20.4%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2: Chalmers Street & Victoria Street

2024 Future Background AM

06/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	7	0	14	14	0	1	3	19	8	1	36	2
Future Volume (Veh/h)	7	0	14	14	0	1	3	19	8	1	36	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	9	0	18	18	0	1	4	25	11	1	47	3
Pedestrians		14			6			12			7	
Lane Width (m)		3.5			3.5			4.0			4.0	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)								74				
pX, platoon unblocked												
vC, conflicting volume	111	114	74	125	110	44	64			42		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	111	114	74	125	110	44	64			42		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.4			5.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.5			3.1		
p0 queue free %	99	100	98	98	100	100	100			100		
cM capacity (veh/h)	839	762	967	809	766	1019	1345			1108		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	27	19	40	51								
Volume Left	9	18	4	1								
Volume Right	18	1	11	3								
cSH	920	817	1345	1108								
Volume to Capacity	0.03	0.02	0.00	0.00								
Queue Length 95th (m)	0.7	0.5	0.1	0.0								
Control Delay (s)	9.0	9.5	0.8	0.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.0	9.5	0.8	0.2								
Approach LOS	A	A										
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			20.4%		ICU Level of Service				A			
Analysis Period (min)			15									

Lanes, Volumes, Timings
1: Shore Gardens/Chalmers Street & Lakeshore Road

2024 Future Background PM

06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	403	3	6	945	20	9	1	4	8	1	16
Future Volume (vph)	32	403	3	6	945	20	9	1	4	8	1	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.3	3.3	3.1	3.3	3.3	3.5	3.5	3.5	4.0	4.0	4.0
Storage Length (m)	25.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			60.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		0.99	1.00			0.98			0.97	
Frt		0.999			0.997			0.964			0.915	
Flt Protected	0.950			0.950				0.968			0.984	
Satd. Flow (prot)	1705	1787	0	1705	1783	0	0	1738	0	0	1748	0
Flt Permitted	0.194			0.507				0.783			0.883	
Satd. Flow (perm)	348	1787	0	901	1783	0	0	1393	0	0	1562	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			3			4			17	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		109.7			128.8			40.1			73.7	
Travel Time (s)		7.9			9.3			2.9			5.3	
Confl. Peds. (#/hr)	11		10	10		11	8		7	7		8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	4	0	0	4	0	0	0	0	0	0	0
Adj. Flow (vph)	35	438	3	7	1027	22	10	1	4	9	1	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	441	0	7	1049	0	0	15	0	0	27	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.07	1.04	1.08	1.07	1.04	1.01	1.01	1.01	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
 1: Shore Gardens/Chalmers Street & Lakeshore Road

2024 Future Background PM
 06/12/2019

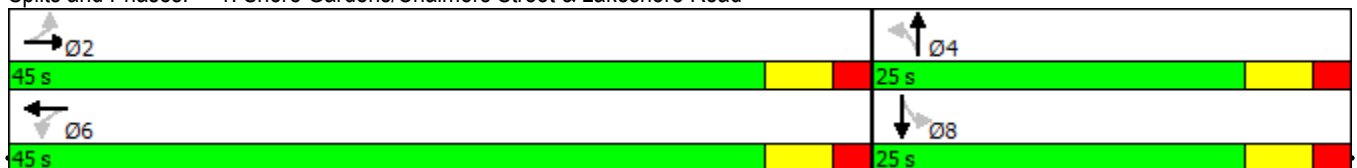


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	25.6	25.6		25.6	25.6		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.4	39.4		39.4	39.4		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		10	10		10	10	
Act Effct Green (s)	56.7	56.7		56.7	56.7			11.7			11.7	
Actuated g/C Ratio	0.86	0.86		0.86	0.86			0.18			0.18	
v/c Ratio	0.12	0.29		0.01	0.68			0.06			0.09	
Control Delay	5.7	4.2		4.5	10.8			20.9			15.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.7	4.2		4.5	10.8			20.9			15.3	
LOS	A	A		A	B			C			B	
Approach Delay		4.3			10.7			20.9			15.3	
Approach LOS		A			B			C			B	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 65.8
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 9.0
 Intersection Capacity Utilization 70.4%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service C

Splits and Phases: 1: Shore Gardens/Chalmers Street & Lakeshore Road





Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	35	441	7	1049	15	27
v/c Ratio	0.12	0.29	0.01	0.68	0.06	0.09
Control Delay	5.7	4.2	4.5	10.8	20.9	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.7	4.2	4.5	10.8	20.9	15.3
Queue Length 50th (m)	0.0	0.0	0.0	0.0	1.0	0.9
Queue Length 95th (m)	6.5	47.9	1.8	#223.2	5.3	6.5
Internal Link Dist (m)		85.7		104.8	16.1	49.7
Turn Bay Length (m)	25.0		25.0			
Base Capacity (vph)	300	1540	776	1537	418	477
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.29	0.01	0.68	0.04	0.06

Intersection Summary

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

Lanes, Volumes, Timings
2: Chalmers Street & Victoria Street

2024 Future Background PM

06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	0	9	7	0	0	16	22	6	1	25	7
Future Volume (vph)	5	0	9	7	0	0	16	22	6	1	25	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.913						0.982			0.970	
Flt Protected		0.983			0.950			0.982			0.999	
Satd. Flow (prot)	0	1686	0	0	1785	0	0	1872	0	0	1923	0
Flt Permitted		0.983			0.950			0.982			0.999	
Satd. Flow (perm)	0	1686	0	0	1785	0	0	1872	0	0	1923	0
Link Speed (k/h)		50			48			50			50	
Link Distance (m)		107.6			102.5			73.7			104.6	
Travel Time (s)		7.7			7.7			5.3			7.5	
Confl. Peds. (#/hr)	2		7	7		2	12		8	8		12
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	17%	0%	0%	0%
Adj. Flow (vph)	6	0	11	9	0	0	20	27	7	1	30	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	0	0	9	0	0	54	0	0	40	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	22.2%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2: Chalmers Street & Victoria Street

2024 Future Background PM

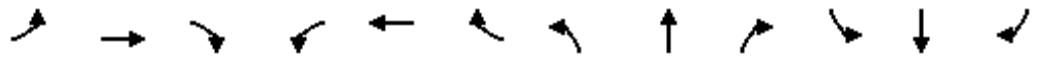
06/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	0	9	7	0	0	16	22	6	1	25	7
Future Volume (Veh/h)	5	0	9	7	0	0	16	22	6	1	25	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	0	11	9	0	0	20	27	7	1	30	9
Pedestrians		12			8			7			2	
Lane Width (m)		3.5			3.5			4.0			4.0	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)								74				
pX, platoon unblocked												
vC, conflicting volume	121	130	54	133	132	40	51			42		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	121	130	54	133	132	40	51			42		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	99	100	100	99			100		
cM capacity (veh/h)	827	740	1001	802	739	1027	1551			1568		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	17	9	54	40								
Volume Left	6	9	20	1								
Volume Right	11	0	7	9								
cSH	932	802	1551	1568								
Volume to Capacity	0.02	0.01	0.01	0.00								
Queue Length 95th (m)	0.4	0.3	0.3	0.0								
Control Delay (s)	8.9	9.5	2.8	0.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	8.9	9.5	2.8	0.2								
Approach LOS	A	A										
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			22.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Lanes, Volumes, Timings
1: Shore Gardens/Chalmers Street & Lakeshore Road

2024 Future Total AM
06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	825	2	6	247	23	9	0	15	47	1	22
Future Volume (vph)	10	825	2	6	247	23	9	0	15	47	1	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.3	3.3	3.1	3.3	3.3	3.5	3.5	3.5	4.0	4.0	4.0
Storage Length (m)	25.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			60.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	1.00			1.00			0.99			0.99	
Frt					0.987			0.917			0.958	
Flt Protected	0.950			0.950				0.981			0.967	
Satd. Flow (prot)	1397	1770	0	1705	1706	0	0	1690	0	0	1735	0
Flt Permitted	0.584			0.251				0.842			0.781	
Satd. Flow (perm)	843	1770	0	450	1706	0	0	1441	0	0	1401	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					11			41			23	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		109.7			128.8			40.1			73.7	
Travel Time (s)		7.9			9.3			2.9			5.3	
Confl. Peds. (#/hr)	14		5	5		14	10					10
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	22%	2%	50%	0%	4%	6%	0%	0%	0%	7%	0%	0%
Bus Blockages (#/hr)	0	4	0	0	4	0	0	0	0	0	0	0
Adj. Flow (vph)	11	878	2	6	263	24	10	0	16	50	1	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	880	0	6	287	0	0	26	0	0	74	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.07	1.04	1.08	1.07	1.04	1.01	1.01	1.01	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
 1: Shore Gardens/Chalmers Street & Lakeshore Road

2024 Future Total AM
 06/12/2019

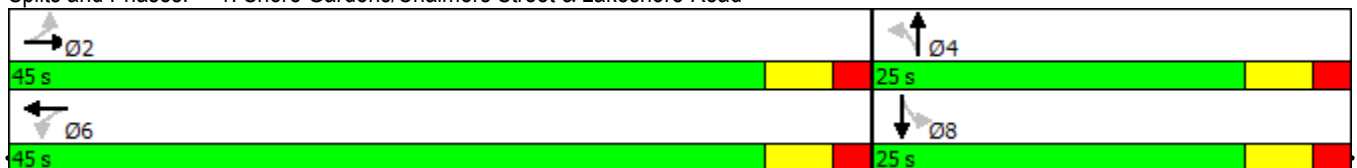


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	25.6	25.6		25.6	25.6		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.4	39.4		39.4	39.4		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		10	10		10	10	
Act Effct Green (s)	50.2	50.2		50.2	50.2			11.7			11.7	
Actuated g/C Ratio	0.78	0.78		0.78	0.78			0.18			0.18	
v/c Ratio	0.02	0.64		0.02	0.21			0.09			0.27	
Control Delay	5.4	11.0		5.7	4.9			5.4			19.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	5.4	11.0		5.7	4.9			5.4			19.2	
LOS	A	B		A	A			A			B	
Approach Delay		10.9			4.9			5.4			19.2	
Approach LOS		B			A			A			B	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 64.1
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 9.9
 Intersection Capacity Utilization 63.3%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 1: Shore Gardens/Chalmers Street & Lakeshore Road





Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	11	880	6	287	26	74
v/c Ratio	0.02	0.64	0.02	0.21	0.09	0.27
Control Delay	5.4	11.0	5.7	4.9	5.4	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.4	11.0	5.7	4.9	5.4	19.2
Queue Length 50th (m)	0.4	56.2	0.2	10.6	0.0	6.0
Queue Length 95th (m)	2.4	#168.3	1.8	29.2	3.5	14.1
Internal Link Dist (m)		85.7		104.8	16.1	49.7
Turn Bay Length (m)	25.0		25.0			
Base Capacity (vph)	660	1385	352	1338	466	442
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.64	0.02	0.21	0.06	0.17

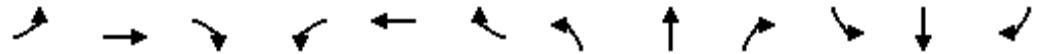
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
2: Chalmers Street & Victoria Street

2024 Future Total AM
06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	7	0	14	31	0	1	3	19	13	1	36	2
Future Volume (vph)	7	0	14	31	0	1	3	19	13	1	36	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.910			0.997			0.950			0.992	
Flt Protected		0.984			0.953			0.996			0.999	
Satd. Flow (prot)	0	1682	0	0	1785	0	0	1693	0	0	1830	0
Flt Permitted		0.984			0.953			0.996			0.999	
Satd. Flow (perm)	0	1682	0	0	1785	0	0	1693	0	0	1830	0
Link Speed (k/h)		50			48			50			50	
Link Distance (m)		107.6			102.5			73.7			104.6	
Travel Time (s)		7.7			7.7			5.3			7.5	
Confl. Peds. (#/hr)	7		12	12		7	14		6	6		14
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	33%	6%	13%	100%	6%	0%
Adj. Flow (vph)	9	0	18	41	0	1	4	25	17	1	47	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	42	0	0	46	0	0	51	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	20.4%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2: Chalmers Street & Victoria Street

2024 Future Total AM
06/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	7	0	14	31	0	1	3	19	13	1	36	2
Future Volume (Veh/h)	7	0	14	31	0	1	3	19	13	1	36	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	9	0	18	41	0	1	4	25	17	1	47	3
Pedestrians		14			6			12			7	
Lane Width (m)		3.5			3.5			4.0			4.0	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)								74				
pX, platoon unblocked												
vC, conflicting volume	114	120	74	128	114	46	64			48		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	114	120	74	128	114	46	64			48		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.4			5.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.5			3.1		
p0 queue free %	99	100	98	95	100	100	100			100		
cM capacity (veh/h)	835	756	967	805	763	1015	1345			1101		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	27	42	46	51								
Volume Left	9	41	4	1								
Volume Right	18	1	17	3								
cSH	919	809	1345	1101								
Volume to Capacity	0.03	0.05	0.00	0.00								
Queue Length 95th (m)	0.7	1.2	0.1	0.0								
Control Delay (s)	9.0	9.7	0.7	0.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.0	9.7	0.7	0.2								
Approach LOS	A	A										
Intersection Summary												
Average Delay			4.2									
Intersection Capacity Utilization			20.4%		ICU Level of Service					A		
Analysis Period (min)			15									

Lanes, Volumes, Timings
1: Shore Gardens/Chalmers Street & Lakeshore Road

2024 Future Total PM
06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	403	3	6	945	34	9	1	4	16	1	17
Future Volume (vph)	34	403	3	6	945	34	9	1	4	16	1	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.3	3.3	3.1	3.3	3.3	3.5	3.5	3.5	4.0	4.0	4.0
Storage Length (m)	25.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	50.0			60.0			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		0.99	1.00			0.98			0.98	
Frt		0.999			0.995			0.964			0.932	
Flt Protected	0.950			0.950				0.968			0.977	
Satd. Flow (prot)	1705	1787	0	1705	1779	0	0	1738	0	0	1776	0
Flt Permitted	0.185			0.507				0.778			0.842	
Satd. Flow (perm)	332	1787	0	901	1779	0	0	1384	0	0	1521	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			4			4			18	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		109.7			128.8			40.1			73.7	
Travel Time (s)		7.9			9.3			2.9			5.3	
Confl. Peds. (#/hr)	11		10	10		11	8		7	7		8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	4	0	0	4	0	0	0	0	0	0	0
Adj. Flow (vph)	37	438	3	7	1027	37	10	1	4	17	1	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	441	0	7	1064	0	0	15	0	0	36	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.07	1.04	1.08	1.07	1.04	1.01	1.01	1.01	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
1: Shore Gardens/Chalmers Street & Lakeshore Road

2024 Future Total PM
06/12/2019

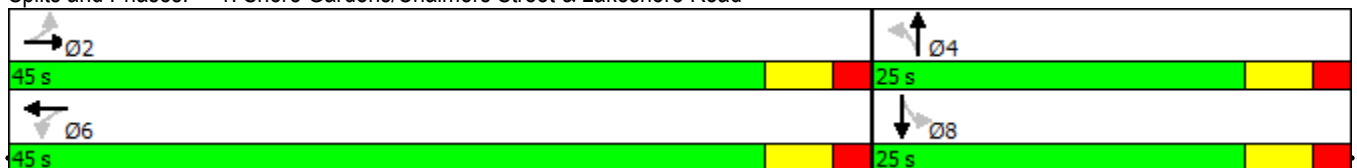


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	25.6	25.6		25.6	25.6		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.4	39.4		39.4	39.4		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		10	10		10	10	
Act Effct Green (s)	55.5	55.5		55.5	55.5			11.7			11.7	
Actuated g/C Ratio	0.86	0.86		0.86	0.86			0.18			0.18	
v/c Ratio	0.13	0.29		0.01	0.70			0.06			0.12	
Control Delay	6.1	4.4		4.7	11.5			19.9			15.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	6.1	4.4		4.7	11.5			19.9			15.9	
LOS	A	A		A	B			B			B	
Approach Delay		4.5			11.4			19.9			15.9	
Approach LOS		A			B			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 64.8
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 9.5 Intersection LOS: A
 Intersection Capacity Utilization 71.3% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Shore Gardens/Chalmers Street & Lakeshore Road



Queues

2024 Future Total PM

1: Shore Gardens/Chalmers Street & Lakeshore Road

06/12/2019



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	37	441	7	1064	15	36
v/c Ratio	0.13	0.29	0.01	0.70	0.06	0.12
Control Delay	6.1	4.4	4.7	11.5	19.9	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	4.4	4.7	11.5	19.9	15.9
Queue Length 50th (m)	0.0	0.0	0.0	0.0	1.0	1.7
Queue Length 95th (m)	7.0	48.3	1.8	#225.8	5.1	7.9
Internal Link Dist (m)		85.7		104.8	16.1	49.7
Turn Bay Length (m)	25.0		25.0			
Base Capacity (vph)	284	1531	772	1525	420	471
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.29	0.01	0.70	0.04	0.08

Intersection Summary

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

Lanes, Volumes, Timings
2: Chalmers Street & Victoria Street

2024 Future Total PM
06/12/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	0	9	16	0	0	16	22	22	1	25	7
Future Volume (vph)	5	0	9	16	0	0	16	22	22	1	25	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.913						0.951			0.970	
Flt Protected		0.983			0.950			0.987			0.999	
Satd. Flow (prot)	0	1686	0	0	1785	0	0	1754	0	0	1923	0
Flt Permitted		0.983			0.950			0.987			0.999	
Satd. Flow (perm)	0	1686	0	0	1785	0	0	1754	0	0	1923	0
Link Speed (k/h)		50			48			50			50	
Link Distance (m)		107.6			102.5			73.7			104.6	
Travel Time (s)		7.7			7.7			5.3			7.5	
Confl. Peds. (#/hr)	2		7	7		2	12		8	8		12
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	17%	0%	0%	0%
Adj. Flow (vph)	6	0	11	20	0	0	20	27	27	1	30	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	0	0	20	0	0	74	0	0	40	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.1%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2: Chalmers Street & Victoria Street

2024 Future Total PM
06/12/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	0	9	16	0	0	16	22	22	1	25	7
Future Volume (Veh/h)	5	0	9	16	0	0	16	22	22	1	25	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	0	11	20	0	0	20	27	27	1	30	9
Pedestrians		12			8			7			2	
Lane Width (m)		3.5			3.5			4.0			4.0	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)								74				
pX, platoon unblocked												
vC, conflicting volume	131	150	54	143	142	50	51			62		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	131	150	54	143	142	50	51			62		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	97	100	100	99			100		
cM capacity (veh/h)	815	721	1001	790	729	1014	1551			1542		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	17	20	74	40								
Volume Left	6	20	20	1								
Volume Right	11	0	27	9								
cSH	926	790	1551	1542								
Volume to Capacity	0.02	0.03	0.01	0.00								
Queue Length 95th (m)	0.4	0.6	0.3	0.0								
Control Delay (s)	9.0	9.7	2.1	0.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.0	9.7	2.1	0.2								
Approach LOS	A	A										
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			23.1%		ICU Level of Service					A		
Analysis Period (min)			15									

APPENDIX F

TTS Data

Wed Jun 12 2019 11:26:00 GMT-0400 (Eastern Daylight Time) - Run Time: 2120ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of destination - pd_dest

Column: Primary travel mode of trip - mode_prime

Filters:

(Start time of trip - start_time In 700-1000

and

2006 GTA zone of origin - gta06_orig In 4001

and

Primary travel mode)

Trip 2016

Table:

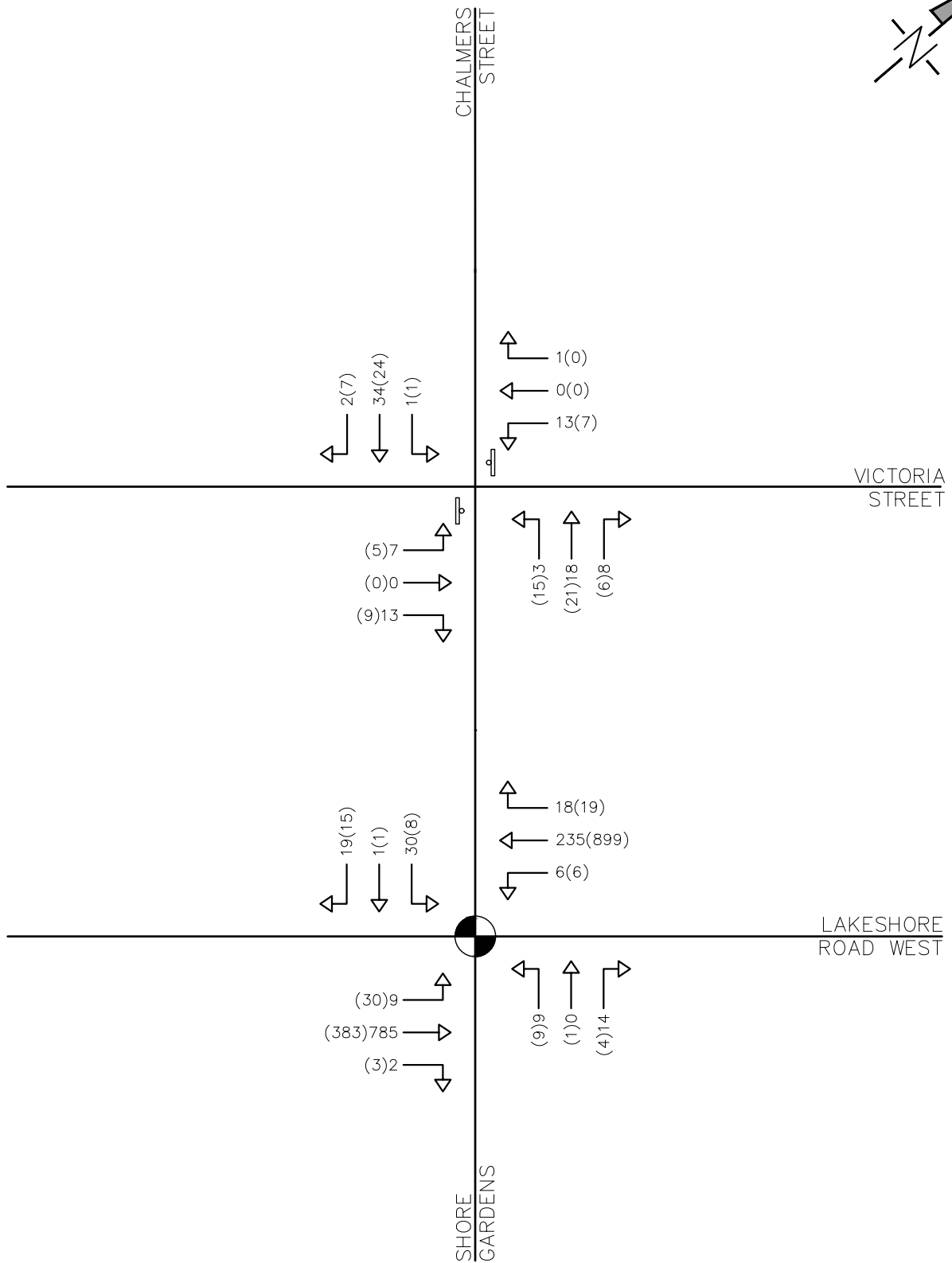
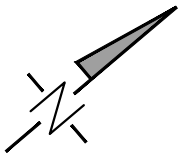
	Auto driver	% total	Direction
PD 1 of Toronto	67	2.3%	East
PD 7 of Toronto	59	2.0%	East
PD 8 of Toronto	57	1.9%	East
Markham	22	0.7%	East
Brampton	57	1.9%	East
Mississauga	487	16.4%	East
Milton	65	2.2%	North
Oakville	1580	53.2%	East
Burlington	382	12.9%	West
Hamilton	132	4.4%	West
Kitchener	29	1.0%	West
Brantford	16	0.5%	West
External	15	0.5%	West
	2968	100%	

Direction	% of trips	% assumed
East	78.5%	75%
West	19.3%	20%
North	2.2%	5%

FIGURES



Legend	Project	3171 LAKESHORE ROAD WEST		 CROZIER & ASSOCIATES Consulting Engineers The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.crozier.ca info@crozier.ca			
	Drawing	SITE LOCATION					
Drawn By		D.L.	Design By	D.L.	Project	1159-4614	
Scale		N.T.S.	Date	JUNE 12, 2019	Check By	A.F.	
						Drawing	FIG. 2



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

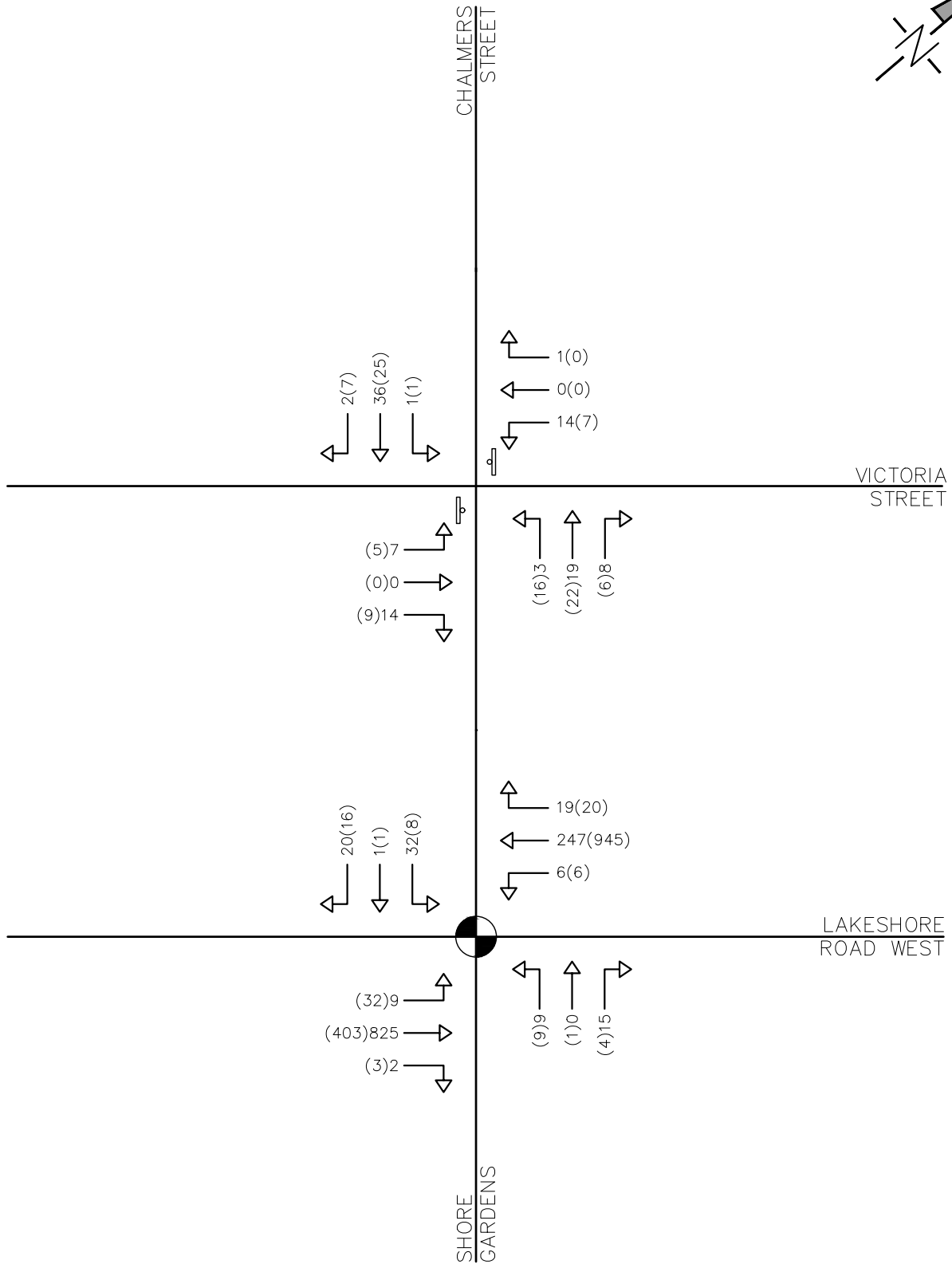
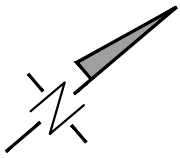
	SIGNAL CONTROL
	STOP CONTROL
XX(YY)	A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES

Project	3171 LAKESHORE ROAD WEST	
Drawing	2019 EXISTING TRAFFIC VOLUMES	



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Drawn By	D.L.	Design By	D.L.	Project	1159-4614	
Scale	N.T.S.	Date	JUNE 12, 2019	Check By	A.F.	
					Drawing	FIG. 3



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

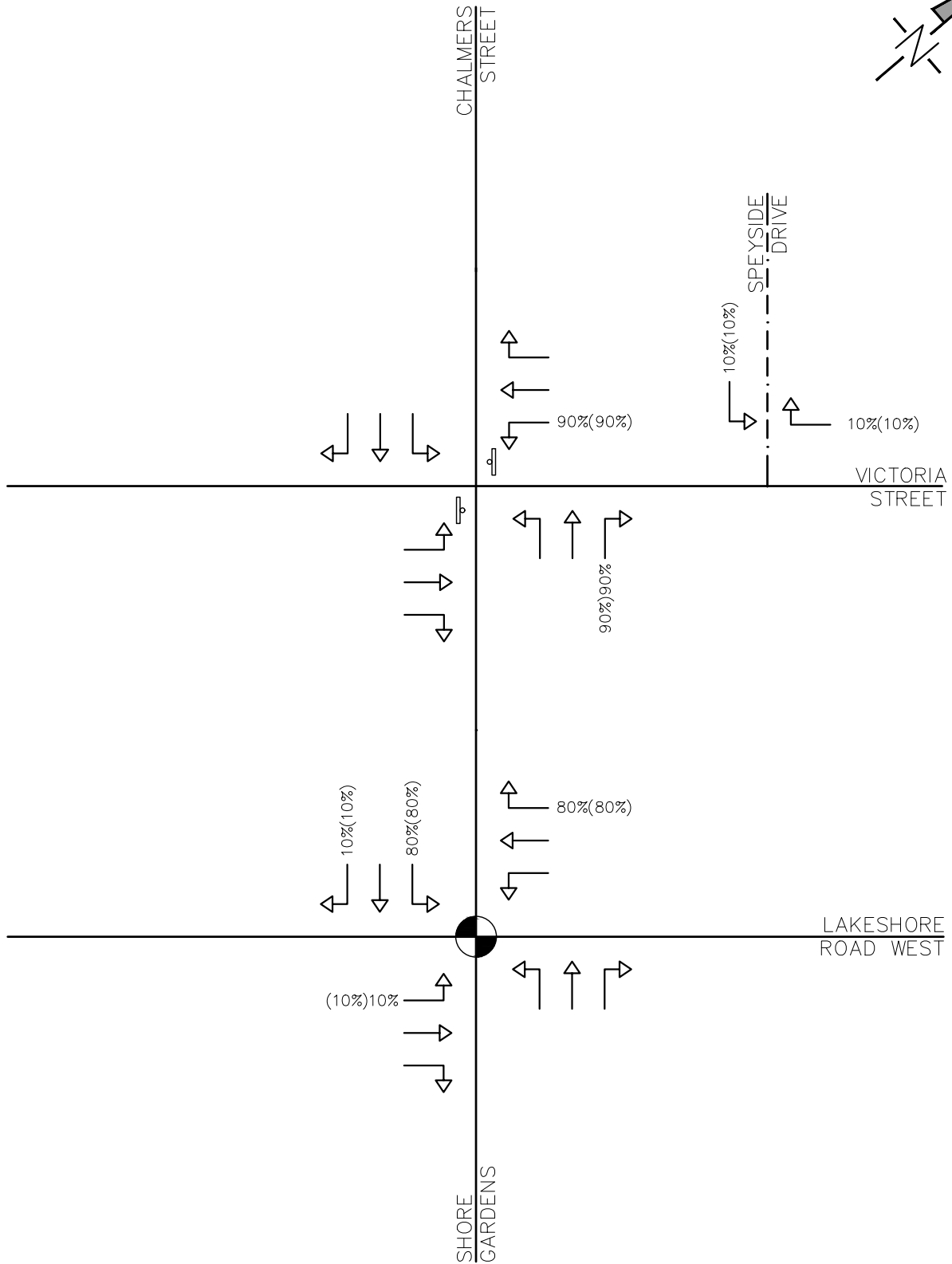
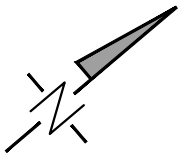
	SIGNAL CONTROL
	STOP CONTROL
XX(YY)	A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES

Project	3171 LAKESHORE ROAD WEST	
Drawing	2024 FUTURE BACKGROUND TRAFFIC VOLUMES	



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Drawn By	D.L.	Design By	D.L.	Project	1159-4614	
Scale	N.T.S.	Date	JUNE 12, 2019	Check By	A.F.	
					Drawing	FIG. 4



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

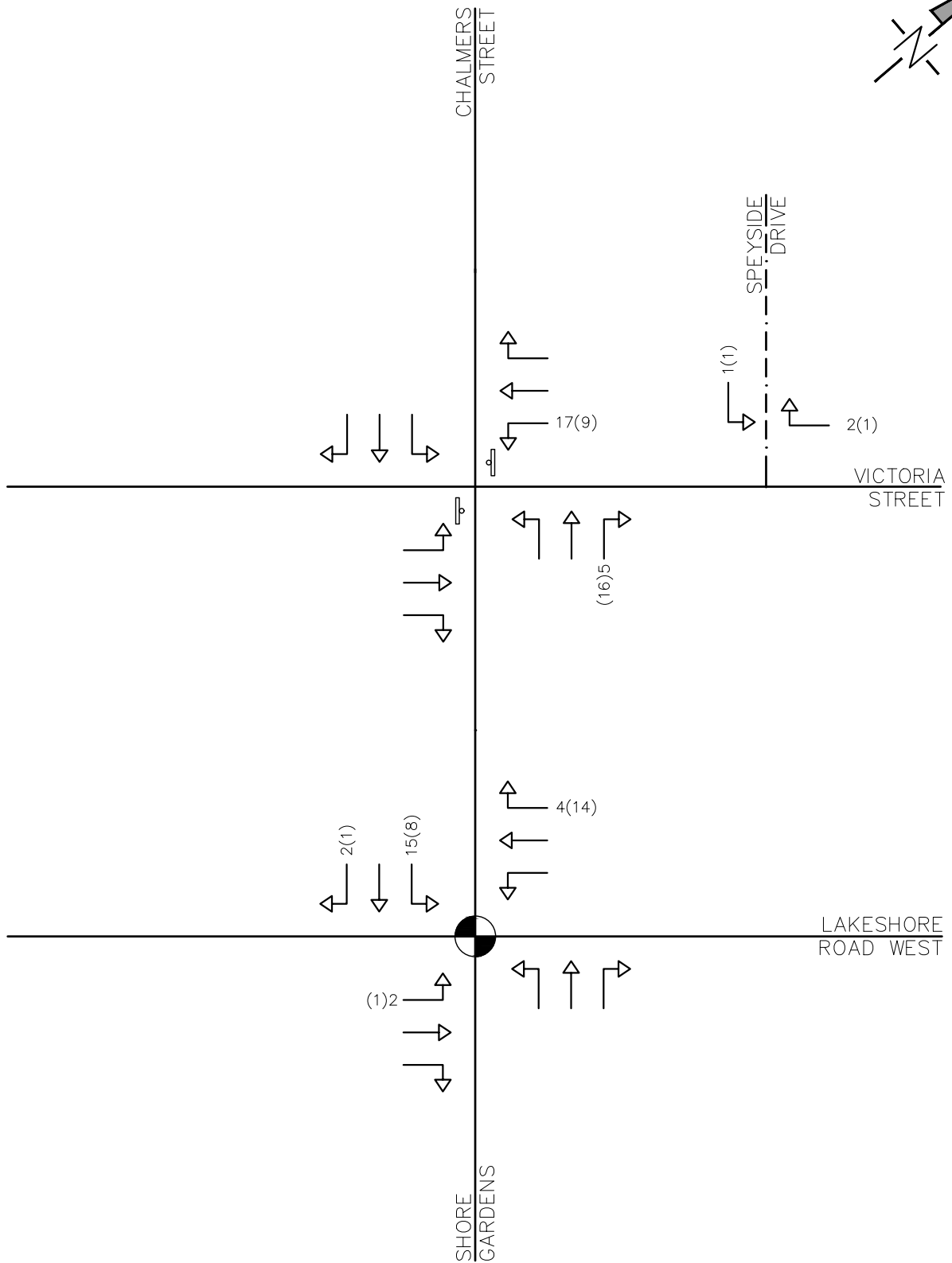
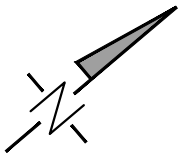
	SIGNAL CONTROL
	STOP CONTROL
XX(YY)	A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES

Project	3171 LAKESHORE ROAD WEST
Drawing	TRIP DISTRIBUTION



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Drawn By	D.L.	Design By	D.L.	Project	1159-4614	
Scale	N.T.S.	Date	JUNE 12, 2019	Check By	A.F.	
					Drawing	FIG. 5



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

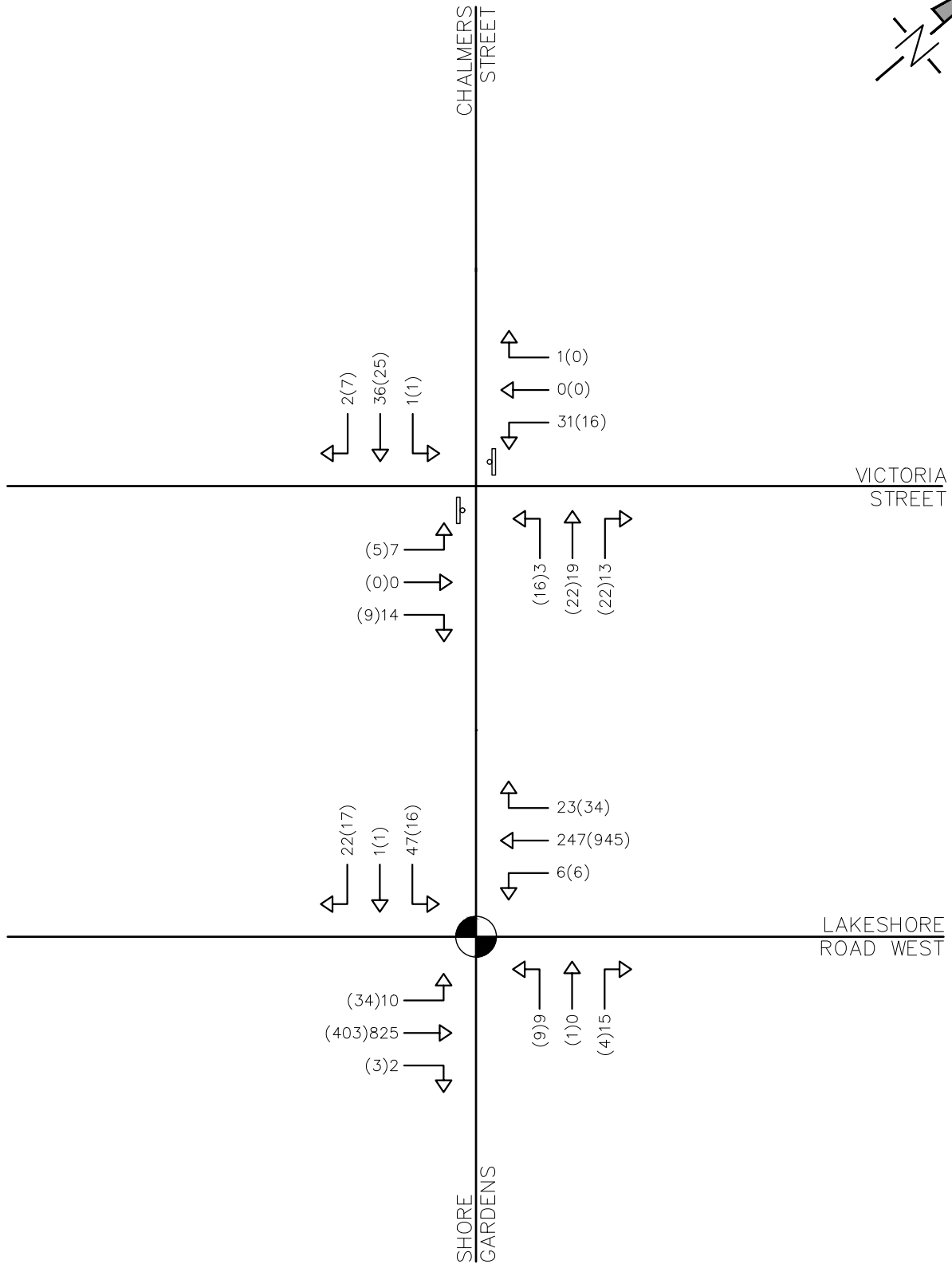
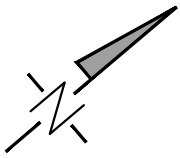
	SIGNAL CONTROL
	STOP CONTROL
XX(YY)	A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES

Project	3171 LAKESHORE ROAD WEST	
Drawing	TRIP ASSIGNMENT	



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Drawn By	D.L.	Design By	D.L.	Project	1159-4614	
Scale	N.T.S.	Date	JUNE 12, 2019	Check By	A.F.	
					Drawing	FIG. 6



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

	SIGNAL CONTROL
	STOP CONTROL
XX(YY)	A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES

Project	3171 LAKESHORE ROAD WEST	
Drawing	2024 FUTURE TOTAL TRAFFIC VOLUMES	



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Drawn By	D.L.	Design By	D.L.	Project	1159-4614	
Scale	N.T.S.	Date	JUNE 12, 2019	Check By	A.F.	
					Drawing	FIG. 7