291 North Service Road, City of Burlington Transportation Impact Assessment

Paradigm Transportation Solutions Limited

May 2021
200584

ptsl.com

Project Summary

Project Number
200584

May 2021

Client
King Paving and Construction Ltd
3385 Harvester Road
PO Box 699
Burlington, Ontario
L7R 3Y5

Client Contact
John Hutter
President

Consultant Project Team
Stewart Elkins, BES
Scott Catton, CET
Erica Bayley, P.Eng.
Greg Lue, MASc, P.Eng.

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road
Cambridge ON N1R 8J8
p: 519.896.3163
905.381.2229
416.479.9684
www.ptsl.com

Version 1.0.0

291 North Service Road, City of Burlington Transportation Impact Assessment



Erica Bayley, P.Eng.

Disclaimer

This document has been prepared for the titled project or named part thereof (the "project") and except for approval and commenting municipalities and agencies in their review and approval of this project, should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authorization of Paradigm Transportation Solutions Limited being obtained. Paradigm Transportation Solutions Limited accepts no responsibility or liability for the consequence of this document being used for a purpose other than the project for which it was commissioned. Any person using or relying on the document for such other purpose agrees and will by such use or reliance be taken to confirm their agreement to indemnify Paradigm Transportation Solutions Limited for all loss or damage resulting there from. Paradigm Transportation Solutions Limited accepts no responsibility or liability for this document to any party other than the person by whom it was commissioned and the approval and commenting municipalities and agencies for the project.

To the extent that this report is based on information supplied by other parties, Paradigm Transportation Solutions Limited accepts no liability for any loss or damage suffered by the client, whether through contract or tort, stemming from any conclusions based on data supplied by parties other than Paradigm Transportation Solutions Limited and used by Paradigm Transportation Solutions Limited in preparing this report.

Executive Summary

Content

King Paving & Construction Limited retained Paradigm Transportation Solutions Limited (Paradigm) to prepare this Transportation Impact Assessment (TIA) for the proposed relocation of an existing asphalt plant.

King Paving operates an existing asphalt plant at 1077 Howard Road in the City of Burlington. King Paving is planning to relocate the asphalt plant to 291 North Service Road (subject site) in the City of Burlington.

This study determines the impacts of the development traffic on the surrounding road network and identifies the recommended improvements to accommodate the site generated traffic.

Development Concept

The subject site is located at 291 North Service Road in the City of Burlington. The subject site is owned by the Halton Region and is a former landfill site. Vehicle access is provided by Hickory Lane. Hickory Lane is gated off to regular traffic.

King Paving is planning to relocate their existing asphalt plant, located at 1077 Howard Road, to the subject site. As part of the move, the existing Hickory Lane intersection will be closed and relocated to a point approximately 205 metres to the west. The new Hickory Lane intersection will provide access to both the former landfill site and the asphalt plant.

The asphalt plant is expected to be operational by Year 2023.

Conclusions

The main findings and conclusions of this study are as follows:

- **Study Area**: The study area includes the signalized intersections that form the Waterdown Road interchange with Highway 403 and the North Service Road intersection with Hickory Lane.
- **Existing Traffic**: Capacity issues are noted to be occurring during the AM and PM peak hour for select turning movements at the intersection of Waterdown Road and North Service Road/Highway 403 WB on-ramp as well as Waterdown Road and Aldershot GO Station Road. Significant westbound queuing

occurs at Waterdown Road and North Service Road/Highway 403 WB on-ramp in the PM peak hour.

- **Trip Generation**: The site's net trip generation is estimated to be approximately 68 trips in the AM peak hour and 44 trips in the PM peak hour. These trips currently access the Highway 403 & Waterdown Road interchange from the existing plant located south of the interchange. The new site is not expected to generate new trips but shall reassign the existing trips through the area.
- **Forecast Traffic**: The forecast traffic volumes have been assessed for opening date horizon (Year 2023), five years after full build-out (Year 2028), and ten years after full build-out (Year 2033). Future traffic volumes consist of generalized increases in existing traffic and traffic generated by the subject site.
- **Background Traffic**: The capacity issues identified under existing conditions along Waterdown Road in the study area are forecast to continue.
- **Total Traffic**: The capacity issues identified under existing conditions along Waterdown Road in the study area are forecast to continue. The new Hickory Lane approach is forecast to operate with acceptable levels of service during both the AM and PM peak hours. Delays are expected to be the LOS D range with v/c ratios below 0.15 and minimal queuing.
- **Remedial Measures**: the following mitigation measures are identified to better address intersection operations within the study area:
  - Eastbound left-turn lane at the new Hickory Lane intersection with the North Service Road; and
  - Development of double northbound left-turn lanes at the Waterdown Road intersection with the North Service Road. The second northbound left-turn lane could be developed by re-painting the existing hatched area. Double northbound left-turn lane should be considered with or without the relocation of the asphalt plant.

Recommendations

Based on the findings of this study, the following is recommended:

- An eastbound left-turn lane with 30 metres of storage and a 56 metre taper be developed at the North Service Road intersection with the new Hickory Lane.
- The new Hickory Lane approach to the North Service Road operate under stop control.
- To accommodate background traffic, double northbound left-turn lanes be provided at the Waterdown Road intersection with North Service Road and signal timings be adjusted to provide a fully protected northbound left-turn phase.
- The City of Burlington monitor operations of the signalized intersections at the Waterdown Road interchange with Highway 403 to ensure that appropriate signal timing plans are in place.

Contents

1 Introduction 1

1.1 Overview 1
1.2 Study Area 1

2 Existing Conditions 4

2.1 Existing Land Use 4
2.2 Road Network 4
2.3 Pedestrian Network 7
2.4 Cycling Network 7
2.5 Transit Service 9
2.6 Traffic Volumes 12
2.6.1 Existing Plant Activity 15
2.7 Traffic Operations 18

3 Development Concept 22

3.1 Site Description 22
3.2 Trip Generation 25

4 Future Conditions 31

4.1 Traffic Forecast 31
4.2 Background Traffic Operations 44
4.2.1 Opening Date Horizon 44
4.2.2 Five Year Horizon 47
4.2.3 Ten Year Horizon 50
4.3 Total Traffic Operations 53
4.3.1 Opening Date Horizon 53
4.3.2 Five Year Horizon 56
4.3.3 Ten Year Horizon 59

5 Remedial Measures 62

5.1 Traffic Control Improvements 62
5.2 Auxiliary Turn Lane 62
5.2.1 Site Driveway 62
5.2.2 Waterdown Road and North Service Road 62

6 Site Traffic Impacts 65

6.1 Heavy Vehicle Trip Generation 65
6.2 LOS Summary by Site Generated Traffic Movement 69

7 Conclusions and Recommendations 71

7.1 Conclusions 71
7.2 Recommendations 72

Appendices

Appendix A	**Terms of Reference**
Appendix B	**Existing Traffic Data**
Appendix C	**Base Year Traffic Volumes by Vehicle Type**
Appendix D	**Base Year Traffic Operations**
Appendix E	**Site Traffic Volumes by Vehicle Type**
Appendix F	**Forecast Traffic Volumes by Vehicle Type**
Appendix G1	**2023 Background Traffic Operations**
Appendix G2	**2028 Background Traffic Operations**
Appendix G3	**2033 Background Traffic Operations**
Appendix H1	**2023 Total Traffic Operations**
Appendix H2	**2028 Total Traffic Operations**
Appendix H3	**2033 Total Traffic Operations**
Appendix I	**Auxiliary Left-Turn Warrant Analysis**
Appendix J	**2033 Total Traffic Operations Sensitivity Analysis**

Figures

Figure 1.1: Location of Subject Site 3
Figure 2.1: Existing Lane Configuration and Traffic Control 6
Figure 2.2: Existing Cycling Network 8
Figure 2.3a: Existing Transit Network – Burlington Transit 10
Figure 2.3b: Existing Transit Network – Hamilton Street Railway Transit 11
Figure 2.4: Base Year Traffic Volumes (PCE) – AM Peak Hour 13
Figure 2.5: Base Year Traffic Volumes (PCE) – PM Peak Hour 14
Figure 2.6: Average Hourly Temporal Distribution of Shipping Activity 17
Figure 3.1: Site Concept Plan 24
Figure 3.2: Existing and Future Site Traffic Travel Routes 28
Figure 3.3a: Estimated Site Generated Traffic Volumes (PCE) – AM Peak Hour 29
Figure 3.3b: Estimated Site Generated Traffic (PCE) – PM Peak Hour 30
Figure 4.1a: Background Traffic Opening Date Horizon – AM Peak Hour (PCE) 32
Figure 4.1b: Background Traffic Opening Date Horizon – PM Peak Hour (PCE) 33
Figure 4.2a: Background Traffic Five-Year Horizon – AM Peak Hour (PCE) 34
Figure 4.2b: Background Traffic Five-Year Horizon – PM Peak Hour (PCE) 35
Figure 4.3a: Background Traffic Ten-Year Horizon – AM Peak Hour (PCE) 36
Figure 4.3b: Background Traffic Ten-Year Horizon – PM Peak Hour (PCE) 37
Figure 4.4a: Total Traffic Opening Date Horizon – AM Peak Hour (PCE) 38
Figure 4.4b: Total Traffic Opening Date Horizon – PM Peak Hour (PCE) 39
Figure 4.5a: Total Traffic Five-Year Horizon – AM Peak Hour (PCE) 40
Figure 4.5b: Total Traffic Five-Year Horizon – PM Peak Hour (PCE) 41
Figure 4.6a: Total Traffic Ten-Year Horizon – AM Peak Hour (PCE) 42
Figure 4.6b: Total Traffic Ten-Year Horizon – PM Peak Hour (PCE) 43

Tables

Table 2.1: Existing Transit Routes 9
Table 2.2: Turning Movement Count Location and Date 12
Table 2.4: Historical Daily Shipping Activity by Hour 16
Table 2.5: Base Year Traffic Operations 21
Table 3.1: Estimated Truck Trip Generation 26
Table 3.2: Estimated Site Trip Generation 26
Table 4.1: Background Traffic Operations – Opening Date Horizon 46
Table 4.2: Background Traffic Operations – Five Year Horizon 49
Table 4.3: Background Traffic Operations – Ten Year Horizon 52
Table 4.4: Total Traffic Operations – Opening Date Horizon .. 55
Table 4.5: Total Traffic Operations Conditions – Five Year Horizon 58
Table 4.6: Total Traffic Operations Conditions – Ten Year Horizon 61
Table 5.1: 2033 Sensitivity Intersection Operations 64
Table 6.1: Heavy Vehicle Percentages – AM Peak Hour 67
Table 6.2: Heavy Vehicle Percentages – PM Peak Hour 68
Table 6.3: Intersection Operational Summary – Ten Year Horizon Site Traffic Turning Movements 70

1 Introduction

1.1 Overview

King Paving & Construction Limited retained Paradigm Transportation Solutions Limited (Paradigm) to prepare this Transportation Impact Assessment (TIA) for the proposed new location of an asphalt plant located at 291 North Service Road in the City of Burlington. The subject site is owned by the Halton Region and is a former landfill site. **Figure 1.1** illustrates the location of the subject site.

King Paving is planning to relocate their existing asphalt plant, located at 1077 Howard Road, to the subject site. As part of this development the existing Hickory Lane intersection will be closed and relocated to a point approximately 205 metres to the west. The new Hickory Lane intersection will provide access to both the landfill site and the asphalt plant.

The scope of the study includes:

- Determine and assesses the current study area traffic conditions;
- Forecast the additional traffic volumes generated by the proposed development;
- Analyze the impacts of the additional traffic volume on the study area street network; and
- Recommend any necessary remedial measures to mitigate the traffic impacts.

Appendix A contains the pre-study consultation material with the Ministry of Transportation Ontario (MTO) and City of Burlington. This study has been prepared in accordance with the MTO and Halton Region's Transportation Impact Analysis Guidelines[1,2].

1.2 Study Area

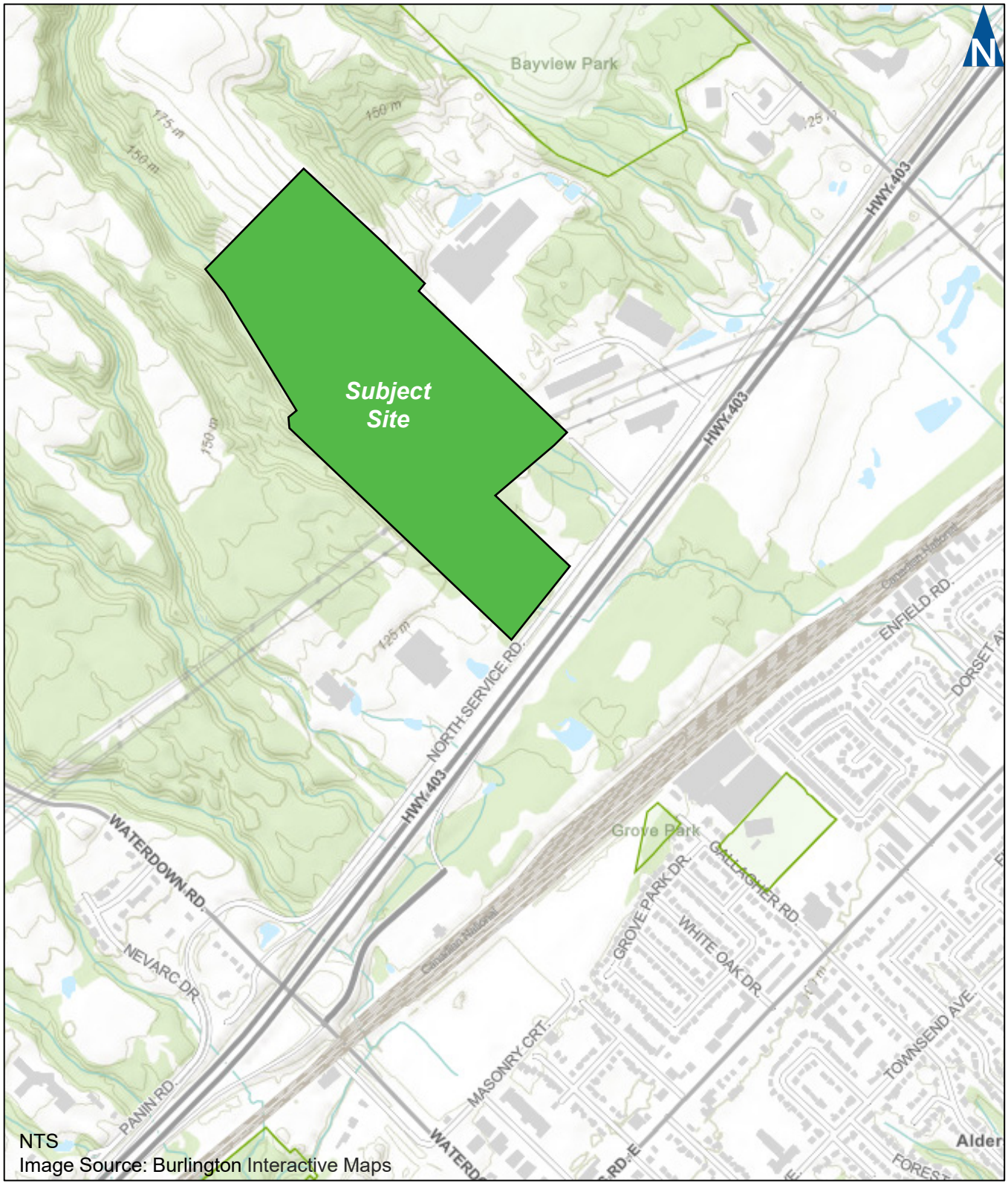
The study area intersections assessed in this study include:

- Waterdown Road and North Service Road/Highway 403 Westbound (WB) on-ramp (signalized);
- Waterdown Road and Panin Road/Highway 403 WB off-ramp (signalized);

[1] MTO Traffic Impact Study Guideline 2014
[2] Halton Region - Transportation Impact Study Guidelines 2015

- Waterdown Road and Highway 403 Eastbound (EB) off-ramp/Aldershot GO Station Road (signalized);
- Aldershot GO Station Road and GO Station Access/Highway 403 EB on-ramp (signalized); and
- North Service Road and Hickory Lane (unsignalized).





NTS
Image Source: Burlington Interactive Maps

paradigm TRANSPORTATION SOLUTIONS LIMITED

Location of Subject Site

291 North Service Road, City of Burlington
200584

Figure 1.1

2 Existing Conditions

2.1 Existing Land Use

The subject site is owned by the Halton Region and is a former landfill site. Vehicle access to the subject site is provided by Hickory Lane. Hickory Lane functions as a driveway to the former landfill site and is gated off to regular traffic. A security gate is located approximately 20 metres back from the edge of the North Service Road travel lane.

Existing activity on the subject lands is limited to:

- Landfill maintenance – Weekly maintenance is conducted by Halton Region staff. Capping activities occur about every other year (or as needed);
- Halton Regional Police Service Training – no fixed scheduled; and
- Winter storage for a boat club – seasonal activity.

The capping operation is organized by the Region and typically occurs between July and September, depending on weather and the size of the cap. The capping operation can generate about 100 truck loads per day, depending on how much fill is required. The Region organizes and plans this activity prior to commencing work.

The subject lands do not generate any regular peak hour traffic. All activity is planned in advance as access to Hickory Lane is controlled by a security gate.

2.2 Road Network

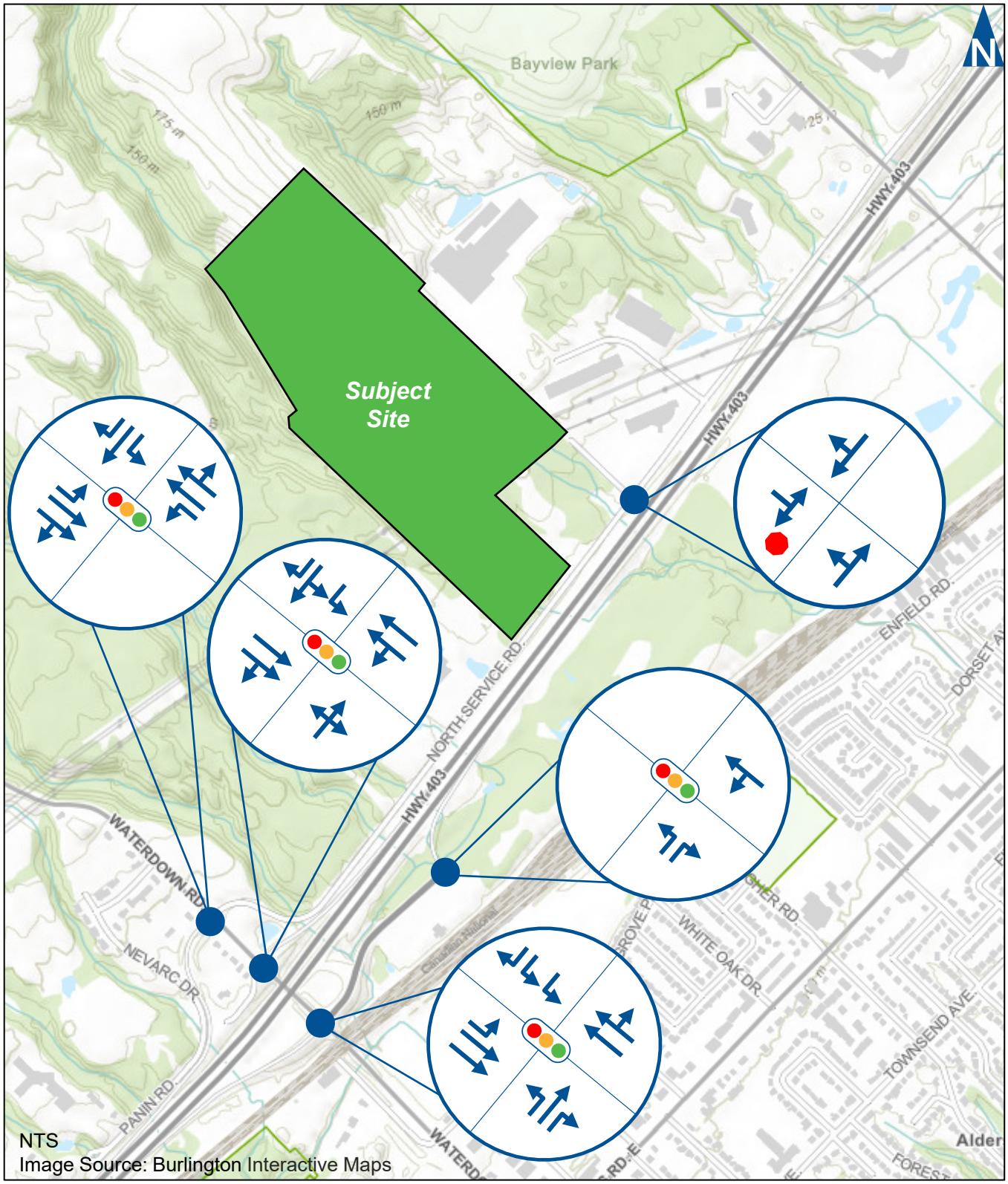
The roadways of interest within the study area include:

- **Waterdown Road**, a north-south minor arterial roadway[3] with a four-lane cross section and a posted speed limit of 50 km/h. On-street bicycle lanes are provided along Waterdown Road between Craven Avenue and Panin Road/Highway 403 WB off-Ramp. Sidewalks are provided on the west side of the road within the study area. The intersections with North Service Road/Highway 403 WB on-ramp, Panin Road/Highway 403 WB off-ramp, and Highway 403 EB off-ramp/Aldershot GO Station Road are signalized.

[3] City of Burlington Official Plan Schedule J 2010

- **North Service Road**, an east-west two-lane minor arterial roadway with speed limit ranging from 50 to 60 km/h. Bike lanes are provided between Waterdown Road to approximately 275 metres east of Waterdown Road. The on-street bicycle lane transitions into a paved shoulder which continues east beyond Hickory Lane. Sidewalks are provided on the north side of the road between Waterdown Road to approximately 275 metres east of Waterdown Road.
- **Panin Road**, an east-west two-lane local road. The statutory 50 km/h speed limit is assumed. There are no cycling facilities or sidewalks provided along this road.
- **Highway 403**, a provincial 400-series highway that provides interregional travel between Woodstock Ontario and Mississauga Ontario. The highway has a six-lane cross section with a posted speed limit of 100km/h within the study area. A full interchange is provided at Waterdown Road.
- **Aldershot GO Station Road**, an east-west four-lane collector road with speed limit of 50km/h. The main function of this road is to provide access to Aldershot GO Station as well as the Highway 403 EB on-ramp. No cycling facility is provided on the road. A sidewalk is provided on the south side of the road from Waterdown Road to approximately 240 metres east of Waterdown Road.
- **Hickory Lane**, a north-south two-lane local road. The statutory 50 km/h speed limit is assumed. The roadway functions as a driveway to the former landfill site and is gated off to regular traffic. A security gate is located approximately 20 metres from the edge of the North Service Road travel lane. There are no cycling facilities or sidewalks provided along this road.

Figure 2.1 illustrates the existing lane configuration and traffic control at the study area intersections.



paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing Lane Configuration & Traffic Control

291 North Service Road, City of Burlington
200584

Figure 2.1

2.3 Pedestrian Network

The City's pedestrian infrastructure within the study area consists of a sidewalk along the west side of Waterdown Road, on the north side of North Service Road from Waterdown Road to approximately 275 metres east of Waterdown Road, and on the south side of Aldershot GO Station Road from Waterdown Road to approximately 240 metres east of Waterdown Road.

2.4 Cycling Network

The City of Burlington's bicycle network provides a variety of cycling facilities within the immediate area. **Figure 2.2** illustrates the existing cycling network.

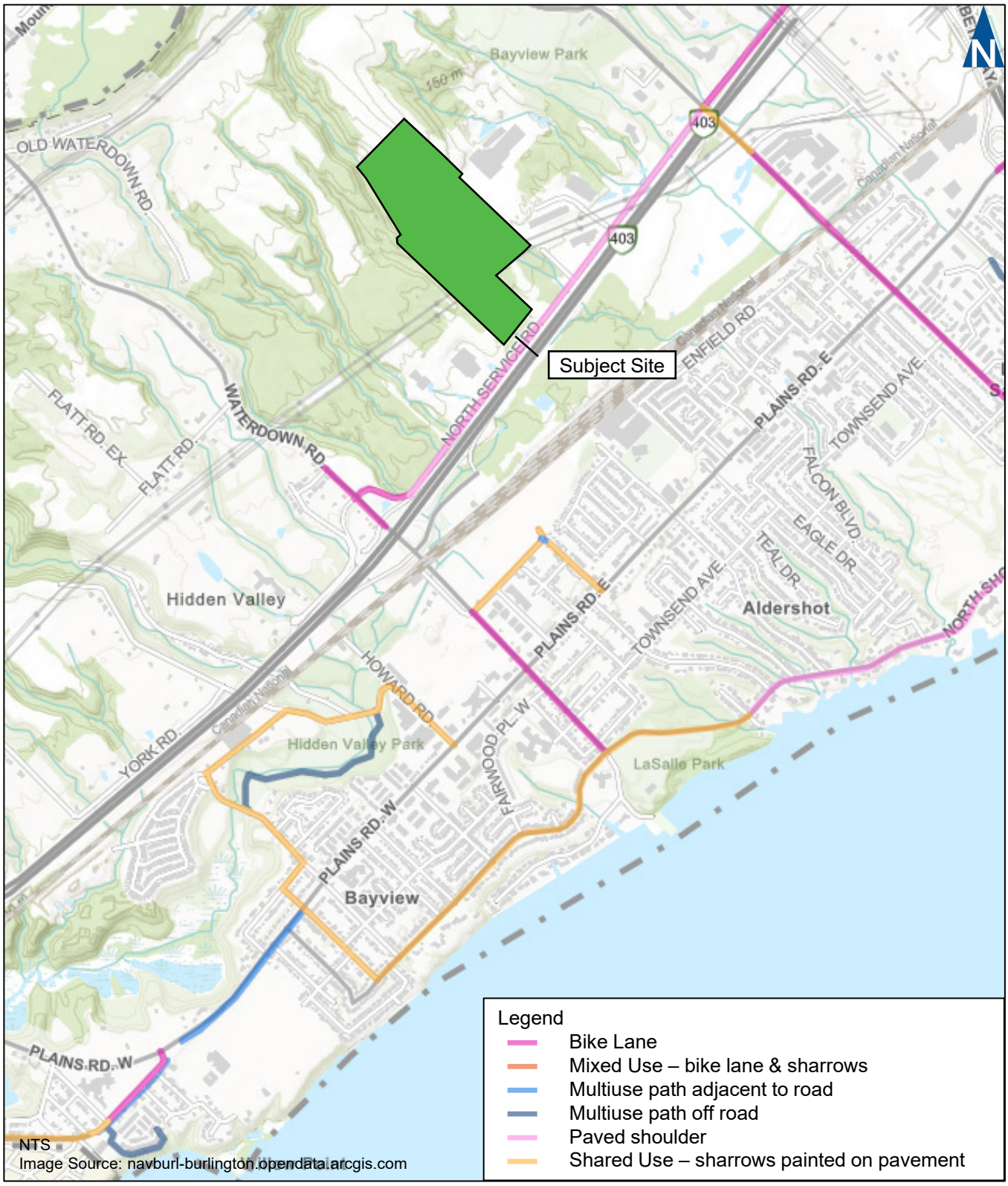
Designated on-street bicycle lanes are provided along Waterdown Road between Craven Avenue and Panin Road/Highway 403 WB off-ramp.

Designated on-street bicycle lanes are provided along North Service Road from Waterdown Road to approximately 275 metres east of Waterdown Road. The on-street bicycle lane transitions into a paved shoulder which continues east beyond Hickory Lane.

The City of Burlington's draft Cycling Plan[4] identifies plans for a multi-use path along Waterdown Road from North Service Road to Mountain Brow Road. No date or project priority is provided for the multi-use path.

A painted buffered bike lane along North Service Road from Waterdown Road to Kern's Road is planned as a long-term project priority. South of the subject site is a planned protected bikeway along South Service Road (extension of Aldershot GO Station Road) from Waterdown to King Road which is identified as a medium-term project priority.

[4] City of Burlington Cycling Plan – Draft 2021. Map 5 – Proposed Network. Map 7 – Proposed Project Priority



Existing Cycling Network

291 North Service Road, City of Burlington
200584

Figure 2.2

2.5 Transit Service

Transit service in the area is provided by Burlington Transit, Hamilton Street Railway (HSR), GO Transit and Via Rail and is centralized around the Aldershot GO Station. The GO Station offers both GO Transit Bus and GO Transit Train service and functions as a turnaround point for several Burlington Transit and HSR transit routes.

Burlington Transit operates two routes within the study area and HSR operates one route within the study area. **Table 2.1** summarizes the existing routes. **Figure 2.3a** and **Figure 2.3b** illustrate the existing transit network.

The closest transit stop to the subject site is located approximately 400 metres west along North Service Road from the existing Hickory Lane and North Service Road intersection. Discontinuous sidewalks along North Service Road are a limiting factor that may discourage the use of transit service to/from the subject site.

TABLE 2.1: EXISTING TRANSIT ROUTES

Route	Description
Burlington Transit Route 87 (Industrial)	Offers service during the weekdays between the Burlington GO Station and Aldershot GO Station along the North Service Road. Weekday headways are in the order of 45 minutes.
Burlington Transit Route 4 (Central)	Offers service 7-days a week between the Appleby GO Station and the Aldershot GO Station. Weekday and weekend headways are in the order of 60 minutes.
Hamilton Street Railway Route 18 (Waterdown)	Offers service on weekdays and Saturday connecting the Waterdown Community to Aldershot GO Station. Weekday headways are in the order of 30-40 minutes. Saturday headways are in the order of 30-minutes.



NTS

Image Source: Burlington Transit

paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing Transit Network
Burlington Transit

291 North Service Road, City of Burlington
200584

Figure 2.3a



NTS
Image Source: Hamilton Street Railway

paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing Transit Network
Hamilton Street Railway Transit

291 North Service Road, City of Burlington
200584

Figure 2.3b

2.6 Traffic Volumes

Table 2.2 summarizes the location and date of the existing turning movement count (TMC) data for the AM and PM weekday peak hours provided by the MTO and City of Burlington. **Appendix B** contains the count data as collected and corresponding to existing traffic conditions.

TABLE 2.2: TURNING MOVEMENT COUNT LOCATION AND DATE

Date	Intersection	Peak Hour	
		AM	PM
October 2016	Waterdown Road & North Service Road/Highway 403 WB on-ramp	07:30 hr	16:30 hr
	Waterdown Road and Panin Road/Highway 403 WB off-ramp	07:45 hr	16:30 hr
	Waterdown Road and Highway 403 Eastbound (EB) off-ramp/Aldershot GO Station Road	07:15 hr	17:45 hr
	Aldershot GO Station Road and GO Station Access/Highway 403 EB on-ramp	07:15 hr	17:45 hr

Volumes at North Service Road and Hickory Lane are based on the traffic from the adjacent intersection at Waterdown Road. Since Hickory Lane functions as a driveway to the former landfill site with no regular traffic generated due to the security gate, no traffic is assumed on Hickory Road in the AM or PM peak hours.

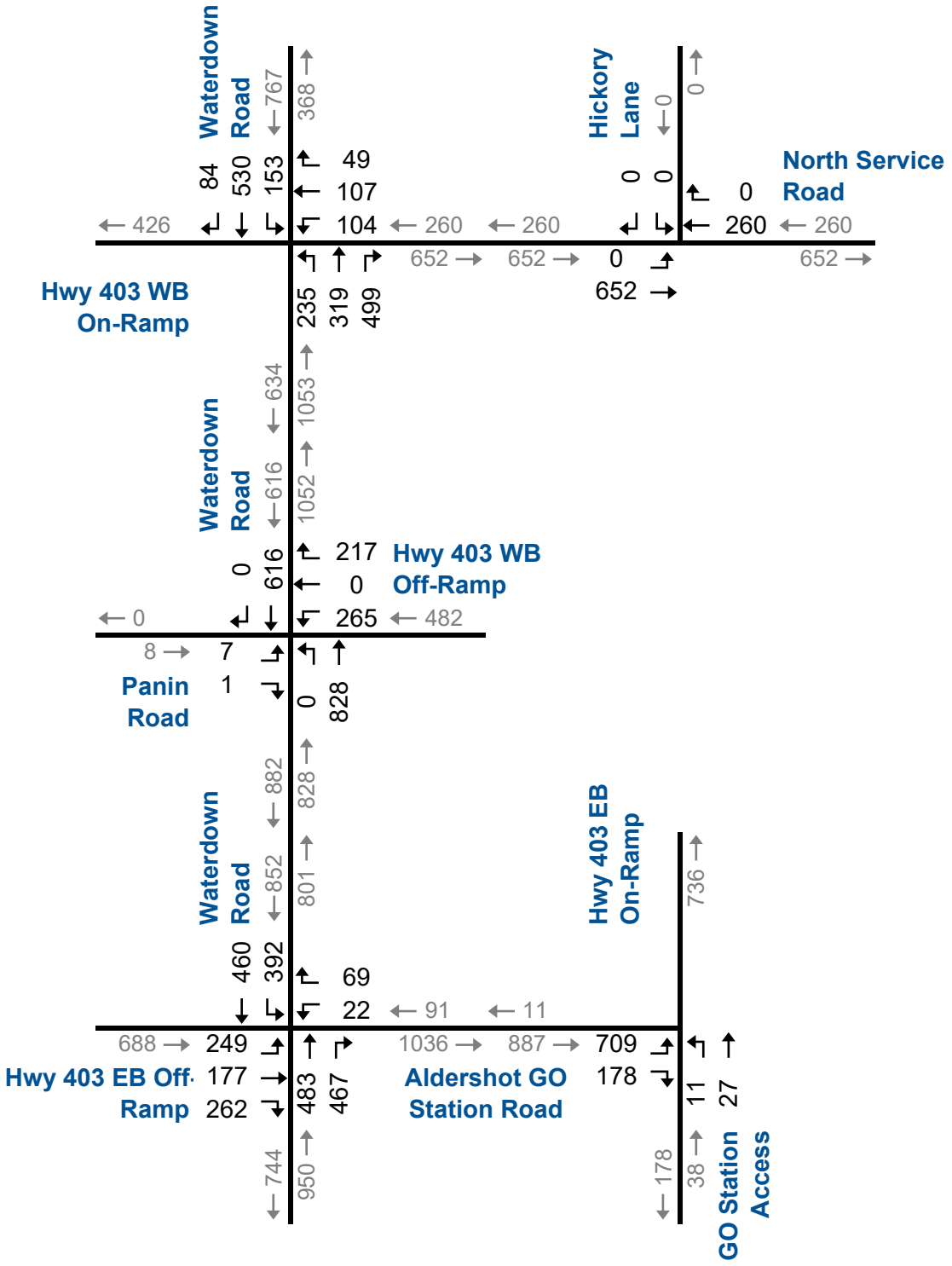
To account for possible traffic volume increases in the historical count volumes, a base year condition (year 2021) is forecast. A generalized growth rate of 2% per annum is used to adjust the count data. Growth rates were identified during pre-study consultation.

The heavy vehicles documented in the existing count data have been converted to passenger car equivalents (PCE) using a factor of 3 PCE per vehicle. A PCE measure has been used to provide a more conservative analysis as it accounts for the relative performance of vehicles. Heavy vehicles take up more space and have lower performance from an acceleration/deceleration perspective.

Figure 2.4 and **Figure 2.5** illustrate the base year peak hour traffic volumes (PCEs) in the study area.

The existing asphalt plant is located south of the study area with existing site truck traffic captured in the count data.

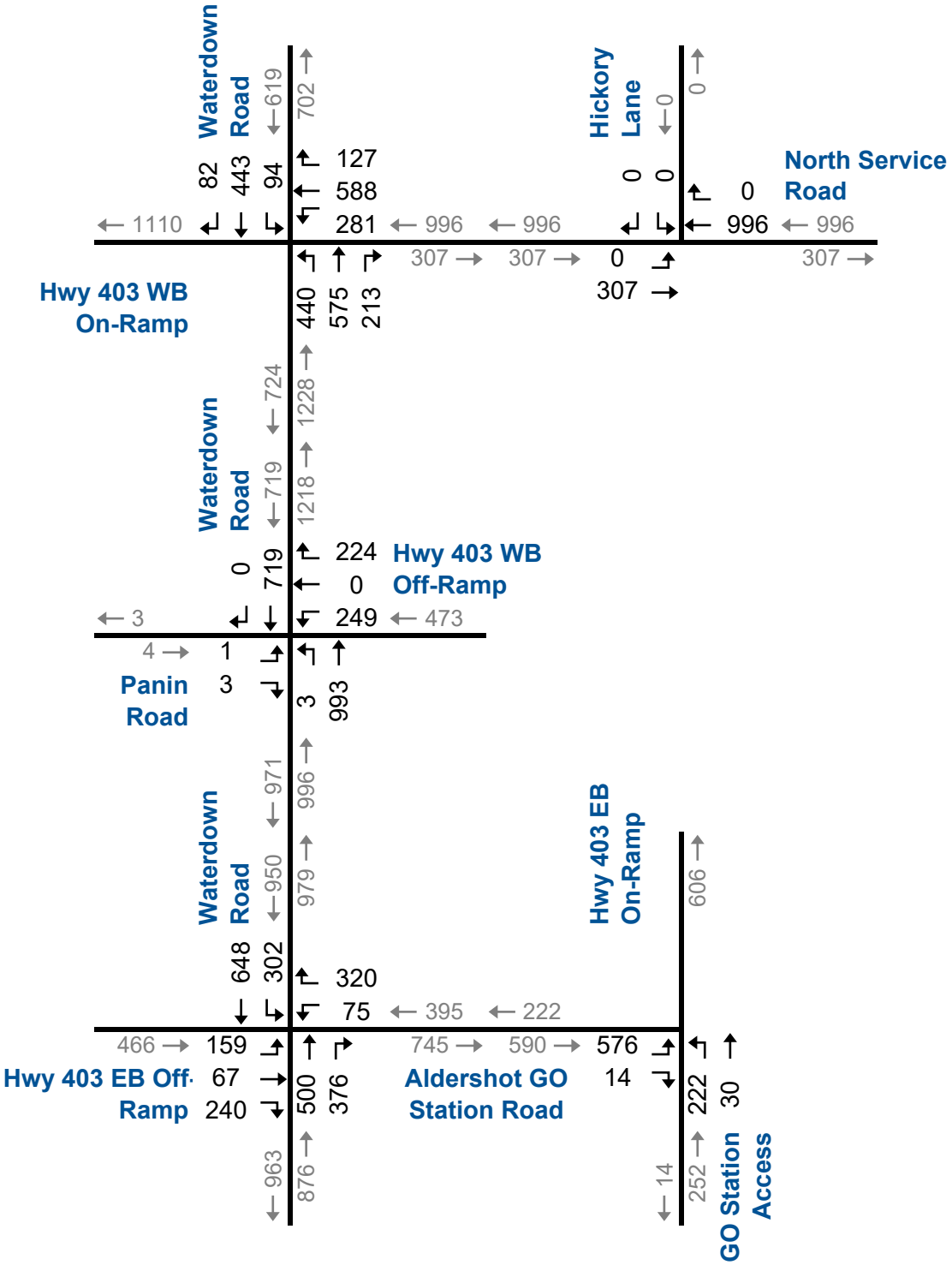
Appendix C contains base year traffic volumes by vehicle type.



Base Year Traffic Volumes (PCE) AM Peak Hour

291 North Service Road, City of Burlington
200584

Figure 2.4



Base Year Traffic Volumes (PCE) PM Peak Hour

291 North Service Road, City of Burlington
200584

Figure 2.5

2.6.1 Existing Plant Activity

Existing paving activity data was obtained from King Paving for the year 2019. **Table 2.3** summarizes the historical monthly shipping activity distribution throughout the year. The following is noted:

- The amount of material shipped is related to market conditions;
- Approximately 75% of plant activity occurs between May and October;
- Peak plant actively occurs in July/August; and
- Limited activity occurs during the winter months.

Table 2.4 summarizes the historical daily shipping activity by hour during the peak month of July. **Figure 2.6** illustrates the distribution of daily shipping activity throughout an average weekday. The following is noted:

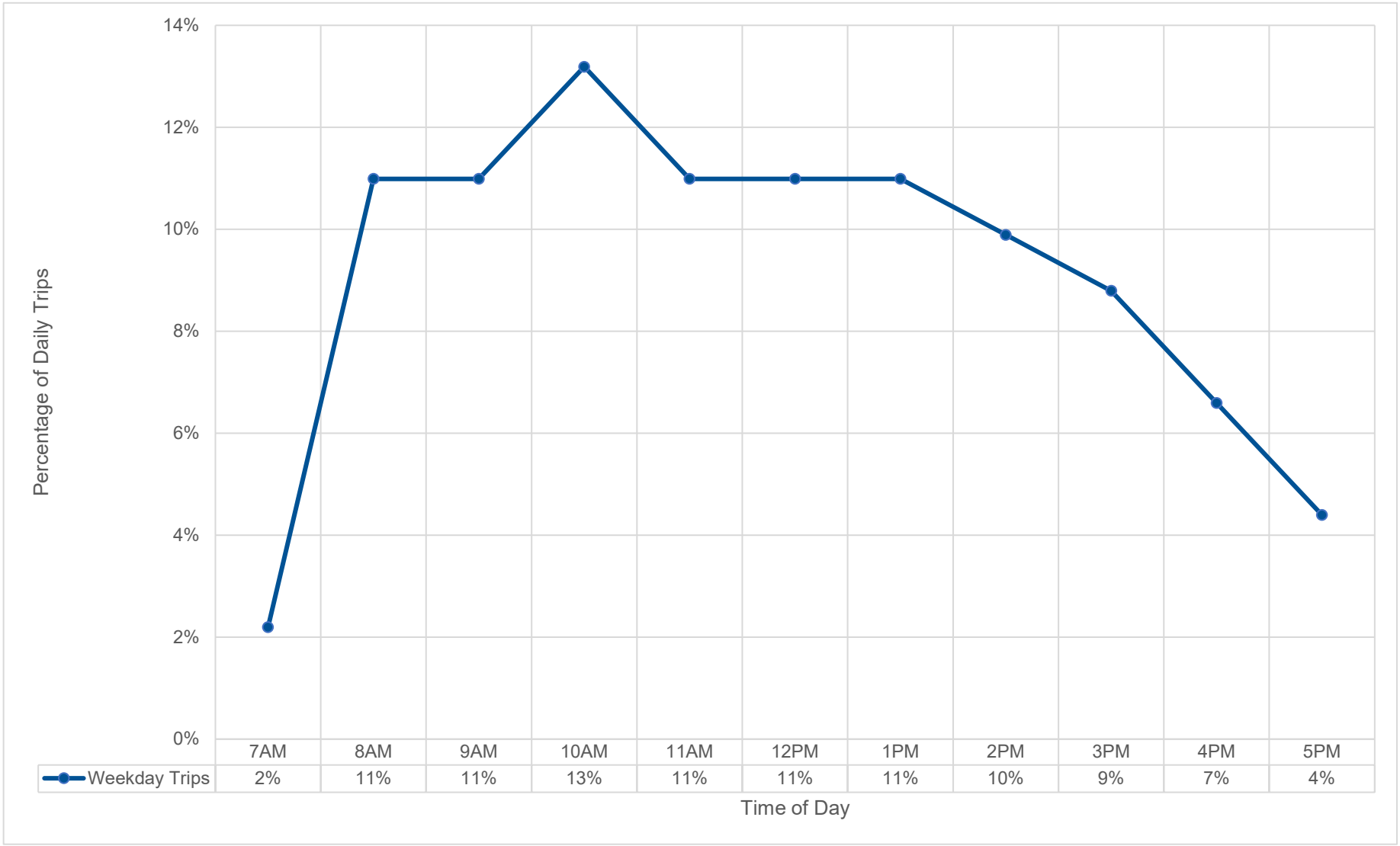
- The amount of material shipped is related to market conditions;
- Shipping activity generally peaks during the AM hours and tapers off towards the end of the day.

TABLE 2.3: HISTORICAL MONTHLY SHIPPING ACTIVITY

Month	Total Loads	% of Total
April	1,220	9%
May	1,810	13%
June	1,500	10%
July	2,060	14%
August	1,850	13%
September	1,780	12%
October	1,910	13%
November	1,250	9%
December	960	7%
Total	**14,340**	**100%**

TABLE 2.4: HISTORICAL DAILY SHIPPING ACTIVITY BY HOUR

Day	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	Total
Day 1	1	10	5	7	10	8	8	8	8	10	2	**77**
Day 2	3	8	15	15	11	11	11	13	14	8	6	**115**
Day 3	0	5	7	12	8	12	5	10	5	3	5	**72**
Day 4	3	16	12	22	18	18	14	12	11	5	3	**134**
Day 5	0	0	0	0	0	0	0	0	0	0	0	**0**
Day 6	3	17	10	7	14	12	13	9	5	4	6	**100**
Day 7	4	11	13	5	9	6	7	11	12	7	1	**86**
Day 8	3	19	12	11	11	14	11	11	9	12	6	**119**
Day 9	5	14	10	5	5	14	10	9	7	2	6	**87**
Day 10	3	7	5	10	8	5	10	10	9	7	3	**77**
Day 11	0	10	8	14	6	9	7	6	9	6	1	**76**
Day 12	0	2	1	0	0	0	0	0	0	0	0	**3**
Day 13	0	7	16	12	9	12	14	10	15	8	6	**109**
Day 14	3	12	13	12	13	6	11	6	2	1	0	**79**
Day 15	0	10	7	15	8	10	13	9	10	9	3	**94**
Day 16	3	14	10	18	11	11	17	10	8	7	4	**113**
Day 17	2	7	17	18	14	11	12	13	11	11	9	**125**
Day 18	5	10	5	14	12	7	9	9	3	4	1	**79**
Day 19	1	15	16	17	11	11	9	6	3	5	2	**96**
Day 20	3	6	8	13	11	14	14	12	19	5	15	**120**
Day 21	3	3	3	5	5	8	9	7	4	2	0	**49**
Day 22	3	7	13	15	7	17	6	13	12	4	6	**103**
Avg. Weekday	2	10	10	12	10	10	10	9	8	6	4	**91**
% of Avg. Daily	2%	11%	11%	13%	11%	11%	11%	10%	9%	7%	4%	**100%**



paradigm TRANSPORTATION SOLUTIONS LIMITED

Average Hourly Temporal Distribution of Shipping Activity

291 North Service Road, City of Burlington
200584

Figure 2.6

2.7 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the efficiency of traffic flow at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles desiring to make a movement, compared to the estimated capacity for that movement. The capacity is based on several criteria related to the opposing traffic flows. The highest possible rating is LOS A, under which the average total delay is equal or less than 10 seconds per vehicle. When the average delay exceeds 80 seconds at signalized intersections (50 seconds at unsignalized intersections), the movement is considered to have a LOS F and remedial measures are usually implemented if they are feasible.

The operations of the intersections in the study area were evaluated using the existing lane configuration, traffic control, existing base year traffic volumes and signal timings. The intersection analysis considered three separate measures of performance:

- The Level of Service (LOS) for each turning movement;
- The volume to capacity ratio (v/c) for each movement; and
- The 95th percentile queue lengths estimated using Synchro.

The MTO's Traffic Impact Study Guidelines[5] identifies the following thresholds for critical movements:

- Movements with a volume to capacity ratio greater than 0.85 at signalized intersections; and
- A volume to capacity ratio greater than 0.75 for all ramp terminals approaches.

The Halton Region Transportation Impact Studies Guideline[6] identifies the following thresholds for critical movements:

- Delays classified as LOS E-F;
- Volume to capacity ratios for through movements or shared through/turning movements are greater than or equal to 0.85;
- Volume to capacity ratios for exclusive turning movements are greater than or equal to 0.95;

[5] Ministry of Transportation Ontario Traffic Impact Study Guideline 2014
[6] Halton Region – Transportation Impact Study Guidelines 2015

- Queue lengths for individual movements that are projected to exceed the available turning lane storage. Queue lengths estimated using Synchro.

Table 2.5 details the base year level of service conditions at the study area intersections, and the critical movements are summarized below:

AM Peak Hour

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Northbound shared through/right operates in the LOS D range with a v/c ratio greater than 0.85.
  - Southbound left-turn lane operates with delays in the LOS E range with a v/c ratio greater than 0.95. The queue length extends beyond the current available storage.

PM Peak Hour

- Waterdown Road & North Service Road/Highway 403 WB on-ramp
  - Westbound left-turn queue length extends beyond the current available storage length.
  - Westbound through movement operates with delays in the LOS F range with a v/c ratio greater than 1.00.
  - Northbound left-turn lane operates with delays in the LOS D range with a v/c ratio greater than 0.90.
  - The overall intersection operates with delays in the LOS D range with a v/c ratio greater than 0.95.
- Waterdown Road & Panin Road/Highway 403 WB off-ramp
  - Westbound off-ramp double left/through movement operates with delays in the LOS F range with a v/c ratio greater than 1.00.
- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Southbound left-turn lane operates with delays in the LOS E range with a v/c ratio greater than 0.95. The queue length extends beyond the current available storage.
  - The overall intersection operates with delays in the LOS D range with a v/c ratio greater than 0.85.

Localized congestion occurs at the study area intersections. In the AM Peak hour, the southbound left turn at Waterdown Road and Aldershot GO Road/Highway 403 WB off-ramp experiences LOS E with queues extending beyond the available storage.

In the PM peak hour, movements providing access to/from Highway 403 generally operate with LOS E or F. In the PM peak hour, westbound traffic at Waterdown Road and North Service Road/Highway 403 WB on-ramp experiences extensive queues along North Service Road, reaching back as far as Hickory Lane.

Appendix D contains the detailed Synchro 10 reports.

TABLE 2.5: BASE YEAR TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					D	D	D	D	A	A	>	A	A	A	>	A	B
			Delay					40	40	37	39	7	5	>	5	7	8	>	7	10
			V/C					0.42	0.39	0.03		0.42	0.30	>		0.34	0.27	>		0.40
			Q					40	37	13		35	44	>		31	59	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					110	--			56	--	>		39	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	D	D	D	D	<	A		A		A	>	A	B
			Delay	<	49	>	49	39	39	35	38	<	5		5		5	>	5	13
			V/C	<	0.00	>		0.52	0.51	0.14		<	0.34				0.25	>		0.37
			Q	<	9	>		46	46	38		<	41				24	>		
			Ex	<	--	>		130	--	105		<	--				--	>		
			Avail.	<	--	>		84	--			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	C	C	C	D		D	D		D	>	D	E	A		D	D
			Delay	38	33	31	34	40		40	40		42	>	42	71	9		37	38
			V/C	0.65	0.42	0.17		0.16		0.05			0.85	>		0.97	0.26			0.79
			Q	71	56	33		15		17			227	>		43	116			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	39	--	--		--		43			--	>		-13	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	C		C					A
			Delay	4		2	4					<	22		22					5
			V/C	0.57		0.12						<	0.24							0.53
			Q	60		15						<	17							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					A		>	A	
			Delay	<	0		0		0	>	0					0		>	0	
			V/C	<	0.00				0.16	>						0.00		>		
			Q	<	0				0	>						0		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					C	F	C	F	D	A	>	B	B	C	>	C	D
			Delay					35	119	28	83	39	9	>	20	18	21	>	21	42
			V/C					0.59	1.13	0.09		0.93	0.45	>		0.32	0.37	>		0.98
			Q					206	303	197		86	88	>		33	71	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					-56	--			4	--	>		37	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	F	F	D	F	<	A		A		A	>	A	D
			Delay	<	54	>	54	325	308	37	184	<	7		7		7	>	7	45
			V/C	<	0.00	>		1.52	1.48	0.16		<	0.48				0.33	>		0.7
			Q	<	6	>		51	51	45		<	59				27	>		
			Ex	<	--	>		130	--	105		<	--				--	>		
			Avail.	<	--	>		79	--			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	D	D	D	E		D	D		C	>	C	E	C		D	D
			Delay	44	39	39	41	55		41	44		33	>	33	71	20		36	37
			V/C	0.58	0.22	0.23		0.66		0.23			0.71	>		0.98	0.37			0.86
			Q	55	32	37		24		49			92	>		44	70			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	55	--	--		--		11			--	>		-14	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	B		A	B					<	B		B					B
			Delay	20		6	19					<	15		15					18
			V/C	0.83		0.01						<	0.53							0.71
			Q	67		7						<	45							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					A		>	A	
			Delay	<	0		0		0	>	0					0		>	0	
			V/C	<	0.00				0.64	>						0.00		>		
			Q	<	0				120	>						0		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

3 Development Concept

3.1 Site Description

King Paving is planning to relocate their existing asphalt plant, located at 1077 Howard Road, to the subject site.

As part of the relocation the existing Hickory Lane intersection with North Service Road will be closed and relocated to a point approximately 205 metres to the west. The new Hickory Lane intersection will provide access to both the existing landfill site and the relocated asphalt plant.

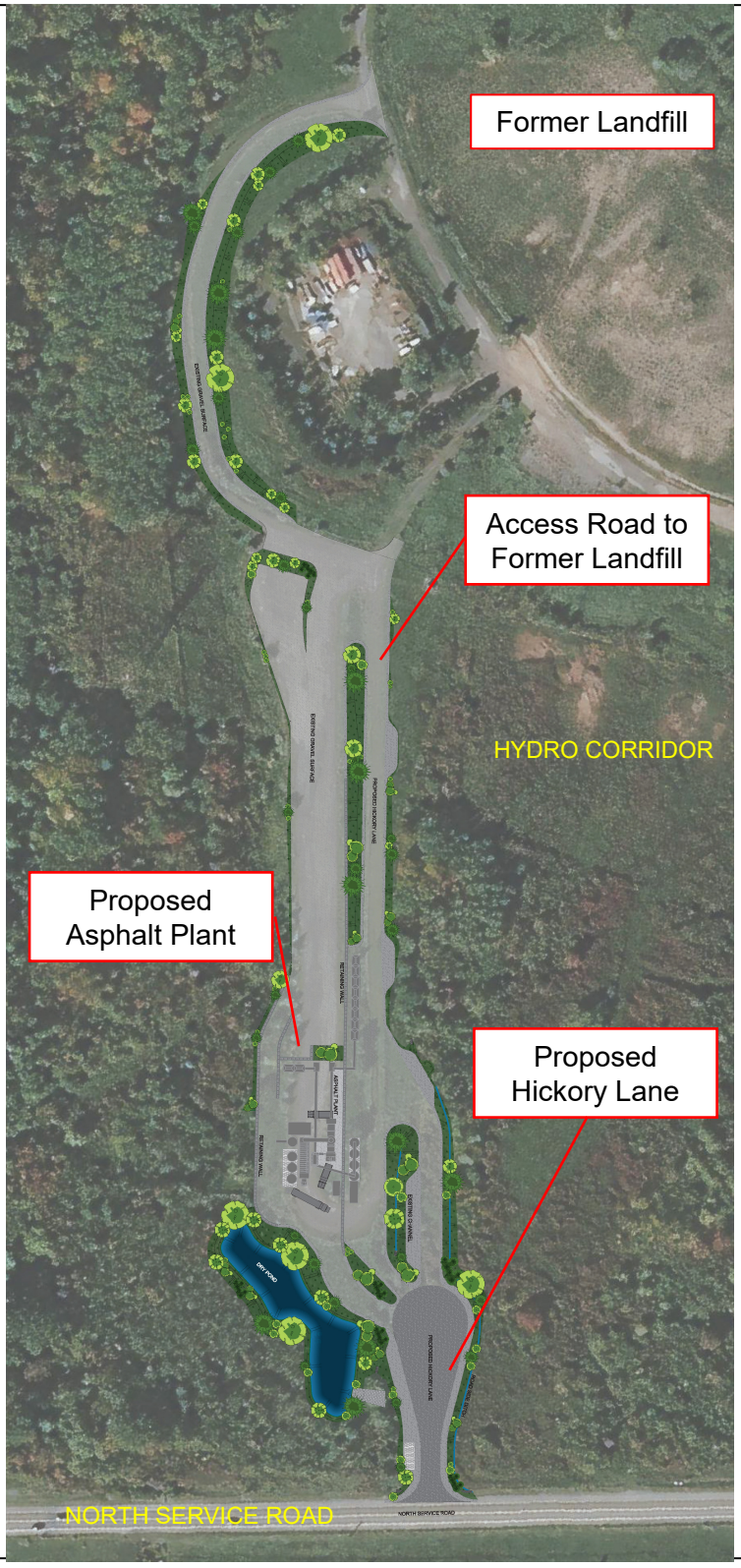
North Service Road at the proposed new Hickory Lane intersection is straight and flat with appropriate sightlines.

Figure 3.1 illustrates the site concept plan.

The details of the planned site operation are the same as existing operations which are described as follows.

- Operations are anticipated to begin in Year 2023 (subject to all necessary approvals)
- The asphalt plant operates year-round with normal operations occurring from April to December. Actively over the winter months is minimal as the plane is shut down.
- Peak season is typically June to October.
- The asphalt plant operates are Monday to Friday from 7:00 AM to 5:30 PM (10.5-hour day)
- The asphalt plant's daily capacity is about 2,000 tonnes per day (same as the existing plant) consisting of:
  - Approximately 1,000 tonnes of asphalt; and
  - Approximately 1,000 tonnes of recycled asphalt material.
- Asphalt is shipped by truck to market with an average load of approximately 20 tonnes per vehicle.
- Vehicles travel to/from the Highway 403 via the Waterdown Road interchange (same as existing). Vehicles destinated to local markets follow all designated truck routes.
  - King Paving estimates that approximately 60% of site traffic travels to/from the east on Highway 403; and
  - Approximately 40% travels to/from the west.

- Shipping typically peaks in the morning and tapers off by about 3:00 PM
- The asphalt plant employees approximately five persons.
- Employees typically arrive at 6:00 AM and depart by 6:00 PM



NTS

paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Concept Plan

291 North Service Road, City of Burlington
200584

Figure 3.1

3.2 Trip Generation

Unlike the former landfill site, the asphalt plant is expected to generate regular traffic during AM and PM peak hours. The existing activities related to the former land fill site will continue with most land fill traffic occurring off peak or as need to maintain the site.

The site's trip generation is estimated using a first principal approach based on staffing data supplied by the site operator. Peak hour truck trips to the site are estimated based on the asphalt plant capacity, truck capacity, and existing operational data outlined in Section 3.1.

Employees traveling to the site are assumed to arrive by Single Occupant Vehicles (SOV). The peak hour trip generation of the employees is assumed to follow the Institute of Transportation Engineers (ITE) Land Use Code (LUC) LUC 140 (Manufacturing)[7].

Table 3.1 summarizes the estimated truck trip generation for the asphalt plant and **Table 3.2** summarizes the total site trip generation.

The subject site is forecast to generate approximately 68 PCE trips in the AM peak hour and 44 PCE trips in the PM peak hour. King Paving estimates that 60% of site traffic travels to/from the east on Highway 403 and 40% travels to/from the west.

The traffic generated by the existing asphalt plant located south of Highway 403 is captured in the existing traffic volumes. When the plant is closed and relocated to the north side of Highway 403, no new vehicle trips are expected to be generated by the former asphalt plant site. Traffic associated with the asphalt plant will be rerouted through the Waterdown Road interchange.

Inbound vehicles from Highway 403 will travel north along Waterdown Road to the new site on North Service Road rather than travelling south on Waterdown Road to the existing site located on Howard Drive. The rerouting will result in a shift from westbound left-turns at Waterdown Road and Panin Road/Highway 403 westbound off-ramp to westbound right-turns. The rerouting will result in a shift from eastbound right-turns at Waterdown Road and Aldershot GO Station Road/Highway 403 eastbound off-ramp to eastbound left-turns.

[7] Trip Generation Tenth Edition, Institute of Transportation Engineers, Washington D.C., 2017

TABLE 3.1: ESTIMATED TRUCK TRIP GENERATION

Measure	Units	Input	Calculation
Daily Production Limit	Tonnes/Day	2,000	
Average Load Per Truck	Tonnes/Truck	20	
Average Trips Per Day	Trucks/Day	100	
Percent of Daily Trips			
AM Peak Hour	%Trucks	11%	
PM Peak Hour	%Trucks	7%	
Peak Hour Truck Volume			
AM Peak Hour	Trucks/Hour		11
PM Peak Hour	Trucks/Hour		7
Passenger Car Equivalent	PCE's/Truck	3	
AM Peak Hour Volume In	**PCE's/Hour**		**33**
AM Peak Hour Volume Out	**PCE's/Hour**		**33**
PM Peak Hour Volume In	**PCE's/Hour**		**21**
PM Peak Hour Volume Out	**PCE's/Hour**		**21**

TABLE 3.2: ESTIMATED SITE TRIP GENERATION

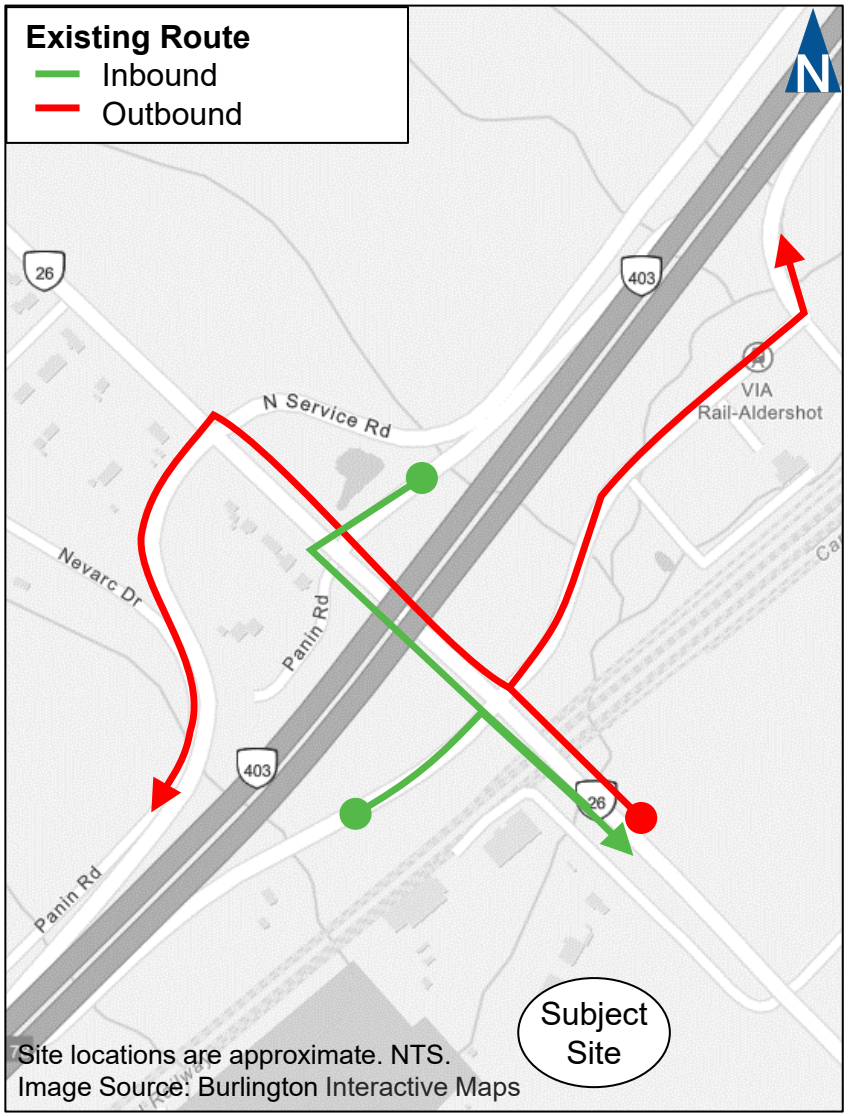
Trip Generation	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Employee Trips – ITE LUC 140	1	1	**2**	1	1	**2**
Truck Trips	11	11	**22**	7	7	**7**
Total Trips	**22**	**22**	**44**	**8**	**8**	**16**
Total Trips (PCE)	**34**	**34**	**68**	**22**	**22**	**44**

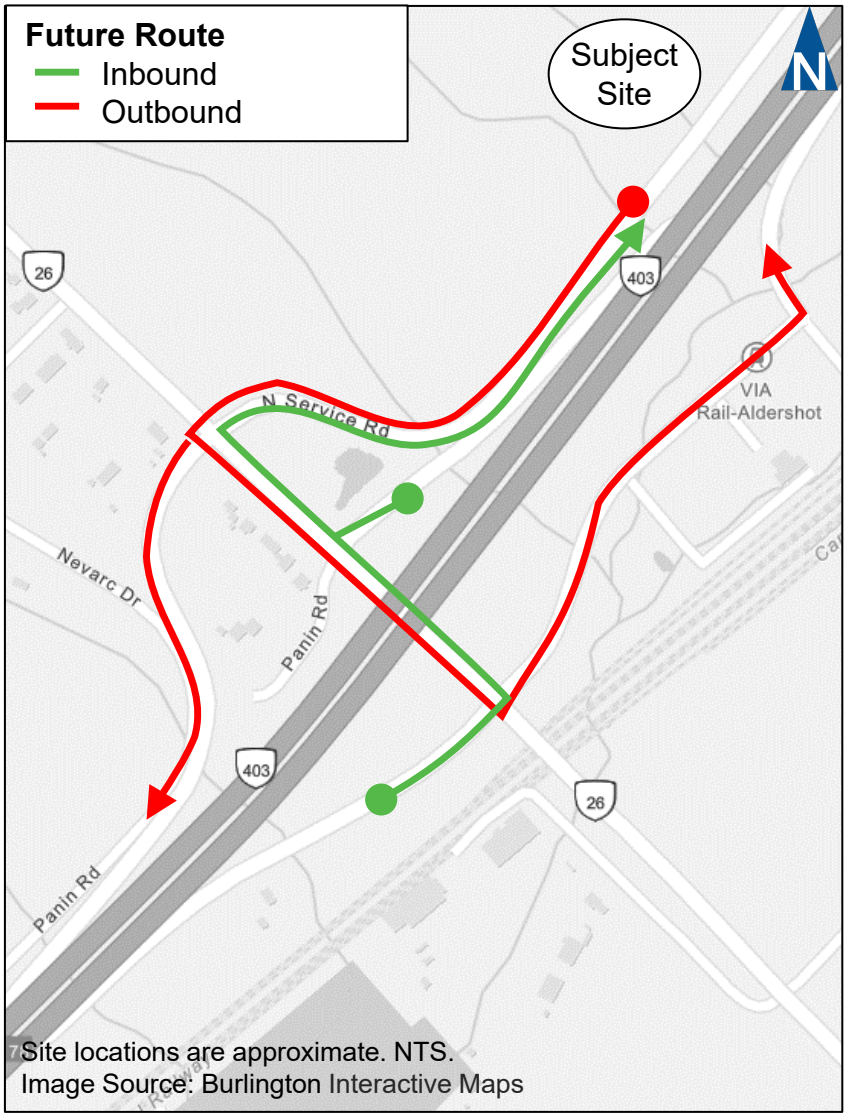
Outbound vehicles from the new site will access the westbound Highway 403 by going westbound through the North Service Road and Waterdown Road intersection. Outbound vehicles from the new site travelling eastbound on Highway 403 must turn left at the North Service Road and Waterdown Road intersection and another left turn at the Aldershot GO Station Road and Waterdown Road intersection. The outbound rerouting will result in a shift from northbound left-turns North Service Road and Waterdown Road to westbound through movements. The outbound rerouting also will result in a shift from northbound right-turns at Aldershot GO Station Road and Waterdown Road to southbound left-turns.

Figure 3.2 illustrates the existing travel route used by site traffic and the expected change in travel patterns through the Waterdown Road interchange.

Figure 3.3a and **Figure 3.3b** illustrates the estimated site-generated peak hour traffic volumes.

Appendix E contains site traffic figures illustrating volumes by vehicle type.



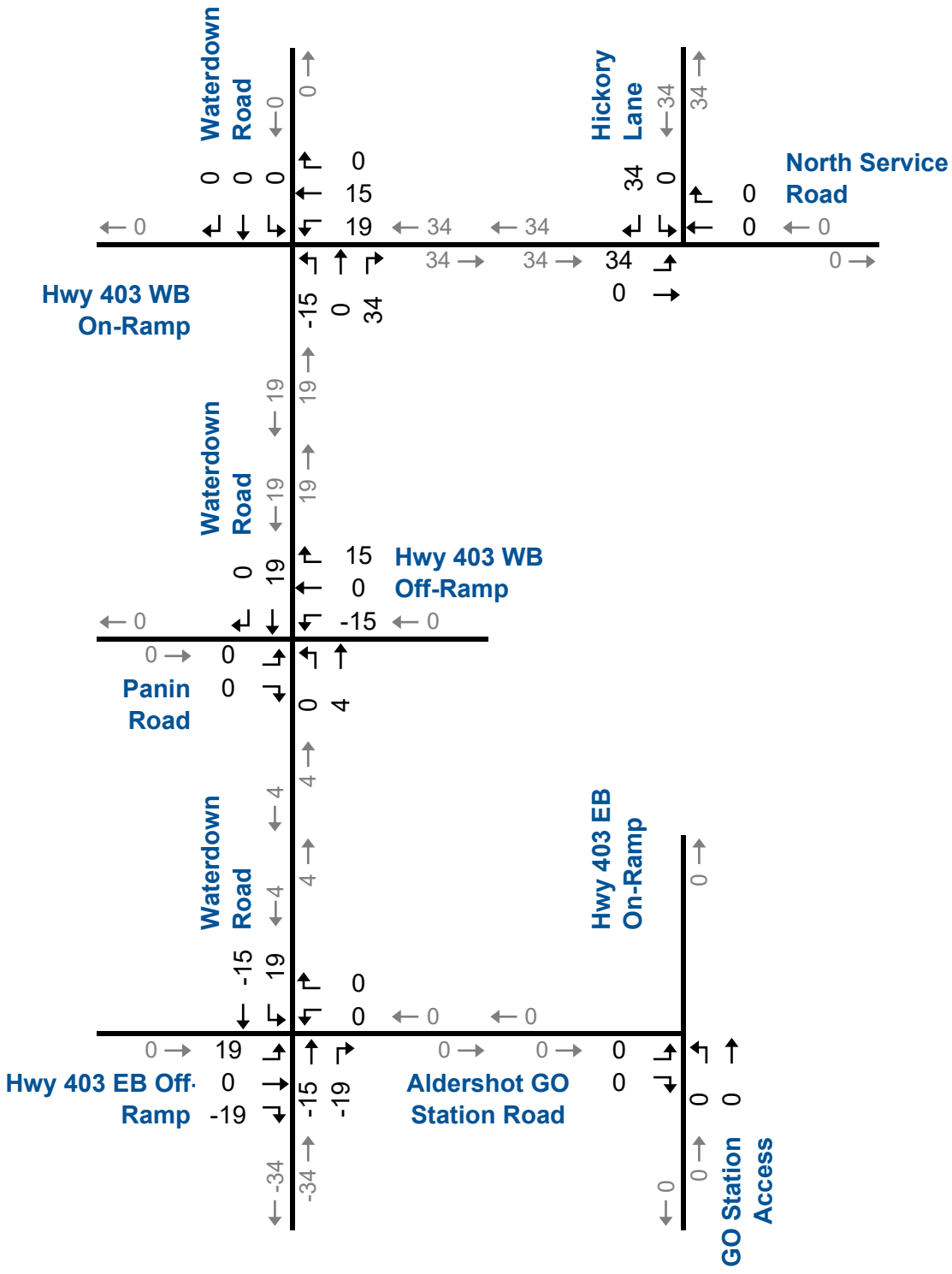


paradigm TRANSPORTATION SOLUTIONS LIMITED

Existing and Future Site Traffic Travel Routes

291 North Service Road, City of Burlington
200584

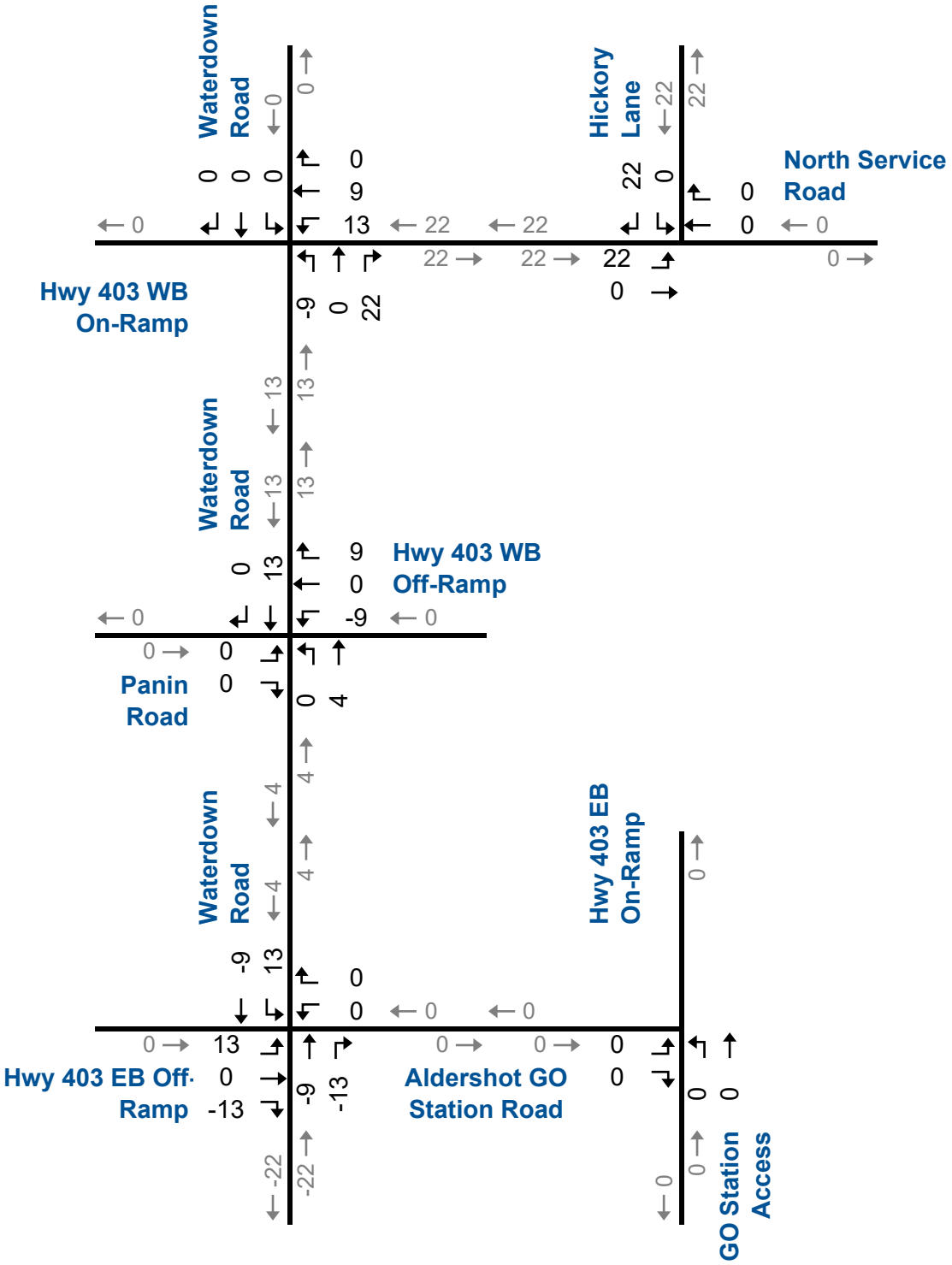
Figure 3.2



Estimate Site Generated Traffic Volumes (PCE) AM Peak Hour

291 North Service Road, City of Burlington
200584

Figure 3.3a



Estimate Site Generated Traffic Volumes (PCE) PM Peak Hour

291 North Service Road, City of Burlington
200584

Figure 3.3b

4 Future Conditions

The assessment of future conditions in this section includes the following components necessary to assess the site traffic implications on the adjacent road network:

- Future background traffic volume estimates;
- Level of service analysis for background traffic (pre-development);
- Future total traffic estimates; and
- Level of service analysis for total traffic (post-development).

4.1 Traffic Forecast

Three horizon years have been assessed: opening date horizon (Year 2023), five years after full build-out (Year 2028), and ten years after full build-out (Year 2033). The likely future traffic volumes near the subject site are estimated to consist of:

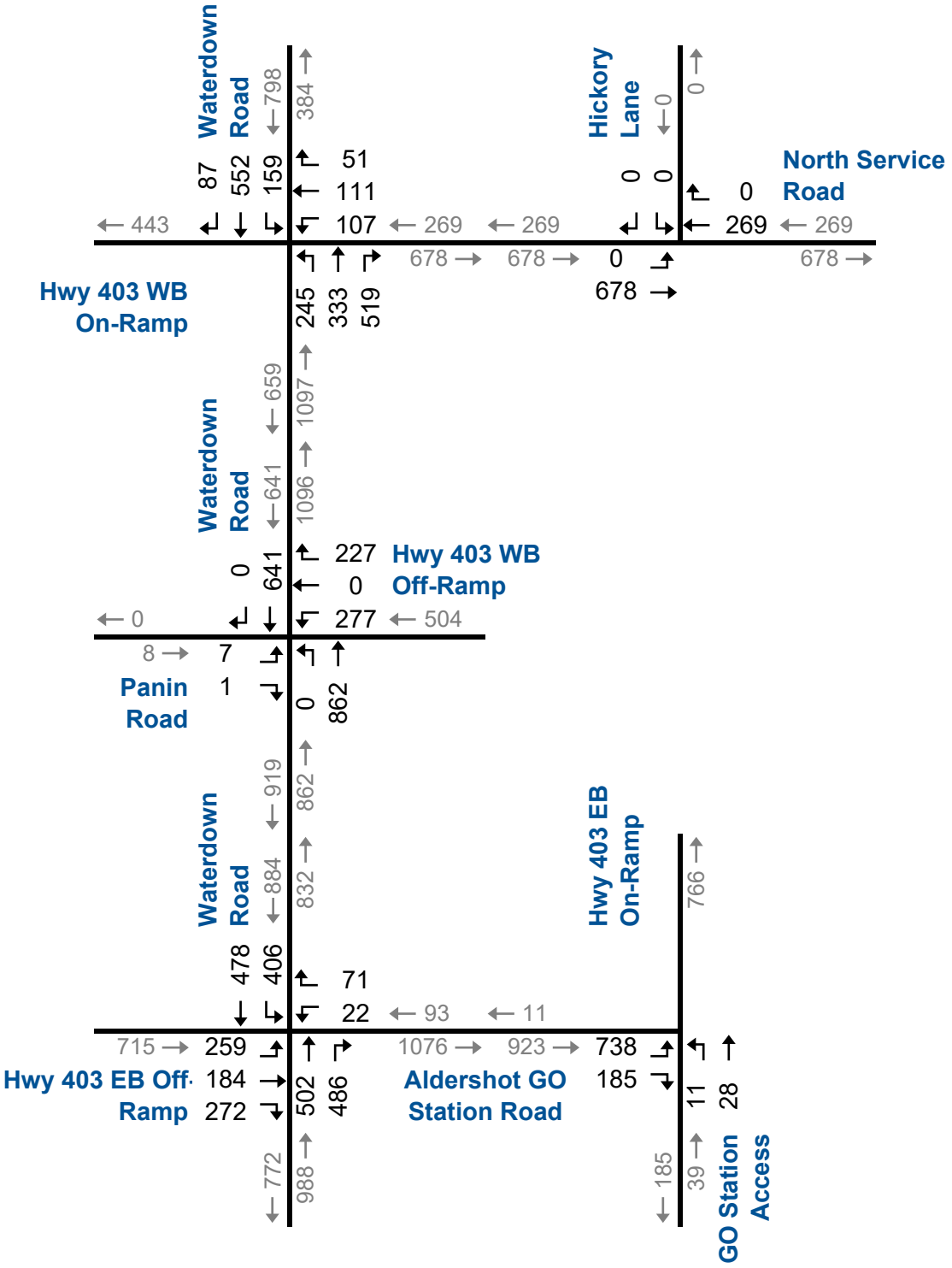
- Increased non-site traffic (generalized background traffic growth). A growth rate of 2% per annum was applied to existing traffic volumes[8]; and
- Traffic generated by the subject site.

No in-stream background developments were identified by the review agencies during pre-study consultation.

Figure 4.1 to **Figure 4.3** illustrate the forecast background traffic volumes. **Figure 4.4** to **Figure 4.6** illustrate the forecast total traffic volumes which include the addition of the subject site traffic.

Appendix F contains traffic forecasts by vehicle type.

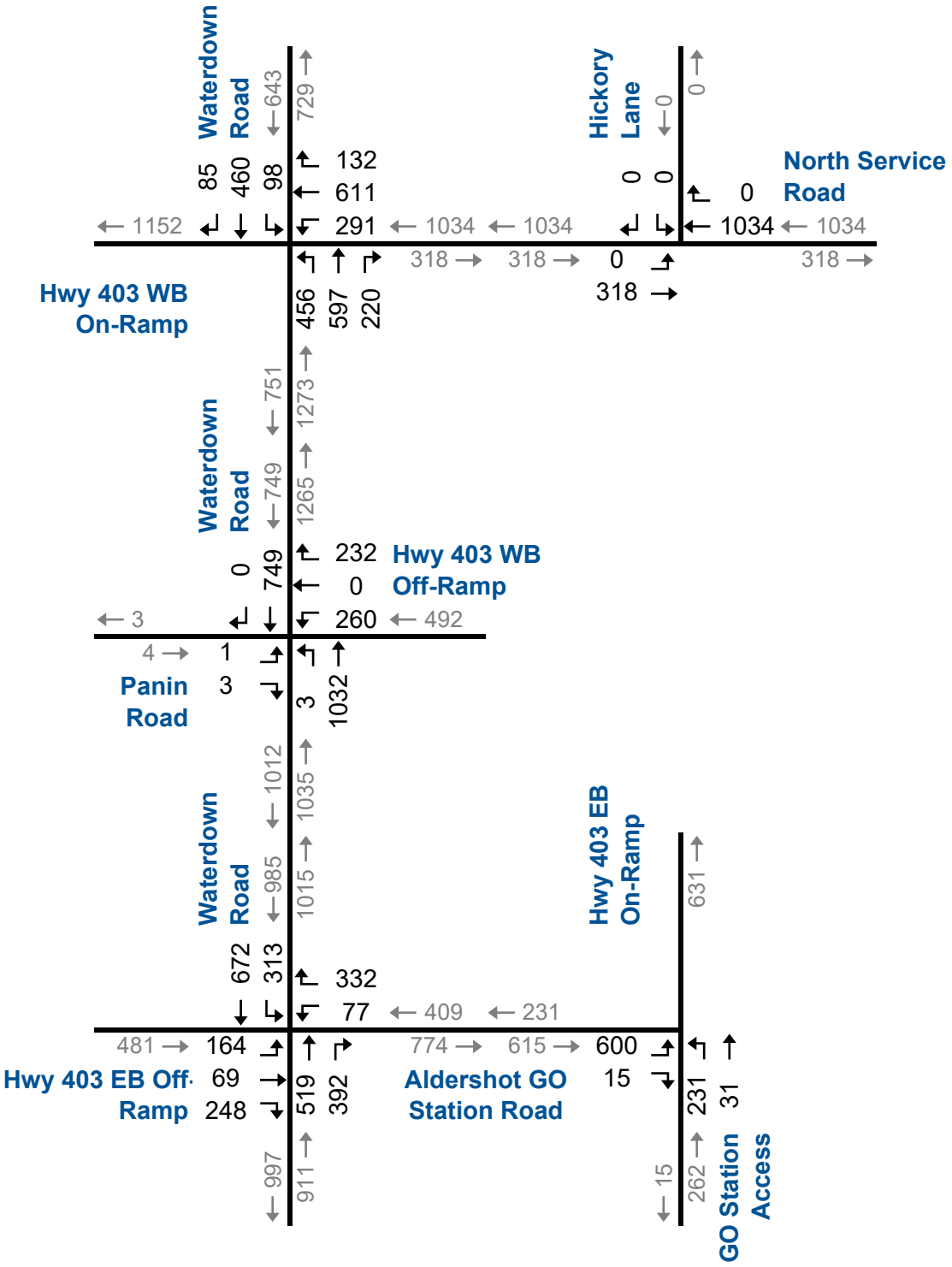
[8] Growth rate identified by the MTO, Region, and City Staff (Appendix A)



Background Traffic Opening Date Horizon - AM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

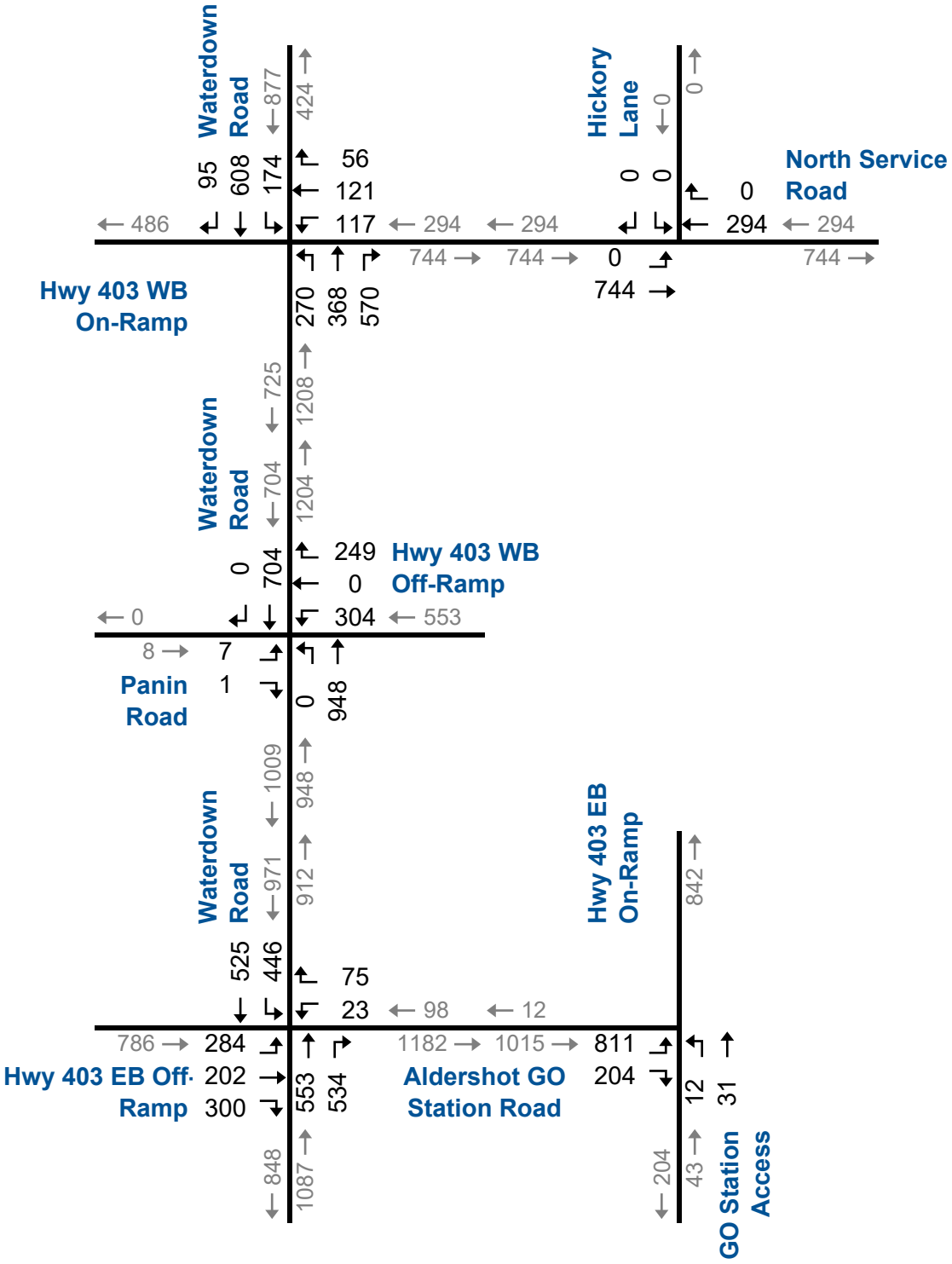
Figure 4.1a



Background Traffic Opening Date Horizon - PM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

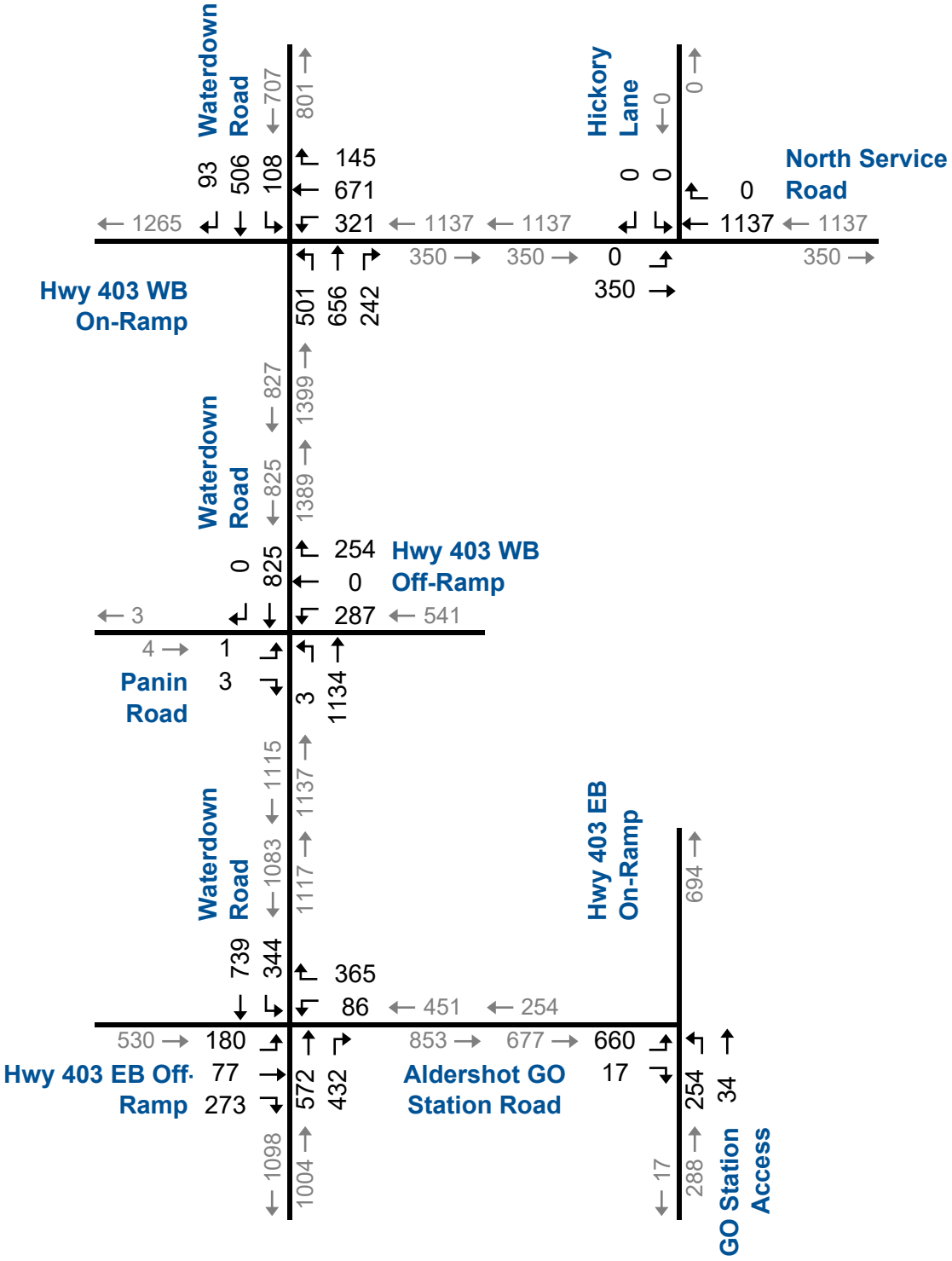
Figure 4.1b



Background Traffic Five-Year Horizon - AM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

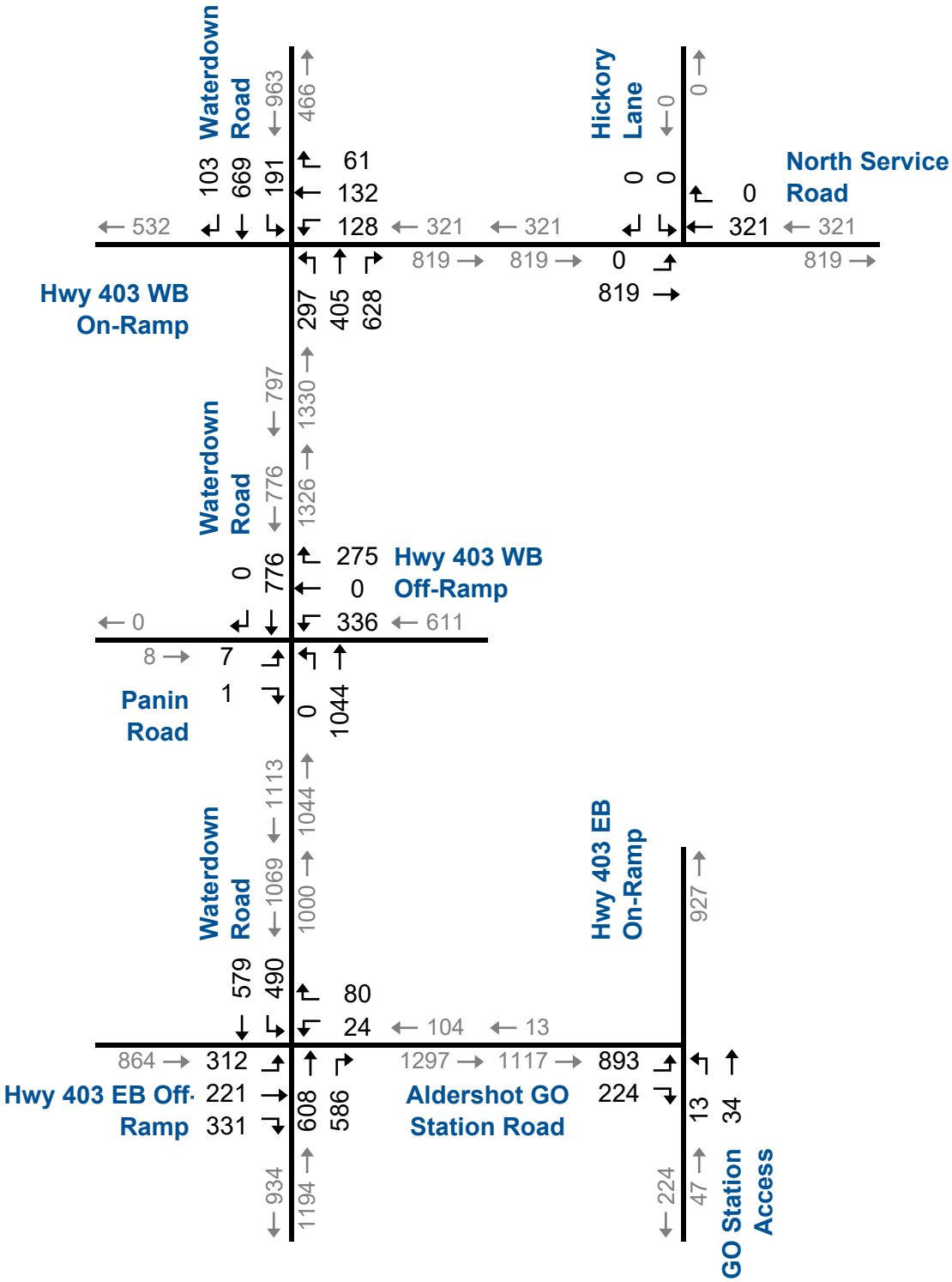
Figure 4.2a



Background Traffic Five-Year Horizon - PM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

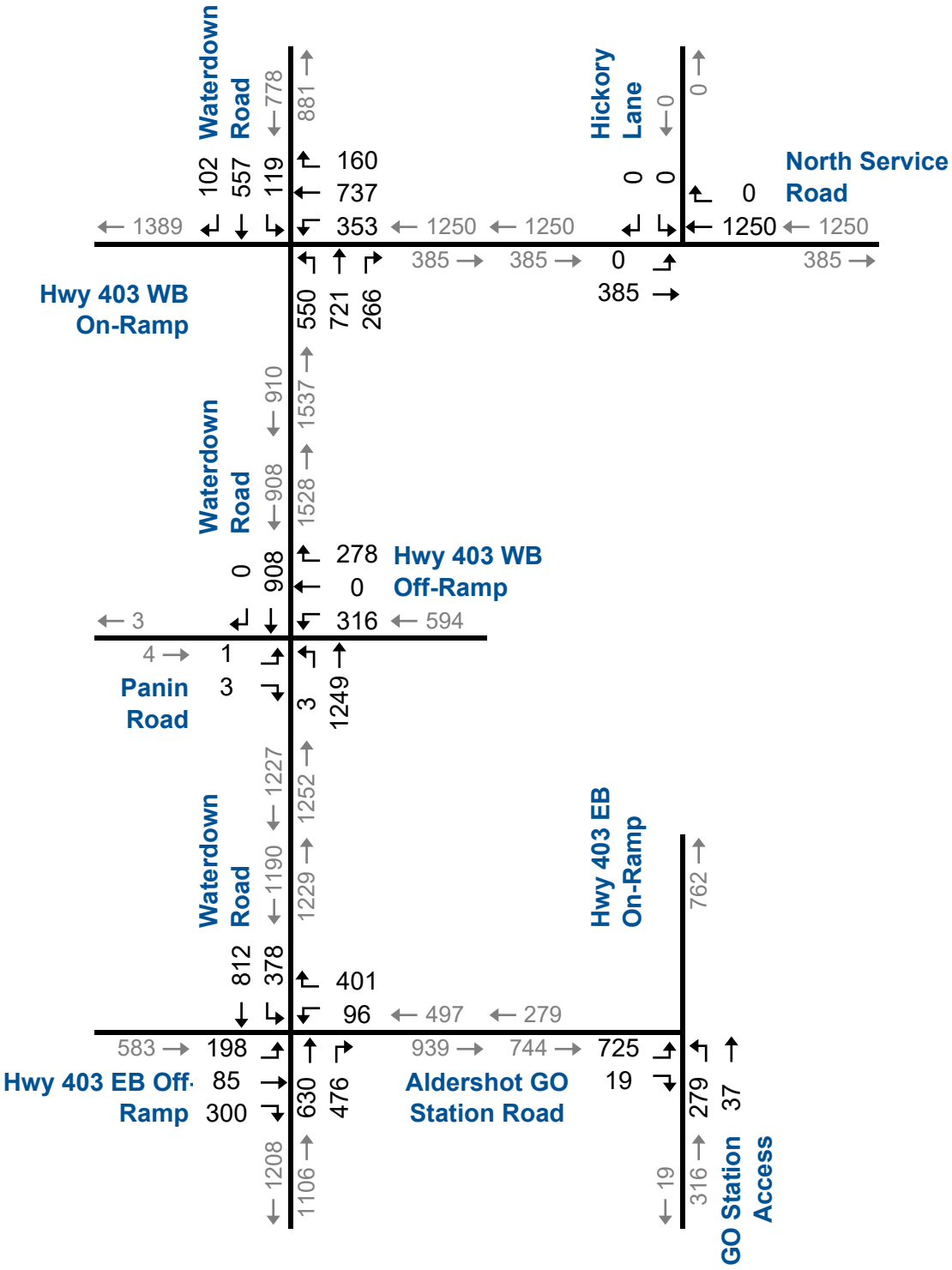
Figure 4.2b



Background Traffic Ten-Year Horizon - AM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

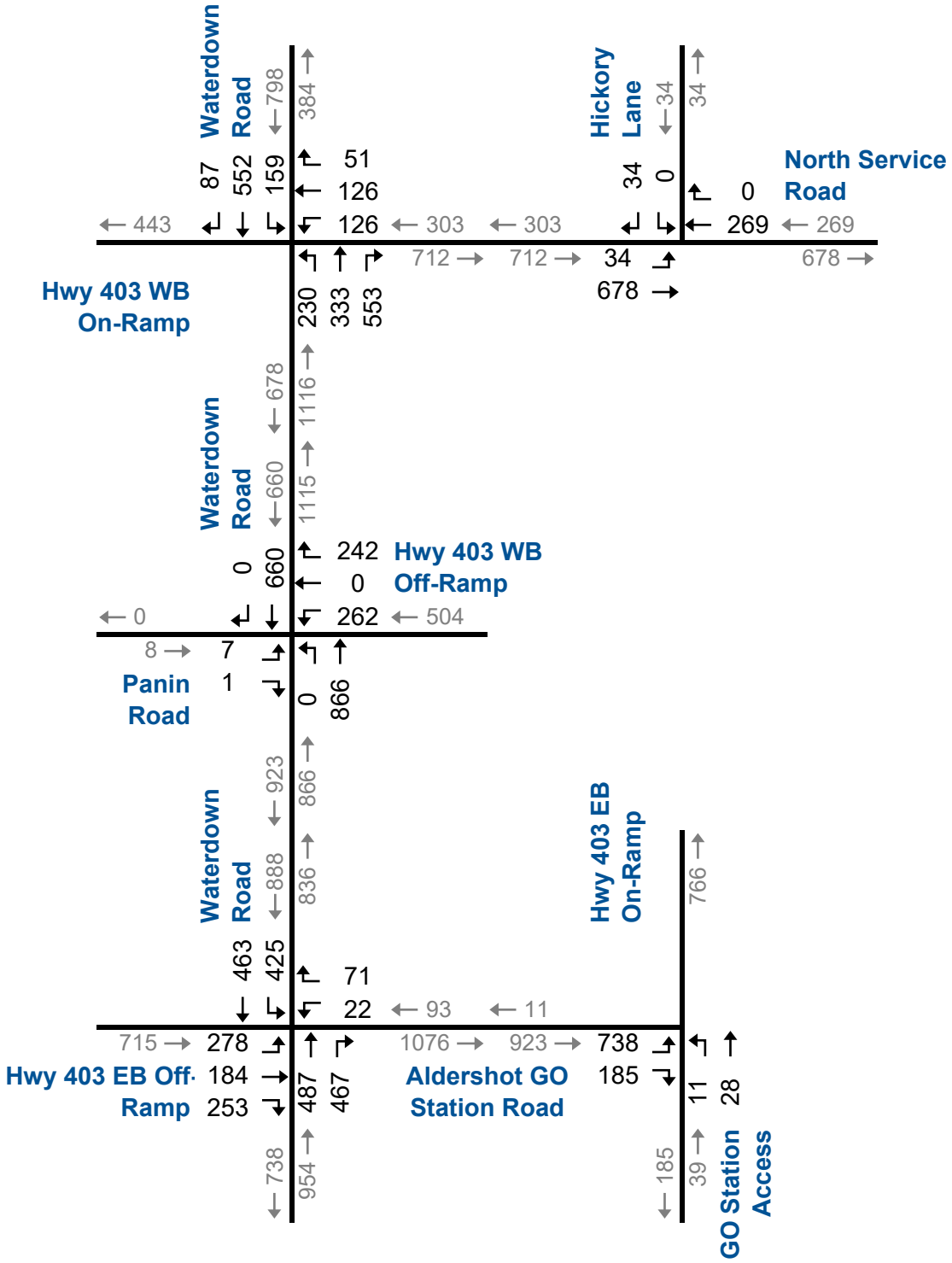
Figure 4.3a



Background Traffic Ten-Year Horizon - PM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

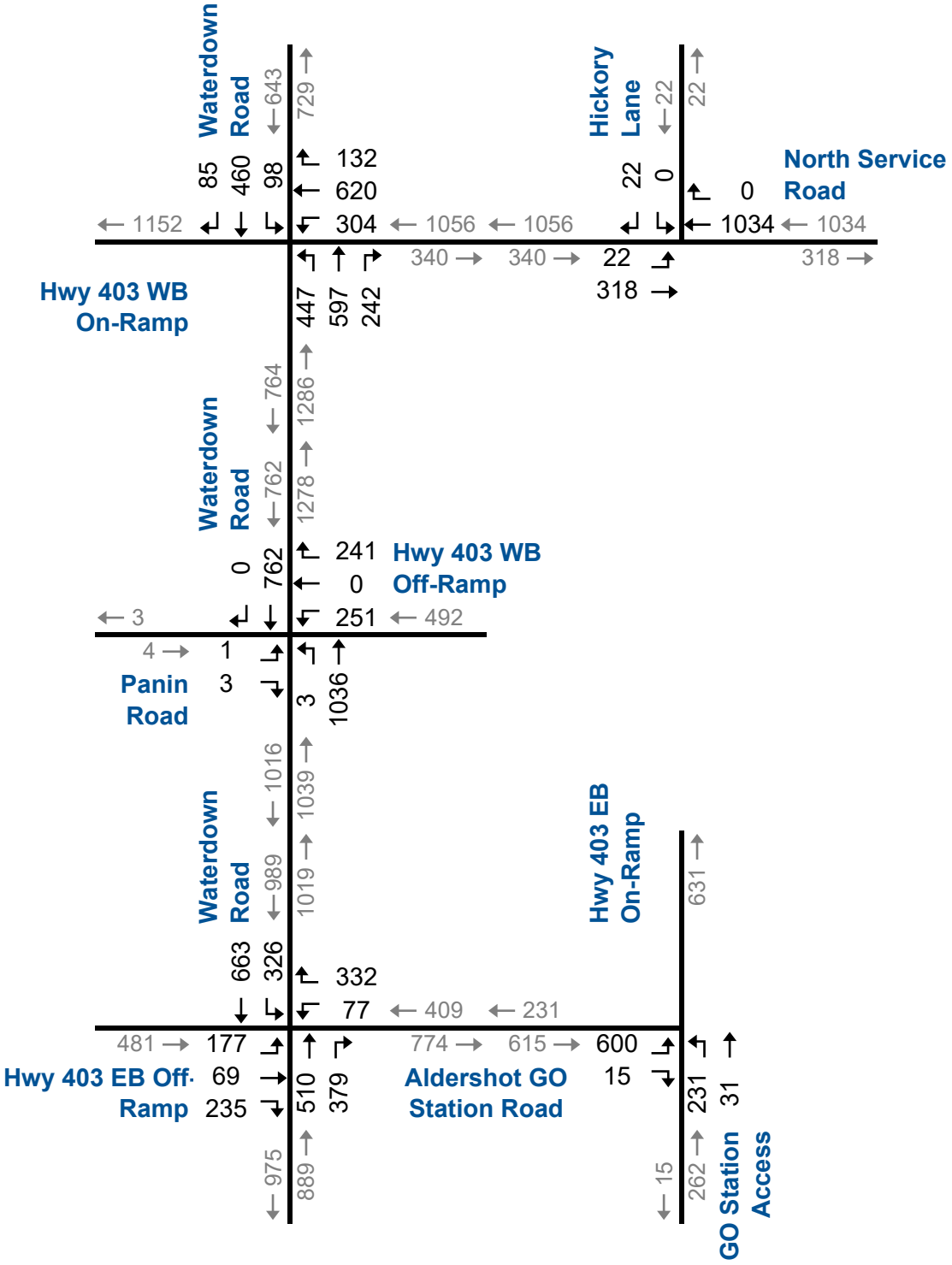
Figure 4.3b



Total Traffic Opening Date Horizon - AM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

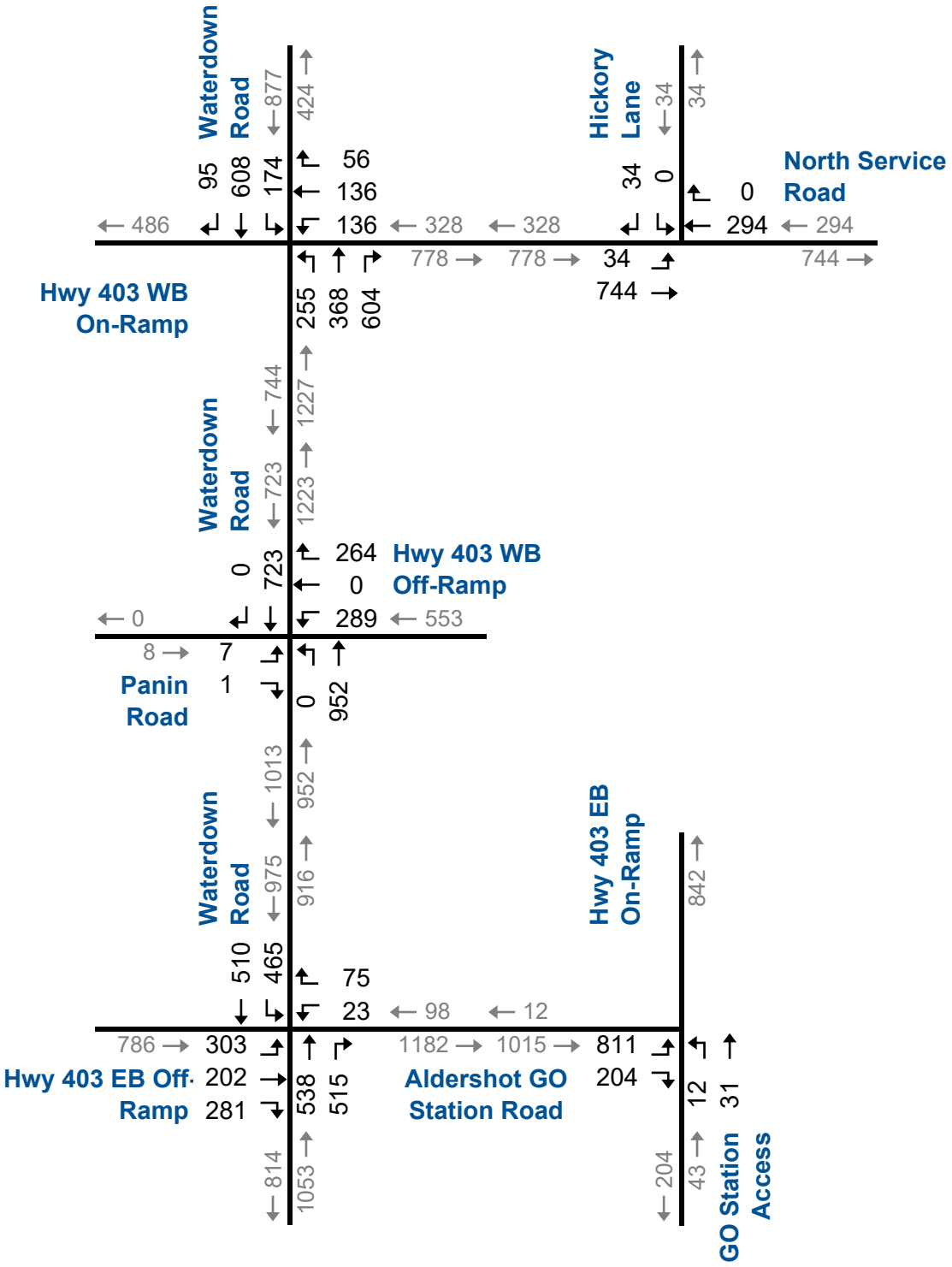
Figure 4.4a



Total Traffic Opening Date Horizon - PM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

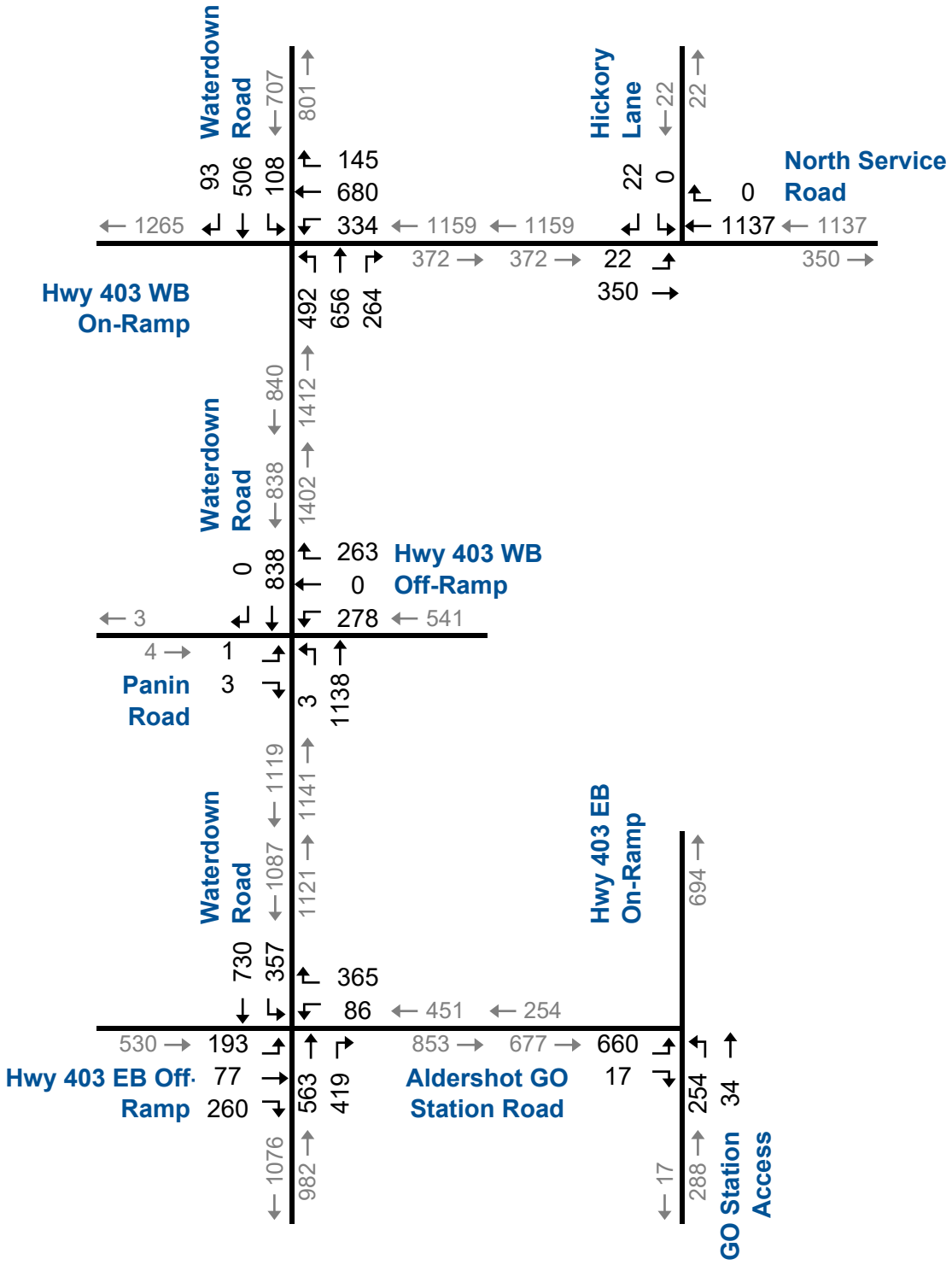
Figure 4.4b



Total Traffic Five-Year Horizon AM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

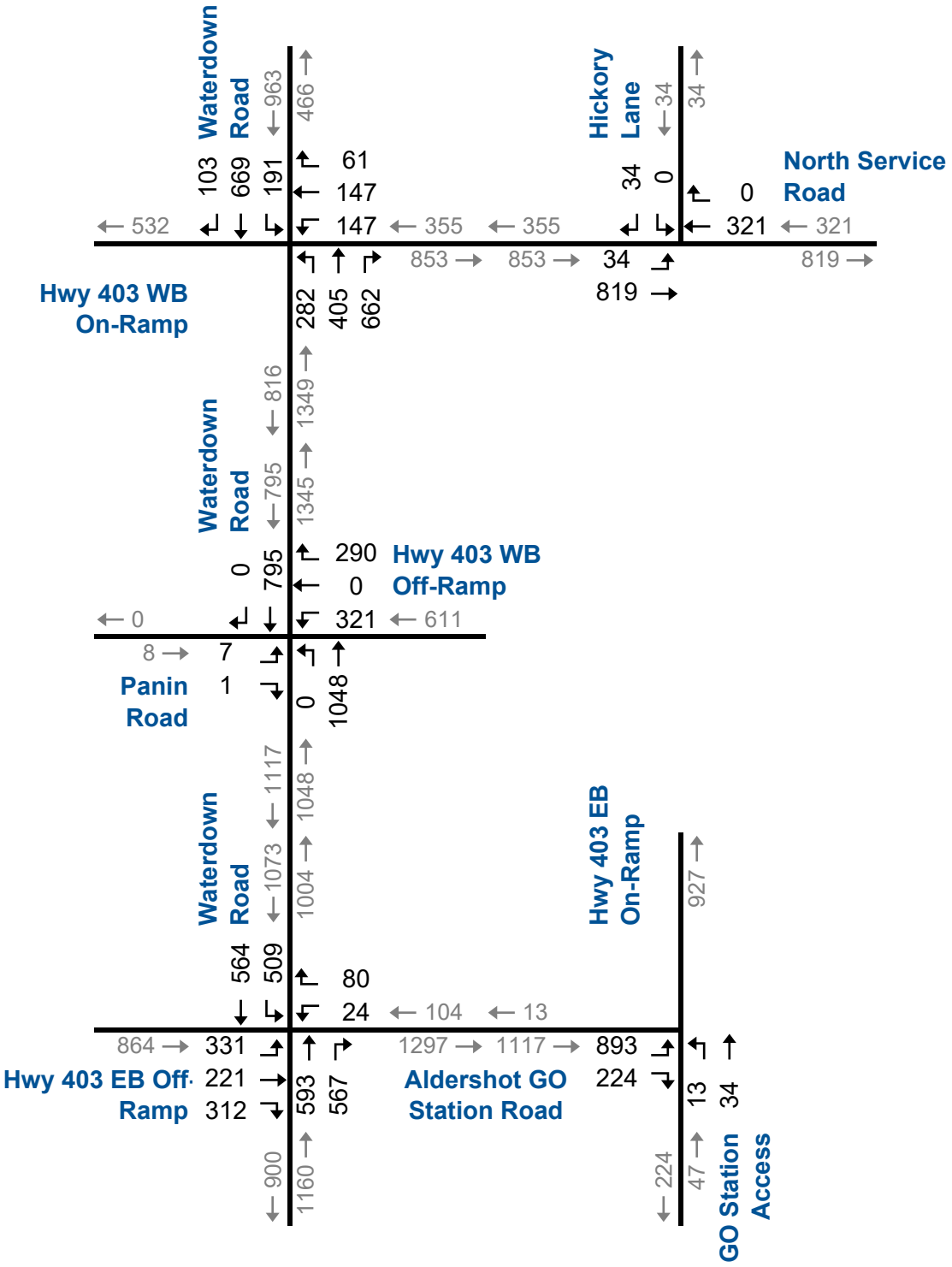
Figure 4.5a



Total Traffic Five-Year Horizon PM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

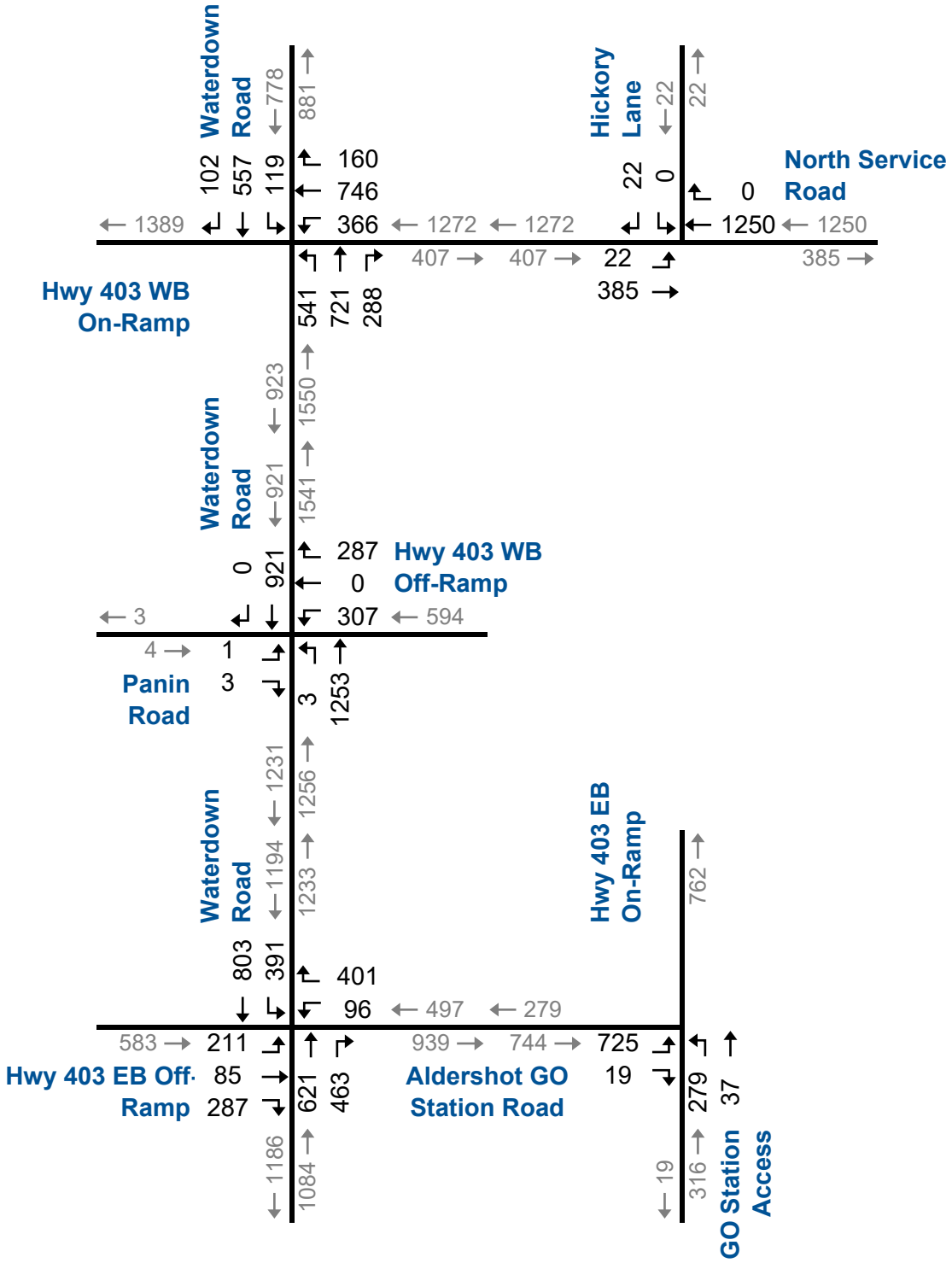
Figure 4.5b



Total Traffic Ten-Year Horizon AM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

Figure 4.6a



Total Traffic Ten-Year Horizon PM Peak Hour (PCE)

291 North Service Road, City of Burlington
200584

Figure 4.6b

4.2 Background Traffic Operations

4.2.1 Opening Date Horizon

The study area intersection background traffic operations analyses followed the same methodology used for existing conditions. Signal timings were optimized to improve traffic operations through the corridor. **Table 4.1** details the level of service conditions, and the critical movements are summarized below:

AM Peak Hour

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Northbound shared through/right is forecast to operate in the LOS D range with a v/c ratio greater than 0.85.
  - Southbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95. The queue length is forecast to extend beyond the current available storage.

PM Peak Hour

- Waterdown Road & North Service Road/Highway 403 WB on-ramp
  - Westbound left-turn queue length is forecast to extend beyond the current available storage length.
  - Westbound through movement is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95.
  - Northbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 1.00.
- Waterdown Road & Panin Road/Highway 403 WB off-ramp
  - Westbound off-ramp double left/through movement is forecast to operate with delays in the LOS F range with a v/c ratio greater than 0.95.
- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp



- Northbound shared through/right is forecast to operate in the LOS D range with a v/c ratio greater than 0.90.
- Southbound left-turn lane is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.90. The queue length is forecast to extend beyond the current available storage.

Localized congestion is forecast to occur at the study area intersections like existing conditions. In the AM Peak hour, the southbound left turn at Waterdown Road and Aldershot GO Road/Highway 403 WB off-ramp is forecast to experience LOS E with queues extending beyond the available storage.

In the PM peak hour, movements providing access to/from Highway 403 generally operate with LOS E or F. In the PM peak hour, westbound traffic at Waterdown Road and North Service Road/Highway 403 WB on-ramp is forecast to experience extensive queues along North Service Road, reaching back as far as Hickory Lane.

Appendix G1 contains the supporting detailed Synchro 10 output.

TABLE 4.1: BACKGROUND TRAFFIC OPERATIONS – OPENING DATE HORIZON

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					D	D	D	D	A	A	>	A	A	A	>	A	B
			Delay					44	43	40	43	4	4	>	4	7	8	>	8	10
			V/C					0.42	0.40	0.03		0.44	0.32	>		0.36	0.28	>		0.42
			Q					42	39	13		42	38	>		36	62	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					108	--			48	--	>		34	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	<	D	D	D	<	A		A		A	>	A	B
			Delay	<	54	>	54	<	44	39	42	<	5		5		5	>	5	14
			V/C	<	0.00	>		<	0.55	0.15		<	0.35				0.26	>		0.38
			Q	<	10	>		<	47	37		<	39				43	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	83			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	D	C	D	D		D	D		D	>	D	E	B		D	D
			Delay	45	38	35	39	46		44	45		44	>	44	66	11		36	40
			V/C	0.71	0.46	0.18		0.18		0.05			0.85	>		0.97	0.25			0.82
			Q	80	52	36		16		19			402	>		42	116			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	31	--	--		--		41			--	>		-12	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					A
			Delay	1		0	1					<	49		49					3
			V/C	0.52		0.12						<	0.28							0.5
			Q	52		16						<	23							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					A		>	A	
			Delay	<	0		0		0	>	0					0		>	0	
			V/C	<	0.00				0.17	>						0.00		>		
			Q	<	0				0	>						0		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					C	E	B	D	E	A	>	C	C	C	>	C	D
			Delay					24	62	19	46	78	7	>	33	25	29	>	28	36
			V/C					0.52	0.99	0.09		1.05	0.55	>		0.44	0.55	>		1.00
			Q					212	391	196		106	125	>		38	82	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					-62	--			-16	--	>		32	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	<	F	C	D	<	B		B		B	>	B	C
			Delay	<	43	>	43	<	88	21	54	<	12		12		15	>	15	22
			V/C	<	0.00	>		<	0.95	0.16		<	0.66				0.46	>		0.76
			Q	<	5	>		<	46	46		<	102				49	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	84			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	C	C	C	C	C		E	E		D	>	D	D	B		C	D
			Delay	33	30	31	31	25		65	58		50	>	50	45	15		24	39
			V/C	0.51	0.20	0.30		0.56		0.24			0.94	>		0.91	0.43			0.79
			Q	49	28	38		20		43			112	>		43	69			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	61	--	--		--		17			--	>		-13	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	C		C					B
			Delay	4		1	4					<	34		34					13
			V/C	0.69		0.01						<	0.69							0.69
			Q	56		4						<	54							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					A		>	A	
			Delay	<	0		0		0	>	0					0		>	0	
			V/C	<	0.00				0.66	>						0.00		>		
			Q	<	0				151	>						0		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

4.2.2 Five Year Horizon

The study area intersection background traffic operations analyses followed the same methodology used for existing conditions. Signal timings were optimized to improve traffic operations through the corridor. **Table 4.2** details the level of service conditions, and the critical movements are summarized below:

AM Peak Hour

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Eastbound off-ramp left-turn is forecast to operate with delays in the LOS D range with a v/c of 0.75.
  - Northbound shared through/right is forecast to operate in the LOS E range with a v/c ratio greater than 0.95.
  - Southbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.85.

PM Peak Hour

- Waterdown Road & North Service Road/Highway 403 WB on-ramp
  - Westbound left-turn queue length is forecast to extend beyond the current available storage length.
  - Westbound through movement is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00.
  - Northbound left-turn lane is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - Southbound left-turn queue length forecast to extend beyond the current available storage length.
  - The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 1.00.
- Waterdown Road & Panin Road/Highway 403 WB off-ramp

- Westbound off-ramp double left/through movement is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Northbound shared through/right is forecast to operate in the LOS D range with a v/c ratio greater than 0.85.
  - Southbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95. The queue length is forecast to extend beyond the current available storage.
  - The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.85.

Localized congestion is forecast to occur at the study area intersections like existing conditions. In the AM Peak hour, congestion generally occurs at the intersection of Waterdown Road and Aldershot GO Road/Highway 403 WB off-ramp due to heavy northbound and southbound traffic.

In the PM peak hour, movements providing access to/from Highway 403 generally operate with LOS E or F. Westbound traffic at Waterdown Road and North Service Road/Highway 403 WB on-ramp is forecast to experience extensive queues along North Service Road, reaching back as far as Hickory Lane.

Appendix G2 contains the supporting detailed Synchro 10 output.

TABLE 4.2: BACKGROUND TRAFFIC OPERATIONS – FIVE YEAR HORIZON

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					D	D	D	D	A	A	>	A	A	A	>	A	B
			Delay					48	48	44	47	4	4	>	4	7	8	>	8	11
			V/C					0.47	0.44	0.04		0.51	0.36	>		0.43	0.30	>		0.49
			Q					49	46	13		40	42	>		42	67	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					101	--			50	--	>		28	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	E	>	E	<	D	D	D	<	A		A		A	>	A	B
			Delay	<	59	>	59	<	49	42	46	<	4		4		5	>	5	15
			V/C	<	0.00	>		<	0.59	0.16		<	0.38				0.28	>		0.41
			Q	<	10	>		<	53	42		<	43				43	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	77			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	D	D	D	D		F	F		E	>	E	E	B		D	D
			Delay	53	42	38	45	52		170	143		59	>	59	76	11		41	52
			V/C	0.78	0.51	0.20		0.20		0.05			0.96	>		1.00	0.27			0.87
			Q	97	71	42		17		18			478	>		43	129			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	13	--	--		--		43			--	>		-13	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					A
			Delay	1		0	1					<	52		52					3
			V/C	0.58		0.13						<	0.28							0.55
			Q	55		16						<	25							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					A		>	A	
			Delay	<	0		0		0	>	0					0		>	0	
			V/C	<	0.00				0.19	>						0.00		>		
			Q	<	0				0	>						0		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					C	E	C	E	F	A	>	D	C	D	>	D	D
			Delay					28	79	23	58	81	10	>	35	32	42	>	41	44
			V/C					0.54	1.04	0.10		1.05	0.62	>		0.51	0.72	>		1.02
			Q					206	308	196		115	155	>		76	107	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					-56	--			-25	--	>		-6	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	<	F	C	E	<	B		B		B	>	B	C
			Delay	<	54	>	54	<	113	24	68	<	16		16		20	>	20	29
			V/C	<	0.00	>		<	1.02	0.18		<	0.71				0.49	>		0.82
			Q	<	6	>		<	52	65		<	134				59	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	78			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	D	D	D	E		F	F		D	>	D	E	B		C	D
			Delay	45	39	41	42	60		162	142		45	>	45	60	15		29	53
			V/C	0.63	0.25	0.50		0.76		0.26			0.89	>		0.97	0.41			0.88
			Q	61	32	45		79		75			147	>		45	89			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	49	--	--		--		-15			--	>		-15	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					B
			Delay	4		1	4					<	46		46					17
			V/C	0.73		0.01						<	0.78							0.74
			Q	67		4						<	57							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					A		>	A	
			Delay	<	0		0		0	>	0					0		>	0	
			V/C	<	0.00				0.73	>						0.00		>		
			Q	<	0				217	>						0		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

4.2.3 Ten Year Horizon

The study area intersection background traffic operations analyses followed the same methodology used for existing conditions. Signal timings were optimized to improve traffic operations through the corridor. **Table 4.3** details the level of service conditions, and the critical movements are summarized below:

AM Peak Hour

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Eastbound off-ramp left-turn is forecast to operate with delays in the LOS E range with a v/c of 0.80.
  - Northbound shared through/right is forecast to operate in the LOS F range with a v/c ratio greater than 1.00.
  - Southbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - The overall intersection is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95.

PM Peak Hour

- Waterdown Road & North Service Road/Highway 403 WB on-ramp
  - Westbound left-turn queue length is forecast to extend beyond the current available storage length.
  - Westbound through movement is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.
  - Northbound left-turn lane is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - Southbound left-turn queue length forecast to extend beyond the current available storage length.
  - The overall intersection is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00.
- Waterdown Road & Panin Road/Highway 403 WB off-ramp

- Westbound off-ramp double left/through movement is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Eastbound off-ramp left-turn queue length is forecast to extend beyond the current available storage but is not expected to impact the operations along Highway 403.
  - Northbound shared through/right is forecast to operate in the LOS F range with a v/c ratio greater than 1.00.
  - Southbound left-turn lane is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.95. The queue length is forecast to extend beyond the current available storage.
  - The overall intersection is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95.

Localized congestion is forecast to occur at the study area intersections like existing conditions. In the AM Peak hour, congestion generally occurs at the intersection of Waterdown Road and Aldershot GO Road/Highway 403 WB off-ramp due to heavy northbound and southbound traffic.

In the PM peak hour, movements providing access to/from Highway 403 generally operate with LOS E or F. In the PM peak hour, westbound traffic at Waterdown Road and North Service Road/Highway 403 WB on-ramp is forecast to experience extensive queues along North Service Road, reaching back as far as Hickory Lane.

Appendix G3 contains the supporting detailed Synchro 10 output.

TABLE 4.3: BACKGROUND TRAFFIC OPERATIONS – TEN YEAR HORIZON

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					D	D	D	D	A	A	>	A	A	A	>	A	B
			Delay					48	48	43	47	7	4	>	5	9	10	>	9	12
			V/C					0.49	0.47	0.04		0.59	0.41	>		0.50	0.34	>		0.56
			Q					52	46	15		46	40	>		48	79	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					99	--			44	--	>		22	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	E	>	E	<	D	D	D	<	A		A		A	>	A	B
			Delay	<	59	>	59	<	49	43	46	<	5		5		6	>	6	16
			V/C	<	0.00	>		<	0.61	0.29		<	0.43				0.32	>		0.46
			Q	<	10	>		<	57	47		<	41				54	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	73			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	E	D	D	D	D		F	F		F	>	F	E	B		D	E
			Delay	58	42	38	46	52		101	89		137	>	137	69	12		38	79
			V/C	0.83	0.54	0.22		0.22		0.05			1.19	>		1.00	0.30			0.96
			Q	108	81	53		16		19			474	>		42	172			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	2	--	--		--		41			--	>		-12	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					A
			Delay	1		0	1					<	52		52					3
			V/C	0.64		0.15						<	0.30							0.61
			Q	58		15						<	24							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					A		>	A	
			Delay	<	0		0		0	>	0					0		>	0	
			V/C	<	0.00				0.21	>						0.00		>		
			Q	<	0				0	>						0		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					C	F	C	E	F	B	>	D	D	D	>	D	E
			Delay					29	116	23	79	122	13	>	52	36	45	>	44	60
			V/C					0.60	1.14	0.11		1.15	0.68	>		0.62	0.79	>		1.12
			Q					202	310	194		98	160	>		83	120	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					-52	--			-8	--	>		-13	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	<	F	C	F	<	B		B		B	>	B	C
			Delay	<	54	>	54	<	144	25	85	<	16		16		20	>	20	32
			V/C	<	0.00	>		<	1.12	0.21		<	0.78				0.54	>		0.9
			Q	<	7	>		<	63	86		<	217				62	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	67			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	D	D	D	E		F	F		F	>	F	D	B		C	E
			Delay	46	38	47	45	73		135	123		93	>	93	53	16		28	66
			V/C	0.67	0.27	0.67		0.84		0.40			1.09	>		0.97	0.46			0.96
			Q	121	195	110		143		78			461	>		42	97			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	-11	--	--		--		-18			--	>		-12	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					B
			Delay	4		1	4					<	48		48					17
			V/C	0.81		0.02						<	0.82							0.81
			Q	69		6						<	55							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					A		>	A	
			Delay	<	0		0		0	>	0					0		>	0	
			V/C	<	0.00				0.80	>						0.00		>		
			Q	<	0				299	>						0		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

4.3 Total Traffic Operations

4.3.1 Opening Date Horizon

The study area intersection total traffic operations analyses followed the same methodology used for existing conditions. Signal timings were optimized to improve traffic operations through the corridor. **Table 4.4** details the level of service conditions, and the critical movements are summarized below:

AM Peak Hour

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Northbound shared through/right is forecast to operate in the LOS D range with a v/c ratio greater than 0.85.
  - Southbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95. The queue length is forecast to extend beyond the current available storage.

PM Peak Hour

- Waterdown Road & North Service Road/Highway 403 WB on-ramp
  - Westbound left-turn queue length is forecast to extend beyond the current available storage length.
  - Westbound through movement is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00.
  - Northbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.95.
- Waterdown Road & Panin Road/Highway 403 WB off-ramp
  - Westbound off-ramp double left/through movement is forecast to operate with delays in the LOS F range with a v/c ratio greater than 0.90.
- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp



- Northbound shared through/right is forecast to operate in the LOS D range with a v/c ratio greater than 0.90.
- Southbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95. The queue length is forecast to extend beyond the current available storage.

Localized congestion is forecast to occur at the study area intersections like background conditions. In the AM Peak hour, the southbound left turn at Waterdown Road and Aldershot GO Road/Highway 403 WB off-ramp is forecast to experience LOS E with queues extending beyond the available storage.

In the PM peak hour, movements providing access to/from Highway 403 generally operate with LOS E or F. In the PM peak hour, westbound traffic at Waterdown Road and North Service Road/Highway 403 WB on-ramp is forecast to experience extensive queues along North Service Road, reaching back as far as Hickory Lane.

The rerouted site traffic is forecast to have minimal contribution to intersection delays, with the largest impact being an additional 16 seconds of delay to the southbound left-turn movement at Waterdown Road and Aldershot GO Road/Highway 403 WB off-ramp in the PM peak hour.

The new Hickory Lane approach is forecast to operate with acceptable levels of service during both the AM and PM peak hours. Delays are expected to be the LOS C range with v/c ratios below 0.15 and minimal queuing.

Appendix H1 contains the supporting detailed Synchro 10 output.

TABLE 4.4: TOTAL TRAFFIC OPERATIONS – OPENING DATE HORIZON

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					D	D	D	D	A	A	>	A	A	A	>	A	B
			Delay					43	43	39	42	4	5	>	5	7	8	>	8	11
			V/C					0.47	0.43	0.03		0.42	0.33	>		0.38	0.28	>		0.41
			Q					48	47	14		37	46	>		45	68	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					102	--			53	--	>		25	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	<	D	D	D	<	A		A		A	>	A	B
			Delay	<	54	>	54	<	44	40	42	<	5		5		5	>	5	14
			V/C	<	0.00	>		<	0.54	0.16		<	0.35				0.27	>		0.38
			Q	<	8	>		<	46	40		<	40				42	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	84			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	D	C	D	D		D	D		D	>	D	E	B		D	D
			Delay	46	37	34	39	46		44	45		47	>	47	65	11		37	42
			V/C	0.73	0.45	0.17		0.18		0.05			0.87	>		0.97	0.25			0.83
			Q	79	60	32		16		16			335	>		42	122			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	31	--	--		--		44			--	>		-12	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					A
			Delay	1		0	1					<	49		49					3
			V/C	0.52		0.12						<	0.28							0.5
			Q	57		13						<	24							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					B		>	A	
			Delay	<	1		1		0	>	0					10		>	1	
			V/C	<	0.03				0.17	>						0.05		>		
			Q	<	10				0	>						14		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					C	E	B	D	E	A	>	C	C	C	>	C	D
			Delay					24	66	19	48	72	8	>	30	25	29	>	28	36
			V/C					0.54	1.01	0.09		1.03	0.56	>		0.46	0.55	>		0.99
			Q					209	374	198		105	122	>		35	77	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					-59	--			-15	--	>		35	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	<	F	C	D	<	B		B		B	>	B	C
			Delay	<	43	>	43	<	84	21	51	<	11		11		15	>	15	21
			V/C	<	0.00	>		<	0.94	0.17		<	0.65				0.46	>		0.75
			Q	<	4	>		<	42	48		<	94				51	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	88			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	C	C	C	C	C		E	E		D	>	D	E	B		C	D
			Delay	33	29	30	31	25		65	58		46	>	46	61	15		30	40
			V/C	0.54	0.19	0.24		0.56		0.24			0.92	>		0.98	0.43			0.8
			Q	55	26	34		19		43			136	>		44	84			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	55	--	--		--		17			--	>		-14	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	C		C					B
			Delay	4		1	4					<	34		34					13
			V/C	0.69		0.01						<	0.69							0.69
			Q	54		5						<	56							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					C		>	A	
			Delay	<	1		1		0	>	0					21		>	1	
			V/C	<	0.04				0.66	>						0.10		>		
			Q	<	29				151	>						12		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

4.3.2 Five Year Horizon

The study area intersection total traffic operations analyses followed the same methodology used for existing conditions. Signal timings were optimized to improve traffic operations through the corridor. **Table 4.5** details the level of service conditions, and the critical movements are summarized below:

AM Peak Hour

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Eastbound off-ramp left-turn is forecast to operate with delays in the LOS E range with a v/c greater than 0.80.
  - Northbound shared through/right is forecast to operate in the LOS E range with a v/c ratio greater than 0.95.
  - Southbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.85.

PM Peak Hour

- Waterdown Road & North Service Road/Highway 403 WB on-ramp
  - Westbound left-turn queue length is forecast to extend beyond the current available storage length.
  - Westbound through movement is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.
  - Northbound left-turn lane is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - Southbound left-turn queue length forecast to extend beyond the current available storage length.
  - The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 1.00.
- Waterdown Road & Panin Road/Highway 403 WB off-ramp



    - Westbound off-ramp double left/through movement is forecast to operate with delays in the LOS F range with a v/c ratio greater than 0.95.
- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
    - Northbound shared through/right is forecast to operate in the LOS D range with a v/c ratio greater than 0.85.
    - Southbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95. The queue length is forecast to extend beyond the current available storage.
    - The overall intersection is forecast to operate with delays in the LOS D range with a v/c ratio greater than 0.85.

Localized congestion is forecast to occur at the study area intersections like existing conditions. In the AM Peak hour, congestion generally occurs at the intersection of Waterdown Road and Aldershot GO Road/Highway 403 WB off-ramp due to heavy northbound and southbound traffic.

In the PM peak hour, movements providing access to/from Highway 403 generally operate with LOS E or F. Westbound traffic at Waterdown Road and North Service Road/Highway 403 WB on-ramp is forecast to experience extensive queues along North Service Road, reaching back as far as Hickory Lane.

The rerouted site traffic is forecast to have minimal contribution to intersection delays, with increases to individual movement delays not exceeding 15 seconds.

The new Hickory Lane approach is forecast to operate with acceptable levels of service during both the AM and PM peak hours. Delays are expected to be the LOS C range with v/c ratios below 0.15 and minimal queuing.

Appendix H2 contains the supporting detailed Synchro 10 output.

TABLE 4.5: TOTAL TRAFFIC OPERATIONS CONDITIONS – FIVE YEAR HORIZON

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					D	D	D	D	A	A	>	A	A	A	>	A	B
			Delay					48	47	43	47	4	5	>	4	8	9	>	9	12
			V/C					0.51	0.47	0.04		0.49	0.37	>		0.45	0.30	>		0.48
			Q					51	47	14		40	48	>		40	67	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					99	--			50	--	>		30	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	E	>	E	<	D	D	D	<	A		A		A	>	A	B
			Delay	<	59	>	59	<	49	43	46	<	5		5		5	>	5	15
			V/C	<	0.00	>		<	0.58	0.21		<	0.38				0.29	>		0.41
			Q	<	10	>		<	50	43		<	39				52	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	80			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	E	D	D	D	D		F	F		E	>	E	E	B		D	D
			Delay	55	41	38	45	52		170	143		63	>	63	77	11		43	54
			V/C	0.81	0.50	0.19		0.20		0.05			0.97	>		1.00	0.26			0.88
			Q	101	74	43		17		20			483	>		42	129			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	9	--	--		--		40			--	>		-12	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					A
			Delay	1		0	1					<	52		52					3
			V/C	0.58		0.13						<	0.28							0.55
			Q	61		13						<	25							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					B		>	A	
			Delay	<	1		1		0	>	0					10		>	1	
			V/C	<	0.03				0.19	>						0.05		>		
			Q	<	14				0	>						13		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					C	F	C	E	E	B	>	C	C	D	>	D	D
			Delay					29	84	23	60	76	10	>	33	33	42	>	41	44
			V/C					0.56	1.06	0.10		1.03	0.63	>		0.52	0.72	>		1.01
			Q					203	368	192		116	148	>		80	108	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					-53	--			-26	--	>		-10	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	<	F	C	E	<	B		B		C	>	C	C
			Delay	<	54	>	54	<	103	24	62	<	15		15		20	>	20	27
			V/C	<	0.00	>		<	0.99	0.18		<	0.71				0.50	>		0.81
			Q	<	5	>		<	51	58		<	141				62	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	79			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	D	D	D	E		F	F		D	>	D	E	B		C	D
			Delay	46	38	40	42	60		162	142		47	>	47	58	16		30	54
			V/C	0.66	0.24	0.44		0.76		0.26			0.90	>		0.97	0.41			0.89
			Q	67	31	43		66		73			154	>		42	122			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	43	--	--		--		-13			--	>		-12	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					B
			Delay	4		1	4					<	46		46					17
			V/C	0.73		0.01						<	0.78							0.74
			Q	68		6						<	56							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					C		>	A	
			Delay	<	1		1		0	>	0					24		>	1	
			V/C	<	0.04				0.73	>						0.11		>		
			Q	<	42				198	>						14		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

4.3.3 Ten Year Horizon

The study area intersection total traffic operations analyses followed the same methodology used for existing conditions. Signal timings were optimized to improve traffic operations through the corridor. **Table 4.6** details the level of service conditions, and the critical movements are summarized below:

AM Peak Hour

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Eastbound off-ramp left-turn is forecast to operate with delays in the LOS E range with a v/c greater than 0.85.
  - Northbound shared through/right is forecast to operate in the LOS F range with a v/c ratio greater than 1.00.
  - Southbound left-turn lane is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - The overall intersection is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95.

PM Peak Hour

- Waterdown Road & North Service Road/Highway 403 WB on-ramp
  - Westbound left-turn queue length is forecast to extend beyond the current available storage length.
  - Westbound through movement is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.
  - Northbound left-turn lane is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - Southbound left-turn queue length forecast to extend beyond the current available storage length.
  - The overall intersection is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00.
- Waterdown Road & Panin Road/Highway 403 WB off-ramp



- Westbound off-ramp double left/through movement is forecast to operate with delays in the LOS F range with a v/c ratio greater than 1.00.

- Waterdown Road & Aldershot GO Road/Highway 403 EB off-ramp
  - Eastbound off-ramp left-turn queue length is forecast to extend beyond the current available storage but is not expected to impact the operations along Highway 403.
  - Northbound shared through/right is forecast to operate in the LOS F range with a v/c ratio greater than 1.00.
  - Southbound left-turn lane is forecast to operate with delays in the LOS E range with a v/c ratio greater than 1.00. The queue length is forecast to extend beyond the current available storage.
  - The overall intersection is forecast to operate with delays in the LOS E range with a v/c ratio greater than 0.95.

Localized congestion is forecast to occur at the study area intersections like background conditions. In the AM Peak hour, congestion generally occurs at the intersection of Waterdown Road and Aldershot GO Road/Highway 403 WB off-ramp due to heavy northbound and southbound traffic.

In the PM peak hour, movements providing access to/from Highway 403 generally operate with LOS E or F. In the PM peak hour, westbound traffic at Waterdown Road and North Service Road/Highway 403 WB on-ramp is forecast to experience extensive queues along North Service Road, reaching back as far as Hickory Lane.

The rerouted site traffic is forecast to have minimal contribution to intersection delays, with increases to individual movement delays not exceeding 15 seconds.

The new Hickory Lane approach is forecast to operate with acceptable levels of service during both the AM and PM peak hours. Delays are expected to be the LOS D range with v/c ratios below 0.15 and minimal queuing.

Appendix H3 contains the supporting detailed Synchro 10 output.

TABLE 4.6: TOTAL TRAFFIC OPERATIONS CONDITIONS – TEN YEAR HORIZON

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					D	D	D	D	A	A	>	A	A	A	>	A	B
			Delay					48	47	43	47	7	5	>	6	9	10	>	10	13
			V/C					0.54	0.49	0.04		0.57	0.42	>		0.52	0.34	>		0.55
			Q					56	53	14		48	47	>		54	80	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					94	--			42	--	>		16	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	E	>	E	<	D	D	D	<	A		A		A	>	A	B
			Delay	<	59	>	59	<	49	44	46	<	6		6		6	>	6	16
			V/C	<	0.00	>		<	0.60	0.35		<	0.42				0.32	>		0.45
			Q	<	10	>		<	72	48		<	42				65	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	59			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	E	D	D	D	D		F	F		F	>	F	F	B		D	E
			Delay	61	42	37	48	52		101	89		127	>	127	82	12		45	77
			V/C	0.86	0.53	0.21		0.22		0.05			1.16	>		1.04	0.29			0.98
			Q	109	82	48		16		18			435	>		40	188			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	1	--	--		--		42			--	>		-10	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					A
			Delay	1		0	1					<	52		52					3
			V/C	0.64		0.15						<	0.30							0.61
			Q	62		15						<	24							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					B		>	A	
			Delay	<	1		1		0	>	0					11		>	1	
			V/C	<	0.03				0.21	>						0.05		>		
			Q	<	14				0	>						13		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					C	F	C	F	F	B	>	D	D	D	>	D	E
			Delay					30	121	23	82	115	14	>	49	37	45	>	44	60
			V/C					0.62	1.16	0.11		1.13	0.69	>		0.64	0.79	>		1.12
			Q					201	312	194		102	163	>		86	120	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					-51	--			-12	--	>		-16	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	<	F	C	E	<	B		B		B	>	B	C
			Delay	<	54	>	54	<	133	25	78	<	16		16		20	>	20	31
			V/C	<	0.00	>		<	1.09	0.23		<	0.78				0.55	>		0.89
			Q	<	3	>		<	123	103		<	222				65	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	7			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	D	D	D	E		F	F		F	>	F	E	B		C	E
			Delay	48	38	44	44	73		131	120		84	>	84	65	16		32	64
			V/C	0.70	0.26	0.61		0.84		0.42			1.06	>		1.01	0.46			0.97
			Q	143	281	173		156		79			491	>		42	146			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	-33	--	--		--		-19			--	>		-12	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					B
			Delay	4		1	4					<	48		48					17
			V/C	0.81		0.02						<	0.82							0.81
			Q	74		5						<	55							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					D		>	A	
			Delay	<	1		1		0	>	0					28		>	1	
			V/C	<	0.05				0.80	>						0.13		>		
			Q	<	47				296	>						20		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

5 Remedial Measures

The following section discusses the potential remedial measures that could be considered to better accommodate the forecast traffic volumes in the study area.

5.1 Traffic Control Improvements

No changes to the existing form of traffic control at the study area intersections are recommended.

It is assumed that the City of Burlington will continue to monitor and adjust signal timings improve operations in the future as traffic volumes increase and travel patterns change.

Stop control is recommended for the Hickory Lane approach to the North Service Road. A stop sign should be position on the Hickory Lane approach in accordance with Ontario Traffic Manual.

5.2 Auxiliary Turn Lane

5.2.1 Site Driveway

The need for an auxiliary left-turn lane for inbound traffic at the new Hickory Lane access was reviewed using the requirements in the MTO's Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads[9]. **Appendix I** contains the warrant analysis. A design speed of 70 km/h is used.

The forecast traffic volumes at the site driveway suggest that a left-turn lane is warranted under future conditions for 15 metres of storage. A storage of 30 metres is recommended to accommodate the trucks expected to use Hickory Lane. The TAC Guide identifies a taper ratio for a left-turn lane of between 15:1 and 42:1[10] for a design speed of 70 km/h. The TAC Guide identifies a deceleration lane length of 57 metre[11].

5.2.2 Waterdown Road and North Service Road

Road space is currently reserved for the addition of a second northbound left-turn lane at the intersection of Waterdown Road and

[9] *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017 Appendix 9 for Chapter 9 Intersections*
[10] TAC Guide Table 9.17.1: Approach and Departure Taper Ratios and Lengths for Left Turns at Intersections Design
[11] TAC Guide Table 2.5.2: Stopping Sight Distance on level roadways for Automobiles – Braking Distance 70 km/h.

North Service Road/Highway 403 WB on-ramp with no set date for implementation. The second turn lane is currently hatched out with pavement markings to be used when additional capacity is needed.

In the PM peak hour, northbound left-turn traffic at Waterdown Road and North Service Road/Highway 403 WB on-ramp currently experiences significant delay. Delays are forecast to increase and queue lengths are forecast to extend beyond available storage.

To address the forecast capacity issue, a second northbound left-turn lane could be developed by re-painting the existing hatched area.

A sensitivity analysis to assess the improvement noted above at the study area intersections has been undertaken for the ten-year total traffic conditions. The following improvements and assumptions have been made:

- Waterdown Road and North Service Road/Highway 403 WB on-ramp northbound left-turn will operate with two left-turn lanes; and
- Waterdown Road and North Service Road/Highway 403 WB on-ramp signal timings will operate with optimized signal timings with a fully protected northbound left-turn phase.

Table 5.1 summarizes the results of the analysis. **Appendix J** contains the detailed Synchro reports.

Overall, the intersection is expected to operate with considerable improvements. The northbound left-turn is forecast to operate with a LOS E, delays of 95 seconds, and v/c ratio greater than 0.95 (down from LOS F, delays of 115 seconds, and v/c ratio greater than 1.00). The 95th percentile queue lengths are still forecasted to extend beyond the available storage, however, spillback to the upstream intersection will reduced.

TABLE 5.1: 2033 SENSITIVITY INTERSECTION OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					D	D	D	D	D	A	>	B	A	B	>	B	B
			Delay					48	47	43	47	51	6	>	15	10	12	>	11	18
			V/C					0.54	0.49	0.04		0.70	0.43	>		0.52	0.36	>		0.52
			Q					56	53	14		48	47	>		54	80	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					94	--			42	--	>		16	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	E	>	E	<	D	D	D	<	A		A		A	>	A	B
			Delay	<	59	>	59	<	49	44	46	<	6		6		3	>	3	15
			V/C	<	0.00	>		<	0.60	0.35		<	0.42				0.32	>		0.45
			Q	<	5	>		<	54	77		<	196				59	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	76			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	E	D	D	D	D		F	F		F	>	F	F	B		D	E
			Delay	61	42	37	48	52		101	89		127	>	127	85	11		46	77
			V/C	0.86	0.53	0.21		0.22		0.05			1.16	>		1.04	0.29			0.98
			Q	142	361	289		210		81			457	>		43	99			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	-32	--	--		--		-21			--	>		-13	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					A
			Delay	1		0	1					<	52		52					3
			V/C	0.64		0.15						<	0.30							0.61
			Q	63		5						<	57							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					B		>	A	
			Delay	<	1		1		0	>	0					11		>	1	
			V/C	<	0.03				0.21	>						0.05		>		
			Q	<	35				0	>						11		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		
PM Peak Hour	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	TCS	LOS					C	D	B	D	E	C	>	D	D	D	>	D	D
			Delay					23	53	18	40	69	21	>	37	48	45	>	45	40
			V/C					0.52	0.97	0.11		0.94	0.81	>		0.74	0.78	>		0.94
			Q					205	368	195		99	140	>		78	100	>		
			Ex					150	--	130		90	--	>		70	--	>		
			Avail.					-55	--			-9	--	>		-8	--	>		
	2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	TCS	LOS	<	D	>	D	<	F	C	E	<	B		B		B	>	B	C
			Delay	<	54	>	54	<	133	25	78	<	16		16		19	>	19	31
			V/C	<	0.00	>		<	1.09	0.23		<	0.78				0.55	>		0.89
			Q	<	4	>		<	55	73		<	194				60	>		
			Ex	<	--	>		<	130	105		<	--				--	>		
			Avail.	<	--	>		<	75			<	--				--	>		
	3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	TCS	LOS	D	D	D	D	E		F	F		F	>	F	E	B		C	E
			Delay	48	38	44	44	73		128	118		84	>	84	65	16		32	64
			V/C	0.70	0.26	0.61		0.84		0.42			1.06	>		1.01	0.46			0.97
			Q	143	359	257		208		79			504	>		43	106			
			Ex	110	--	--		--		60			--	>		30	--			
			Avail.	-33	--	--		--		-19			--	>		-13	--			
	4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	TCS	LOS	A		A	A					<	D		D					B
			Delay	5		1	5					<	48		48					17
			V/C	0.81		0.02						<	0.82							0.81
			Q	65		6						<	56							
			Ex	--		--						<	--							
			Avail.	--		--						<	--							
	5 - North Service Rd & Hickory Lane	TWSC	LOS	<	A		A		A	>	A					D		>	A	
			Delay	<	1		1		0	>	0					28		>	1	
			V/C	<	0.05				0.80	>						0.13		>		
			Q	<	37				0	>						12		>		
			Ex	<	--				--	>						--		>		
			Avail.	<	--				--	>						--		>		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout
< - Shared Left-turn
> - Shared Right-turn

6 Site Traffic Impacts

This section of the report outlines the impacts to the traffic network associated with the rerouted site traffic.

Overall, the rerouted heavy vehicle site traffic is forecast to represent less than 2.5% of all heavy vehicles served by the study area intersections. In addition, increases to turning movement delays because of site traffic are forecast to be less than 15 seconds per vehicle. The rerouted site traffic does not create new critical movements at the study area intersections.

6.1 Heavy Vehicle Trip Generation

Site generated traffic through the Waterdown Road interchange with Highway 403 is occurring today. The existing plant is located south of Highway 403 with site traffic traveling north/south along Waterdown Road to access the existing plant via the Masonry Court/Railway Road intersection.

The development of the subject site will change where site traffic is originating from. Traffic will shift towards the North Service Road intersection with Waterdown Road.

With no change in plant capacity, there would be no change in traffic volumes generated by the site. **Table 3.1** summarizes the estimated truck trip generation for the subject site and **Section 2.6.1** outlines the site's existing plant activity which is not expected to change following the planned relocation to the north side of Highway 403.

Table 6.1 and **Table 6.2** summarize the proportion of heavy vehicles at the study area intersections for the ten-year horizon:

- At Waterdown Road and North Service Road/Highway 403 Westbound on-ramp, site generated vehicles are forecast to be less than 1% of all vehicles served by the intersection during the AM and PM peak hours.
- At Waterdown Road and Panin Road/Highway 403 Westbound off-ramp, site generated vehicles are forecast to be less than 1% of all vehicles served by the intersection during the AM and PM peak hours.
- At Waterdown Road and Aldershot GO Road/Highway 403 Eastbound off-ramp, the rerouting of site generated vehicles is forecast result in a decrease of up to 0.3% of all heavy vehicles served by the intersection during the AM and PM peak hours.

- At Aldershot GO Road and GO Station Access/Highway 403 Eastbound on-ramp, the rerouting of site generated vehicles is forecast result in no increase in heavy vehicles served by the intersection during the AM and PM peak hours.
- At North Service Road and Hickory Lane, the rerouting of site generated vehicles is forecast result in and increase of up to 2.5% in heavy vehicles served by the intersection during the AM and PM peak hours.

TABLE 6.1: HEAVY VEHICLE PERCENTAGES – AM PEAK HOUR

Intersection	Vehicle Type	Intersection Turning Movements					
		Approach				Total	
		EB	WB	NB	SB	VPH	%
1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	Background Traffic - Passenger Vehicle	0	264	1117	885	2266	94.4%
	Background Traffic - Heavy Vehicle	0	19	71	26	116	4.8%
	Site Traffic - Passenger Vehicle	0	1	1	0	2	0.1%
	Site Traffic - Heavy Vehicle	0	11	6	0	17	0.7%
	Total Vehicles	**0**	**295**	**1195**	**911**	**2401**	**100%**
	Overall Heavy Vehicle Percent	0.0%	10.2%	6.4%	2.9%	5.5%	--
	Site Traffic Heavy Vehicle Percent	0.0%	3.7%	0.5%	0.0%	0.7%	--
2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	Background Traffic - Passenger Vehicle	2	509	894	689	2094	94.4%
	Background Traffic - Heavy Vehicle	2	34	50	29	115	5.2%
	Site Traffic - Passenger Vehicle	0	0	1	1	2	0.1%
	Site Traffic - Heavy Vehicle	0	0	1	6	7	0.3%
	Total Vehicles	**4**	**543**	**946**	**725**	**2218**	**100%**
	Overall Heavy Vehicle Percent	50.0%	6.3%	5.4%	4.8%	5.5%	--
	Site Traffic Heavy Vehicle Percent	0.0%	0.0%	0.1%	0.8%	0.3%	--
3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	Background Traffic - Passenger Vehicle	822	65	1017	907	2811	95.6%
	Background Traffic - Heavy Vehicle	14	13	59	54	140	4.8%
	Site Traffic - Passenger Vehicle	0	0	-1	1	0	0.0%
	Site Traffic - Heavy Vehicle	0	0	-11	1	-10	-0.3%
	Total Vehicles	**836**	**78**	**1064**	**963**	**2941**	**100%**
	Overall Heavy Vehicle Percent	1.7%	16.7%	4.5%	5.7%	4.4%	--
	Site Traffic Heavy Vehicle Percent	0.0%	0.0%	-1.0%	0.1%	-0.3%	--
4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	Background Traffic - Passenger Vehicle	1030	0	44	0	1074	97.3%
	Background Traffic - Heavy Vehicle	29	0	1	0	30	2.7%
	Site Traffic - Passenger Vehicle	0	0	0	0	0	0.0%
	Site Traffic - Heavy Vehicle	0	0	0	0	0	0.0%
	Total Vehicles	**1059**	**0**	**45**	**0**	**1104**	**100%**
	Overall Heavy Vehicle Percent	2.7%	0.0%	2.2%	0.0%	2.7%	--
	Site Traffic Heavy Vehicle Percent	0.0%	0.0%	0.0%	0.0%	0.0%	--
5 - North Service Rd & Hickory Lane	Background Traffic - Passenger Vehicle	726	264	0	0	990	93.0%
	Background Traffic - Heavy Vehicle	31	19	0	0	50	4.7%
	Site Traffic - Passenger Vehicle	1	0	0	1	2	0.2%
	Site Traffic - Heavy Vehicle	11	0	0	11	22	2.1%
	Total Vehicles	**769**	**283**	**0**	**12**	**1064**	**100%**
	Overall Heavy Vehicle Percent	5.5%	6.7%	0.0%	91.7%	6.8%	--
	Site Traffic Heavy Vehicle Percent	1.4%	0.0%	0.0%	91.7%	2.1%	--

TABLE 6.2: HEAVY VEHICLE PERCENTAGES – PM PEAK HOUR

Intersection	Vehicle Type	Intersection Turning Movements					
		Approach				Total	
		EB	WB	NB	SB	VPH	%
1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	Background Traffic - Passenger Vehicle	0	1208	1414	739	3361	97.6%
	Background Traffic - Heavy Vehicle	0	14	41	13	68	2.0%
	Site Traffic - Passenger Vehicle	0	1	1	0	2	0.1%
	Site Traffic - Heavy Vehicle	0	7	4	0	11	0.3%
	Total Vehicles	**0**	**1230**	**1460**	**752**	**3442**	**100%**
	Overall Heavy Vehicle Percent	0.0%	1.7%	3.1%	1.7%	2.3%	--
	Site Traffic Heavy Vehicle Percent	0.0%	0.6%	0.3%	0.0%	0.3%	--
2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	Background Traffic - Passenger Vehicle	4	516	1132	848	2500	96.4%
	Background Traffic - Heavy Vehicle	0	26	40	20	86	3.3%
	Site Traffic - Passenger Vehicle	0	0	1	1	2	0.1%
	Site Traffic - Heavy Vehicle	0	0	1	4	5	0.2%
	Total Vehicles	**4**	**542**	**1174**	**873**	**2593**	**100%**
	Overall Heavy Vehicle Percent	0.0%	4.8%	3.5%	2.7%	3.5%	--
	Site Traffic Heavy Vehicle Percent	0.0%	0.0%	0.1%	0.5%	0.2%	--
3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	Background Traffic - Passenger Vehicle	484	437	1016	1112	3049	96.7%
	Background Traffic - Heavy Vehicle	33	20	30	26	109	3.5%
	Site Traffic - Passenger Vehicle	0	0	-1	1	0	0.0%
	Site Traffic - Heavy Vehicle	0	0	-7	1	-6	-0.2%
	Total Vehicles	**517**	**457**	**1038**	**1140**	**3152**	**100%**
	Overall Heavy Vehicle Percent	6.4%	4.4%	2.2%	2.4%	3.3%	--
	Site Traffic Heavy Vehicle Percent	0.0%	0.0%	-0.7%	0.1%	-0.2%	--
4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	Background Traffic - Passenger Vehicle	672	0	316	0	988	97.6%
	Background Traffic - Heavy Vehicle	24	0	0	0	24	2.4%
	Site Traffic - Passenger Vehicle	0	0	0	0	0	0.0%
	Site Traffic - Heavy Vehicle	0	0	0	0	0	0.0%
	Total Vehicles	**696**	**0**	**316**	**0**	**1012**	**100%**
	Overall Heavy Vehicle Percent	3.4%	0.0%	0.0%	0.0%	2.4%	--
	Site Traffic Heavy Vehicle Percent	0.0%	0.0%	0.0%	0.0%	0.0%	--
5 - North Service Rd & Hickory Lane	Background Traffic - Passenger Vehicle	346	1208	0	0	1554	97.3%
	Background Traffic - Heavy Vehicle	13	14	0	0	27	1.7%
	Site Traffic - Passenger Vehicle	1	0	0	1	2	0.1%
	Site Traffic - Heavy Vehicle	7	0	0	7	14	0.9%
	Total Vehicles	**367**	**1222**	**0**	**8**	**1597**	**100%**
	Overall Heavy Vehicle Percent	5.4%	1.1%	0.0%	87.5%	2.6%	--
	Site Traffic Heavy Vehicle Percent	1.9%	0.0%	0.0%	87.5%	0.9%	--

6.2 LOS Summary by Site Generated Traffic Movement

Table 6.3 summarizes the study area intersection operational conditions for the specific turning movements used by site generated traffic for the ten-year horizon. The tables detail the background traffic operations (with existing routing of site traffic) and the total traffic operations (with the rerouted new site traffic).

The turning movements impacted by the site traffic are limited to the following:

- Waterdown Road and North Service Road
  - Northbound right-turn (inbound);
  - Westbound through (outbound);
  - Westbound left-turn (outbound);
- Waterdown Road and Panin Road/Highway 403 Westbound off-ramp
  - Westbound right-turn (inbound);
  - Northbound through (inbound)
  - Southbound through (outbound);
- Waterdown Road and Aldershot GO Road
  - Eastbound left-turn (inbound);
  - Southbound left-turn (outbound)

Overall, the traffic generated by the subject site is forecast to have minor impacts to the operation of turning movements at the intersections in the study area.

Excluding the delay experienced at the new Hickory Lane site driveway, the increase in delay for movements impacted by site traffic is forecast to be under 15 seconds during the AM and PM Peak hours. These movements are not forecast to become critical movements because of the rerouted site traffic.



TABLE 6.3: INTERSECTION OPERATIONAL SUMMARY – TEN YEAR HORIZON SITE TRAFFIC TURNING MOVEMENTS

Peak Hour	Direction	Intersection	Movement	Background			Total Traffic		
				LOS	Delay	V/C	LOS	Delay	V/C
AM	In	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	NB Right	A	4	0.41	A	5	0.42
		2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	WB Right	D	43	0.29	D	44	0.35
		3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	EB Left	E	58	0.83	E	61	0.86
		5 - North Service Rd & Hickory Lane	EB Left	A	0	0.00	A	1	0.03
	Out	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	WB Left	D	48	0.49	D	48	0.54
		1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	WB Thru	D	48	0.47	D	47	0.49
		2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	SB Thru	A	6	0.32	A	6	0.32
		3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	SB Left	E	69	1.00	F	82	1.04
		4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	EB Left	A	1	0.64	A	1	0.64
		5 - North Service Rd & Hickory Lane	SB Right	A	0	0.00	B	11	0.05
PM	In	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	NB Right	B	13	0.68	B	14	0.69
		2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	WB Right	C	25	0.21	C	25	0.23
		3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	EB Left	D	46	0.67	D	48	0.70
		5 - North Service Rd & Hickory Lane	EB Left	A	0	0.00	A	1	0.05
	Out	1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	WB Left	C	29	0.60	C	30	0.62
		1 - Waterdown Rd & North Service Rd/Hwy 403 WB On-Ramp	WB Thru	F	116	1.14	F	121	1.16
		2 - Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp	SB Thru	B	20	0.54	B	20	0.55
		3 - Waterdown Rd & Aldershot GO Rd/Hwy 403 EB Off-Ramp	SB Left	D	53	0.97	E	65	1.01
		4 - Aldershot GO Rd & GO Station Access/Hwy 403 EB On-Ramp	EB Left	A	4	0.81	A	4	0.81
		5 - North Service Rd & Hickory Lane	SB Right	A	0	0.00	D	28	0.13

7 Conclusions and Recommendations

7.1 Conclusions

The main findings and conclusions of this study are as follows:

- **Subject Site** The subject site is located at 291 North Service Road in the City of Burlington. The site is owned by the Halton Region and is a former landfill site.

  King Paving is planning to relocate their existing asphalt plant, located at 1077 Howard Road, to the subject site. Following the relocation, the existing plant will be closed.

  As part of this the existing Hickory Lane intersection will be closed and relocated to a point approximately 205 metres to the west along North Service Road. The new Hickory Lane intersection will provide access to both the landfill site and the asphalt plant.
- **Study Area**: The study area includes the signalized intersections that form the Waterdown Road interchange with Highway 403 and the North Service Road intersection with Hickory Lane.
- **Existing Traffic**: Capacity issues are noted to be occurring during the AM and PM peak hour for select turning movements at the intersection of Waterdown Road and North Service Road/Highway 403 WB on-ramp as well as Waterdown Road and Aldershot GO Station Road. Significant westbound queuing occurs at Waterdown Road and North Service Road/Highway 403 WB on-ramp in the PM peak hour.
- **Trip Generation**: The site's net trip generation is estimated to be approximately 68 trips in the AM peak hour and 44 trips in the PM peak hour. These trips currently access the Highway 403 & Waterdown Road interchange from the existing plant located south of the interchange. The new site is not expected to generate new trips but shall reassign the existing trips through the area.
- **Forecast Traffic**: The forecast traffic volumes have been assessed for opening date horizon (Year 2023), five years after full build-out (Year 2028), and ten years after full build-out (Year 2033). Future traffic volumes consist of generalized increases in existing traffic and traffic generated by the subject site.
- **Background Traffic**: The capacity issues identified under existing conditions along Waterdown Road in the study area are forecast to continue.

- **Total Traffic**: The capacity issues identified under existing conditions along Waterdown Road in the study area are forecast to continue. The new Hickory Lane approach is forecast to operate with acceptable levels of service during both the AM and PM peak hours. Delays are expected to be the LOS D range with v/c ratios below 0.15 and minimal queuing.
- **Remedial Measures**: the following mitigation measures are identified to better address intersection operations within the study area:
  - Eastbound left-turn lane at the new Hickory Lane intersection with the North Service Road; and
  - Development of double northbound left-turn lanes at the Waterdown Road intersection with the North Service Road. The second northbound left-turn lane could be developed by re-painting the existing hatched area. Double northbound left-turn lane should be considered with or without the relocation of the asphalt plant.

7.2 Recommendations

Based on the findings of this study, the following is recommended:

- An eastbound left-turn lane with 30 metres of storage and a 56 metre taper be developed at the North Service Road intersection with the new Hickory Lane.
- The new Hickory Lane approach to the North Service Road operate under stop control.
- To accommodate background traffic, double northbound left-turn lanes be provided at the Waterdown Road intersection with North Service Road and signal timings be adjusted to provide a fully protected northbound left-turn phase.
- The City of Burlington monitor operations of the signalized intersections at the Waterdown Road interchange with Highway 403 to ensure that appropriate signal timing plans are in place.



Appendix A

Terms of Reference

Scott Catton

From: Iannacito, Phil (MTO) <Phil.Iannacito@ontario.ca>
Sent: 17-Feb-21 12:20
To: Scott Catton
Cc: Aurini, Shawn (MTO); Rob Barnett
Subject: RE: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

Categories: Comments

Hi Scott,

MTO traffic office has determined that The QEW and Brant Street Ramp terminal intersections do not have to be included in the study area. The initial reason for including QEW/Brant St ramp terminals was due to the lack of information on the existing trucking routes.

Please proceed with the TIA Brief.

Thanks,

Phil

From: Scott Catton <scatton@ptsl.com>
Sent: February 17, 2021 8:14 AM
To: Iannacito, Phil (MTO) <Phil.Iannacito@ontario.ca>
Cc: Aurini, Shawn (MTO) <Shawn.Aurini@ontario.ca>; Shen, Rey (MTO) <Rey.Shen@ontario.ca>; Rob Barnett <rbarnett@sla.on.ca>
Subject: RE: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

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

Hi Phil,
Wondering if you've had a chance to review and when we might hear back?

Thanks.

Scott Catton, C.E.T.
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x302
e: scatton@ptsl.com
w: www.ptsl.com

From: Scott Catton
Sent: 21-Jan-21 15:00
To: 'Iannacito, Phil (MTO)' <Phil.Iannacito@ontario.ca>
Cc: 'Aurini, Shawn (MTO)' <Shawn.Aurini@ontario.ca>; 'Shen, Rey (MTO)' <Rey.Shen@ontario.ca>; 'Rob Barnett' <rbarnett@sla.on.ca>
Subject: RE: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

Hi Phil,
King Paving has confirmed that their trucks are all SPIF compliant.

Thanks

Scott Catton, C.E.T.
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x302
e: scatton@ptsl.com
w: www.ptsl.com

From: Scott Catton
Sent: 21-Jan-21 12:07
To: Iannacito, Phil (MTO) <Phil.Iannacito@ontario.ca>
Cc: Aurini, Shawn (MTO) <Shawn.Aurini@ontario.ca>; Shen, Rey (MTO) <Rey.Shen@ontario.ca>; Rob Barnett <rbarnett@sla.on.ca>
Subject: RE: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

Hi Phil,
Thanks for the quick reply.

King Paving has indicated a load size of 20 tonnes per truck. I'll see what information they can provide.

Assuming 18.5 as indicated. Daily trips would be about 109. The Weekday AM trip gen would increase by 2 trips to +/- 26 two-way trips. No change in PM trip gen based on the temporal distribution of the plant. Plant activity starts to taper off around 3PM. Preliminary calculations are below.

Thanks.

Truck Trip Generation					
Measure	Units	Input	Calculation		
Daily Production Limit	Tonnes/Day	2,000.00			
Average Load Per Truck	Tonnes/Truck	18.60			
Average Trips Per Day	Trucks/Day - One-way		109		
Temporal Distribution Trips	% In	% Out	In	Out	Total
7:00 AM	2%	2%	2	2	4
8:00 AM	11%	11%	12	12	24
9:00 AM	11%	11%	12	12	24
10:00 AM	13%	13%	14	14	28
11:00 AM	11%	11%	12	12	24
12:00 PM	11%	11%	12	12	24
1:00 PM	11%	11%	12	12	24
2:00 PM	10%	10%	11	11	22
3:00 PM	9%	9%	10	10	20
4:00 PM	7%	7%	7	7	14
6:00 PM	4%	4%	6	6	10
Subtotal	100%	100%	109	109	218
Employee Trip Generation			Calculation		
ITE LUC 140 (Manufacturing) - Employee Trips			In	Out	Total
Weekday AM Peak Hour of Adjacent Street			1	1	2
Weekday PM Peak Hour of Adjacent Street			1	1	2
Total Generation			In	Out	Total
Weekday AM Peak Hour of Adjacent Street			13	13	26
Weekday PM Peak Hour of Adjacent Street			8	8	16

Scott Catton, C.E.T.
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x302
e: scatton@ptsl.com
w: www.ptsl.com

From: Iannacito, Phil (MTO) <Phil.Iannacito@ontario.ca>
Sent: 21-Jan-21 11:48
To: Scott Catton <scatton@ptsl.com>
Cc: Aurini, Shawn (MTO) <Shawn.Aurini@ontario.ca>; Shen, Rey (MTO) <Rey.Shen@ontario.ca>; Rob Barnett <rbarnett@sla.on.ca>
Subject: RE: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

Hi Scott,

2000 tons per day divided by an avg 18.5 tons per triaxle load, unless the trucks are all SPIF compliant, bumping their capacity to an avg of 20 tons, would be approx. 100 to 110 trips per day.

Please confirm the total trips based on the 2000 ton per day output and I will ask MTO traffic to consider your request.

Thanks,

Phil

From: Scott Catton <scatton@ptsl.com>
Sent: January 21, 2021 11:17 AM
To: Iannacito, Phil (MTO) <Phil.Iannacito@ontario.ca>
Cc: Aurini, Shawn (MTO) <Shawn.Aurini@ontario.ca>; Shen, Rey (MTO) <Rey.Shen@ontario.ca>; Rob Barnett <rbarnett@sla.on.ca>
Subject: RE: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

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

Hi Phil,
Thanks for the response. We've reviewed the comments on the study's terms of reference with our client and their agent.

We would like to ask the MTO to reconsider the need to include the QEW and Brant Street Ramp Terminal intersections in the study area.

The subject site is not expected to generate any new vehicle trips. The existing asphalt plant has a capacity of 2,000 tonnes per day and employs 5 persons. The proposed plant will have the same capacity and the same number of employees. Using historical data provided by King Paving the site's trip generation is estimated to be approximately 24 two-way AM trips and 16 two-way PM peak hour trips. Summary table below.

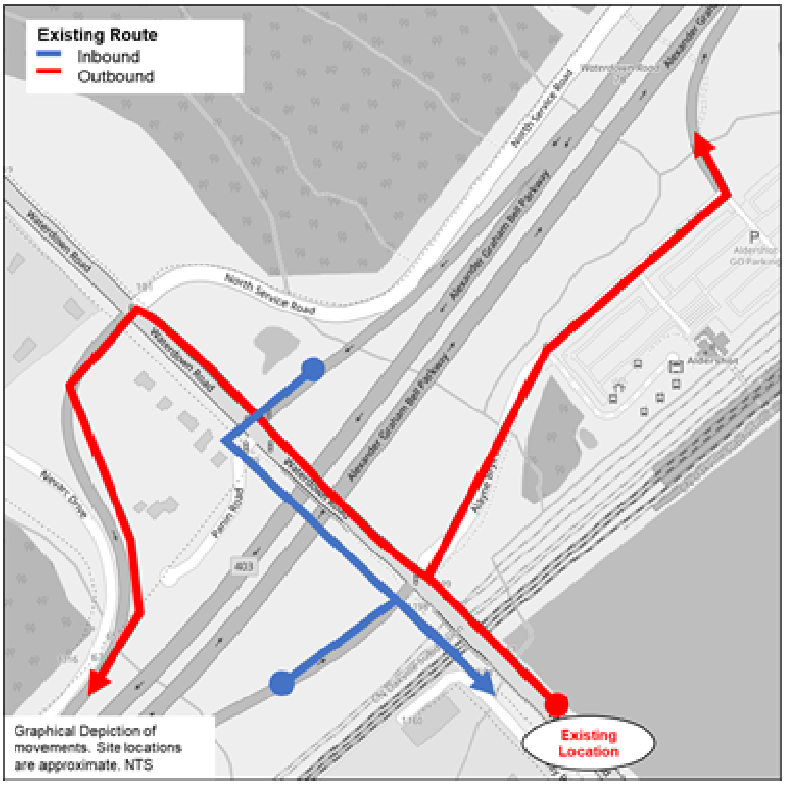
Estimated Trip Generation	In	Out	Total
Weekday AM Peak Hour of Adjacent Street	12	12	**24**
Weekday PM Peak Hour of Adjacent Street	8	8	**16**

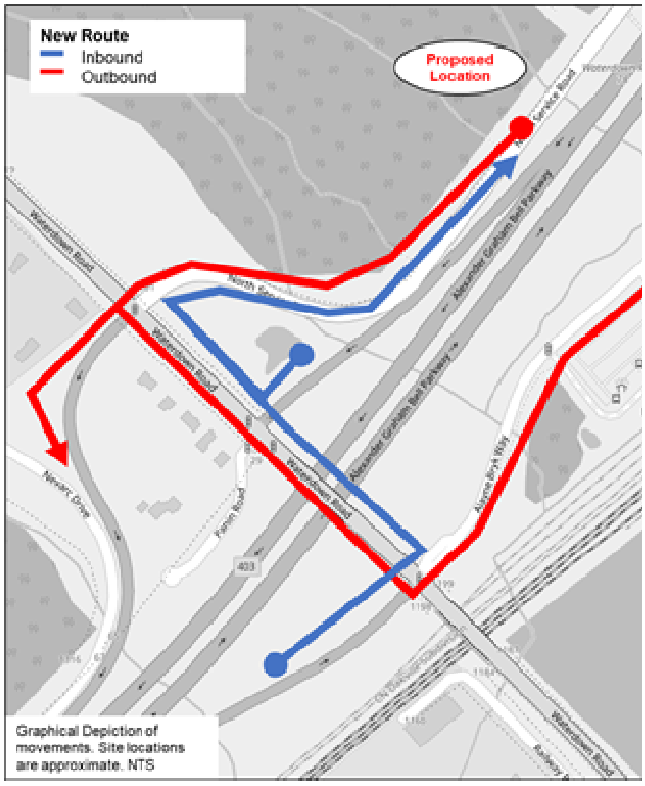
The existing plant is relocating to the north side of Highway 403 from its current location south of Highway 403. Traffic generated by the existing asphalt plant accesses the provincial highway network using the Waterdown Road interchange. Once the plant is relocated traffic will continue to use the Waterdown Road interchange to access the Provincial highway network.

The relocated plant is expected to result in the reassignment of site traffic through the Waterdown Road interchange. No new traffic. The image below illustrates the expected reassignment of site related traffic through the Waterdown Road interchange.

Any vehicle trips originating or destined to the Brant Street Ramp Terminals are occurring today or would be directly related to any work King Paving is doing in the area. Future work in the Brant Street area is completely unknown. Traffic using the Provincial highway network would travel to the interchange closest to where King Paving is working and could be any interchange along Highway 403/QEW.

If you would like to discuss please give me a call. Thanks very much.





Scott Catton, C.E.T.
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x302
e: scatton@ptsl.com
w: www.ptsl.com

Scott Catton, C.E.T.
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x302
e: scatton@ptsl.com
w: www.ptsl.com

From: Iannacito, Phil (MTO) <Phil.Iannacito@ontario.ca>
Sent: 15-Jan-21 10:43
To: Scott Catton <scatton@ptsl.com>

Cc: Aurini, Shawn (MTO) <Shawn.Aurini@ontario.ca>; Shen, Rey (MTO) <Rey.Shen@ontario.ca>
Subject: FW: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

Hi Scott,

The ministry has reviewed the TOR provided by Paradigm for the development at 291 North Service Road and offers the following comments:

1) Please include the following intersections in your traffic analysis:
   a) QEW and Brant St (North and South Ramp Terminals)
   b) Highway 403 and Waterdown Rd (North and South Ramp Terminals)
   c) North Service Rd and Waterdown Road
   d) Waterdown Rd and Go Service Road

2) 2% background growth rate should be used for the MTO Ramp Terminals.

Attached are the latest TMCs available.

Thanks,

Phil

From: Scott Catton <scatton@ptsl.com>
Sent: January 7, 2021 8:52 AM
To: White, Mark J. (MTO) <Mark.J.White@ontario.ca>; Lucas, Steve <Steve.Lucas@burlington.ca>
Subject: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

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

Hi Mark & Steve,
Happy New Year. Hope you had an enjoyable break.

We've been retained by King Paving & Construction Limited to prepare a Transportation Impact Brief for the proposed development of an asphalt plant at 291 North Service Road in the City of Burlington (subject site).

Some background information and a general description of the development is below. Additionally, our proposed terms of reference is summarised below. Can you please review and provide comment on the studies terms of reference?

If you have any questions or would like to discuss, please give me a call.

Thanks very much.

Background/Site Description
The subject site is a former landfill site owned by the Halton Region. Vehicle access is provided by Hickory Lane. Existing activity on the site is limited to maintenance work (landfill capping), Halton Regional Police Service training and winter storage for a boat club.

In general, the existing site does not generate any regular peak hour traffic. The capping operations typically occur between July and September depending on weather and the size of the cap. The capping operation

occurs every 1-2 years. The capping operation can generate about 100 loads a day, depending on how much fill is required. The Region plans the capping operation in advance.

King Paving operates an existing asphalt plant at 1077 Howard Road in the City of Burlington and is planning to relocate the existing asphalt plant to the subject site. The asphalt plant is proposed at the front of the property with the former land fill to the rear. As part of the development, the existing Hickory Lane roadway will be closed and relocated approximately 205 metres to the west. The new Hickory Lane will provide access to both the existing landfill site and the proposed asphalt plant. A site concept plan is attached.

Using data provided by King Paving the asphalt plant is estimated to generate approximately 100 truck trips per day with the plant at capacity. The plant operates between April and December with peak season between June and October. No regular activity occurs during winter months.

The site's weekday peak hour trip generation is estimated to be approximately 24 AM peak hour trips and about 14 PM peak hour trips. The directional distribution is estimated to be 50% in/out.

Proposed Terms of Reference

- Study Area Intersections
    - North Service Road & Proposed Hickory Lane (unsignalized).
- Existing Data
    - Volumes across the site's North Service Road frontage will be estimated using the most recent TMC count volume available at up/downstream intersections. Historical count volumes will be increased to a Year 2021 "Base Year" condition for analysis purposes.
- Horizon Year
    - Opening date (Estimated Year 2023);
    - Five-years post build-out (Year 2028); and
    - Ten-years post build-out (Year 2033).
- Analysis Periods
    - Weekday AM peak hour; and
    - Weekday PM peak hour.
- Analysis
    - Synchro 10 with HCM 2000;
    - SimTraffic Queueing (five 60-min iterations);
    - Signal warrants will be assessed using OTM Book 12 Justifications;
    - Left-Turn lane warrants will be assessed using Left-Turn Lane warrant nomographs based on MTO Design Supplement for TAC Guide.
- Background Traffic
    - Generalized growth rate 1% per annum unless otherwise advised.
- Trip Generation
    - First principle estimate using data provided by the applicant; and
    - ITE Trip Generation Data 10th Edition LUC 140 Manufacturing for employee trips.
    - No modal split reductions
- Site Traffic Distribution
    - Site traffic is expected to follow existing truck routes and be focused towards the QEW. Local deliveries are possible but would be related to any paving operations.
- Report
    - We will document the study methodologies, findings, and conclusions in a letter report with appendices containing the detailed analysis results and any data collected.

Thanks.

Scott Catton, C.E.T.
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x302
e: scatton@ptsl.com
w: www.ptsl.com

This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.
This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.
This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.
This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.

Scott Catton

From: Lucas, Steve <Steve.Lucas@burlington.ca>
Sent: 18-Jan-21 12:05
To: Scott Catton
Subject: RE: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

Categories: Comments

Hello Scott,

I hope your doing well! Upon review of this proposal, we do not have any additional comments to make.

Thank you,

-Steve

From: Scott Catton <scatton@ptsl.com>
Sent: Friday, January 15, 2021 9:31 AM
To: Iannacito, Phil (MTO) <Phil.Iannacito@ontario.ca>; Lucas, Steve <Steve.Lucas@burlington.ca>
Subject: RE: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

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

Hi Phil & Steve,
Just following up on this. Wondering if you've had a chance to review?

Please advise.

Thanks very much.

Scott Catton, C.E.T.
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x302
e: scatton@ptsl.com
w: www.ptsl.com

From: White, Mark J. (MTO) <Mark.J.White@ontario.ca>
Sent: 7-Jan-21 09:15
To: Scott Catton <scatton@ptsl.com>
Cc: Iannacito, Phil (MTO) <Phil.Iannacito@ontario.ca>
Subject: FW: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

Good morning Scott,

I am no longer responsible for Building and Land Use in Halton region. I have cc'ed the Planner for Halton, Phil, for his attention.

Thanks,

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

From: Scott Catton <scatton@ptsl.com>
Sent: January 7, 2021 8:52 AM
To: White, Mark J. (MTO) <Mark.J.White@ontario.ca>; Lucas, Steve <Steve.Lucas@burlington.ca>
Subject: 200584 (291 North Service Rd, Burlington) Proposed Asphalt Plant TIA Brief

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

Hi Mark & Steve,
Happy New Year. Hope you had an enjoyable break.

We've been retained by King Paving & Construction Limited to prepare a Transportation Impact Brief for the proposed development of an asphalt plant at 291 North Service Road in the City of Burlington (subject site).

Some background information and a general description of the development is below. Additionally, our proposed terms of reference is summarised below. Can you please review and provide comment on the studies terms of reference?

If you have any questions or would like to discuss, please give me a call.

Thanks very much.

Background/Site Description
The subject site is a former landfill site owned by the Halton Region. Vehicle access is provided by Hickory Lane. Existing activity on the site is limited to maintenance work (landfill capping), Halton Regional Police Service training and winter storage for a boat club.

In general, the existing site does not generate any regular peak hour traffic. The capping operations typically occur between July and September depending on weather and the size of the cap. The capping operation occurs every 1-2 years. The capping operation can generate about 100 loads a day, depending on how much fill is required. The Region plans the capping operation in advance.

King Paving operates an existing asphalt plant at 1077 Howard Road in the City of Burlington and is planning to relocate the existing asphalt plant to the subject site. The asphalt plant is proposed at the front of the property with the former land fill to the rear. As part of the development, the existing Hickory Lane roadway will be closed and relocated approximately 205 metres to the west. The new Hickory Lane will provide access to both the existing landfill site and the proposed asphalt plant. A site concept plan is attached.

Using data provided by King Paving the asphalt plant is estimated to generate approximately 100 truck trips per day with the plant at capacity. The plant operates between April and December with peak season between June and October. No regular activity occurs during winter months.

The site's weekday peak hour trip generation is estimated to be approximately 24 AM peak hour trips and about 14 PM peak hour trips. The directional distribution is estimated to be 50% in/out.

Proposed Terms of Reference

- Study Area Intersections
  - North Service Road & Proposed Hickory Lane (unsignalized).
- Existing Data
  - Volumes across the site's North Service Road frontage will be estimated using the most recent TMC count volume available at up/downstream intersections. Historical count volumes will be increased to a Year 2021 "Base Year" condition for analysis purposes.
- Horizon Year
  - Opening date (Estimated Year 2023);
  - Five-years post build-out (Year 2028); and
  - Ten-years post build-out (Year 2033).
- Analysis Periods
  - Weekday AM peak hour; and
  - Weekday PM peak hour.
- Analysis
  - Synchro 10 with HCM 2000;
  - SimTraffic Queueing (five 60-min iterations);
  - Signal warrants will be assessed using OTM Book 12 Justifications;
  - Left-Turn lane warrants will be assessed using Left-Turn Lane warrant nomographs based on MTO Design Supplement for TAC Guide.
- Background Traffic
  - Generalized growth rate 1% per annum unless otherwise advised.
- Trip Generation
  - First principle estimate using data provided by the applicant; and
  - ITE Trip Generation Data 10th Edition LUC 140 Manufacturing for employee trips.
  - No modal split reductions
- Site Traffic Distribution
  - Site traffic is expected to follow existing truck routes and be focused towards the QEW. Local deliveries are possible but would be related to any paving operations.
- Report
  - We will document the study methodologies, findings, and conclusions in a letter report with appendices containing the detailed analysis results and any data collected.

Thanks.

Scott Catton, C.E.T.
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x302
e: scatton@ptsl.com
w: www.ptsl.com

This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for

the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.
This e-mail and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this e-mail in error please notify the sender immediately. Please note that any views or opinions presented in this e-mail are solely those of the author and do not necessarily represent those of Paradigm Transportation Solutions Limited. Finally, the recipient should check this e-mail and any attachments for the presence of viruses. Paradigm Transportation Solutions Limited accepts no liability for any damage caused by any virus transmitted by this e-mail.
This message, including any attachments, is privileged and intended only for the addressee(s) named above. If you are not the intended recipient, you must not read, use or disseminate the information contained in this email/fax. If you have received this email/fax transmission in error, please notify the sender immediately by telephone, fax or email and permanently delete this email from your computer/shred this fax, including any attachments, without making a copy. Access to this email/fax by anyone else is unauthorized. Thank you.

Appendix B

Existing Traffic Data

Ministry of Transportation
Ministère des Transports

Intersection Layout Sheet

Version: 1.0 Feb 1, 2016

Contract # 9015-E-0009
Work Order # 601

Date: OCT / 13 / 16 Day: THUR / Hrs: 06 - 10 + 15 - 19 + ___ - ___

Location: HWY 403 @ WATERDOWN RD @ NORTH SERVICE ROAD Ramps: ___ / 16

Reg/Mun: CR Town/City: BURLINGTON Area: ___

File Name: 0483000000 Device: Gretch / Jamar Unit # 04 / Interval 1: (AM) / NN / PM

Observer: EKATERINA VYATKINA Weather: CLEAR / Road Condition: GOOD /

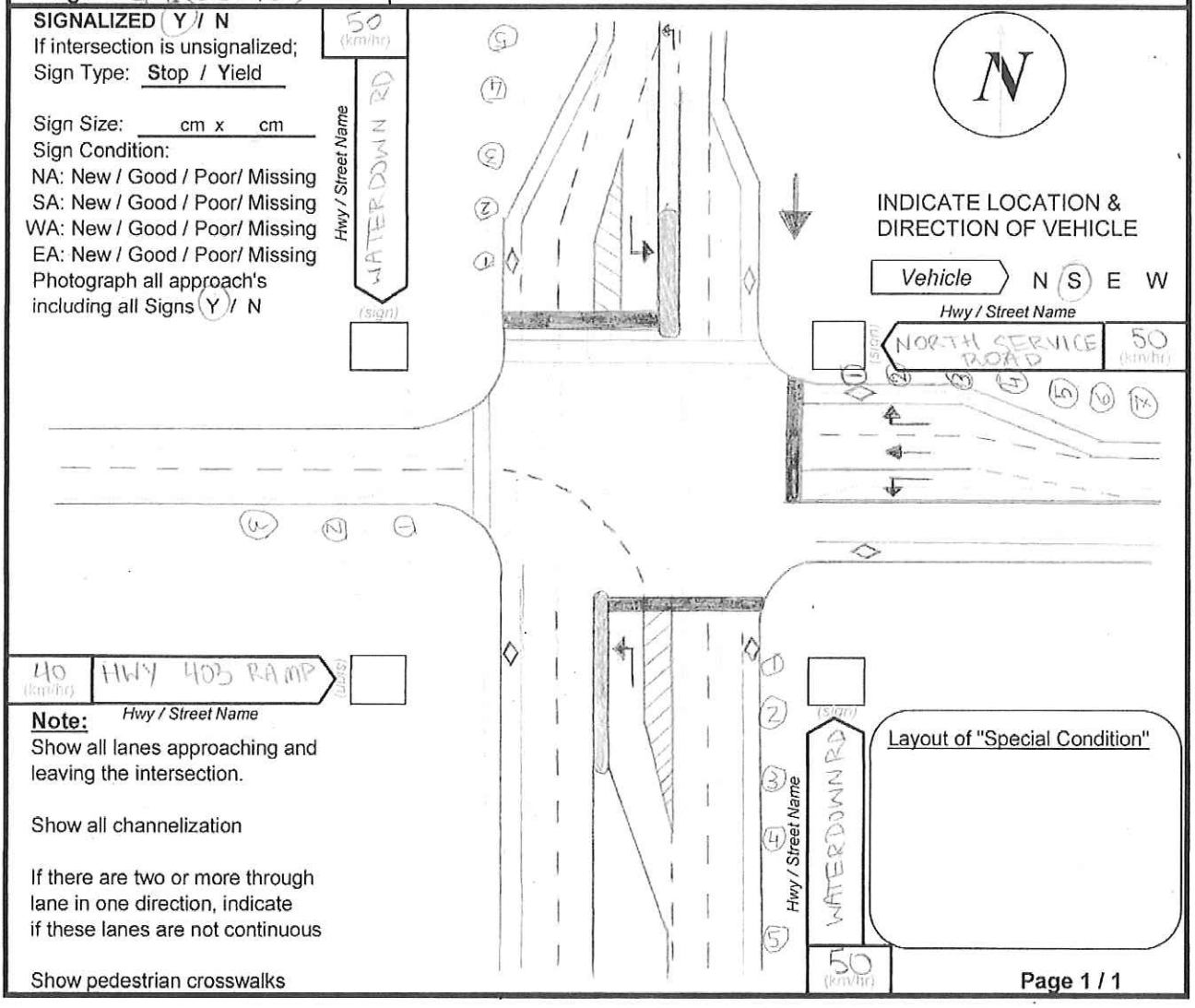
LHRS & O/S: 48300 — 0

GPS: G-STAR IV
Datum: WGS 84 (Y) / N
Lat: 43.313667
Long: -79.862133

Comments:

SIGNALIZED (Y) / N
If intersection is unsignalized;
Sign Type: Stop / Yield

Sign Size: ___ cm x ___ cm
Sign Condition:
NA: New / Good / Poor / Missing
SA: New / Good / Poor / Missing
WA: New / Good / Poor / Missing
EA: New / Good / Poor / Missing
Photograph all approach's including all Signs (Y) / N



Note:
Show all lanes approaching and leaving the intersection.

Show all channelization

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

Show pedestrian crosswalks

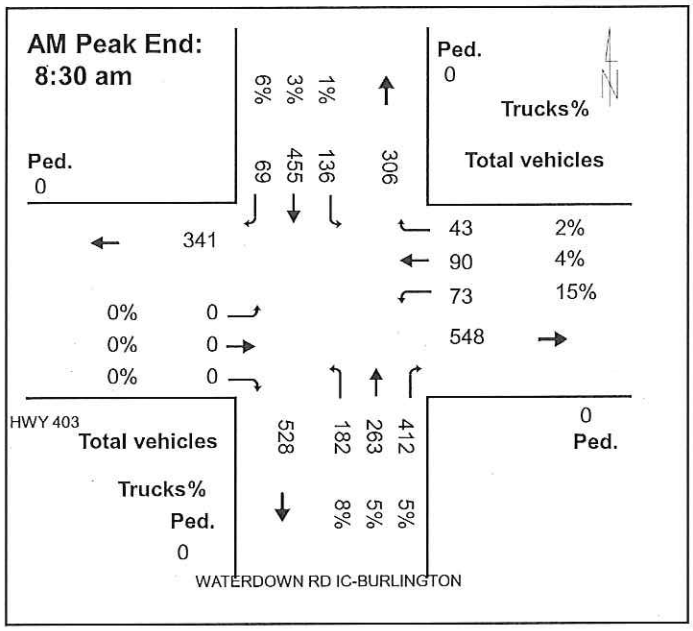
Layout of "Special Condition"

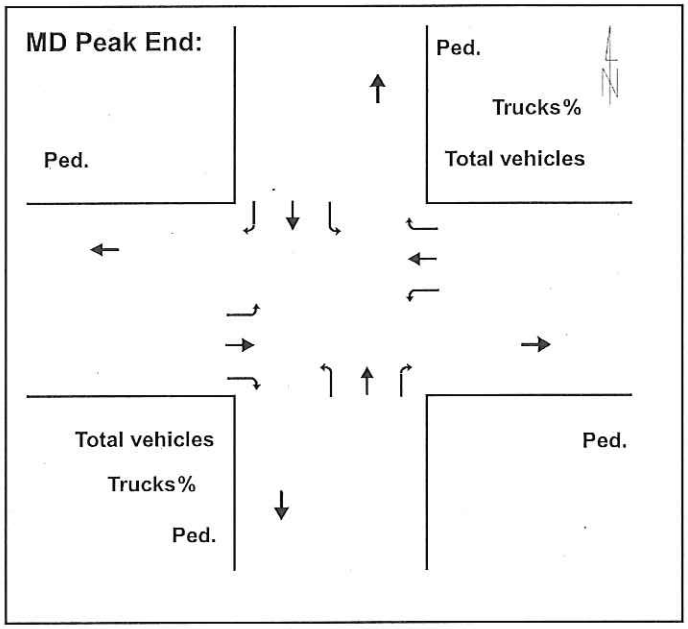
Ontario

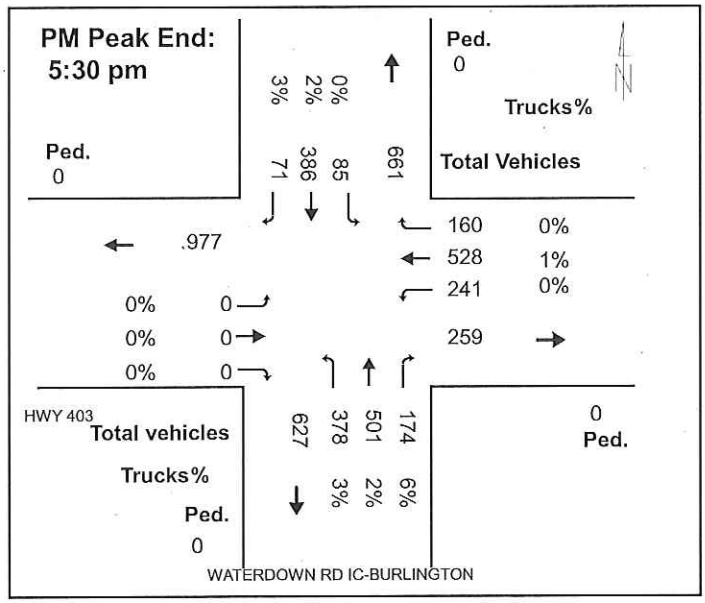
HWY 403 @ WATERDOWN RD IC-BURLINGTON

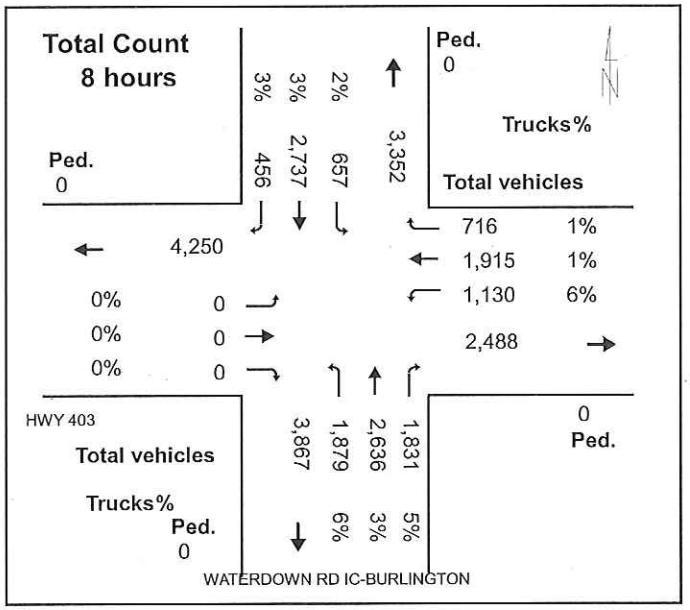
Central

Intersection ID:483000000 | **Count Day: Thursday** | **Count Date: 13-Oct-2016**









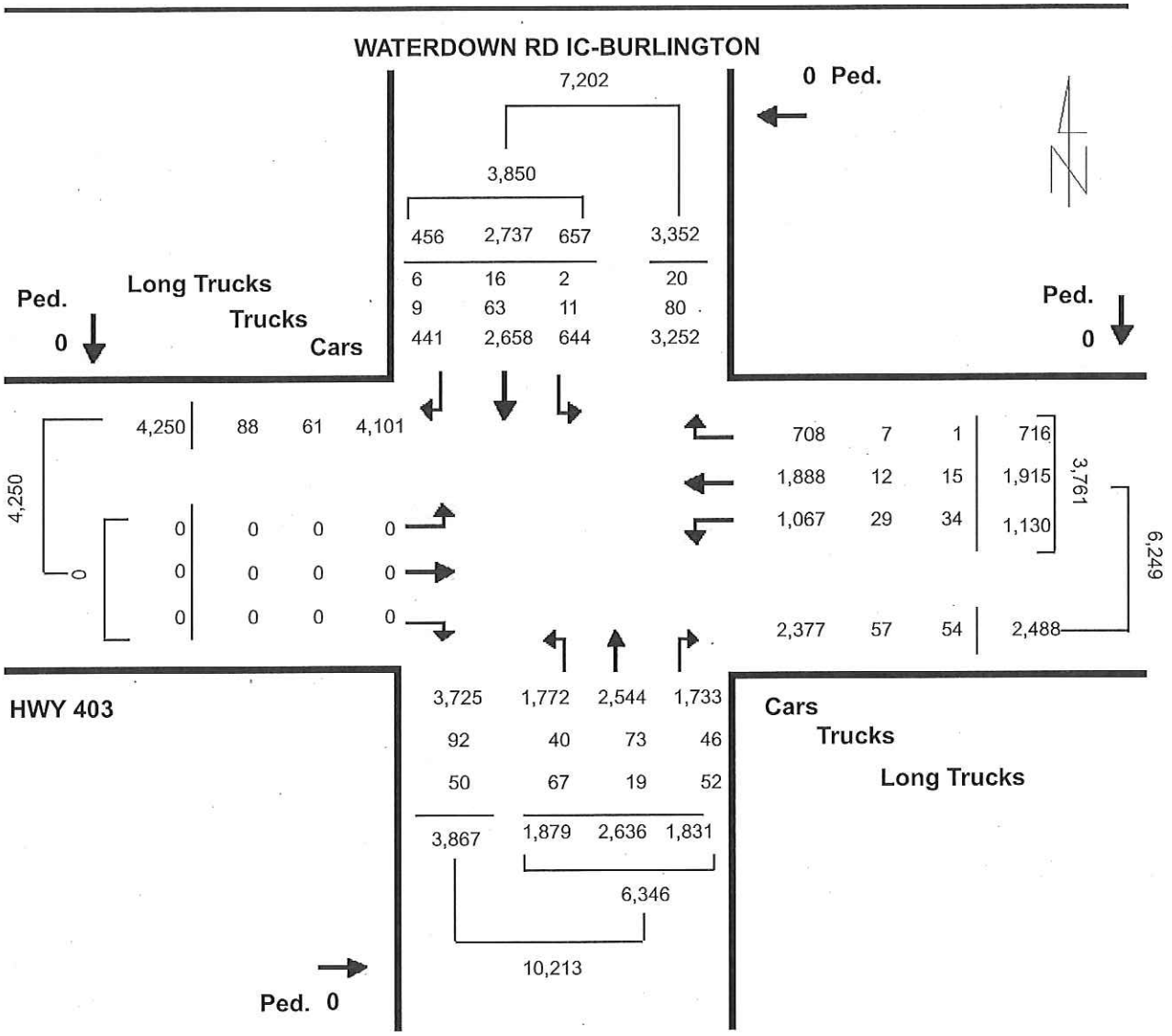
Traffic
Engineering
Software

COUNT TOTAL

HWY 403 @ WATERDOWN RD IC-BURLINGTON

Central

Intersection ID:483000000 **Date: 13-Oct-2016**



15 MIN REPORT

Intersection ID:483000000 **HWY 403 @ WATERDOWN RD IC-BURLINGTON** **Municipality: Central** **Date: 13-Oct-2016**

	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										
Time	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period1																																									
6:15	4	37	2	1	2	0	0	1	0	0	5	6	2	0	0	0	0	0	0	0	19	21	41	3	1	3	1	0	2	0	0	0	0	0	0	0	0	0	0	0	151
6:30	13	72	4	1	4	0	0	0	0	0	4	11	4	2	1	0	1	1	0	0	17	31	44	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	214
6:45	12	75	9	1	1	1	0	0	0	0	4	8	8	0	0	0	3	0	0	0	26	67	43	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	263
7:00	17	88	6	0	2	0	0	0	0	0	6	6	5	0	0	0	2	0	0	0	31	47	61	0	2	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	277
7:15	14	79	12	0	1	0	0	0	0	0	4	6	5	1	1	1	1	0	0	0	27	51	53	0	1	2	3	1	3	0	0	0	0	0	0	0	0	0	0	0	266
7:30	23	105	3	0	2	0	0	1	1	0	6	16	3	0	0	0	2	1	0	0	30	59	63	2	4	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	327
7:45	30	115	19	0	6	0	1	0	0	0	11	19	10	4	0	1	2	1	0	0	48	49	87	2	3	3	2	0	3	0	0	0	0	0	0	0	0	0	0	0	416
8:00	31	117	10	0	3	1	0	0	1	0	18	27	6	1	1	0	1	1	0	0	47	59	102	1	4	5	1	0	2	0	0	0	0	0	0	0	0	0	0	0	439
8:15	37	101	16	1	2	0	0	0	1	0	20	21	12	0	0	0	0	0	0	0	38	72	105	2	1	5	3	1	2	0	0	0	0	0	0	0	0	0	0	0	440
8:30	36	108	20	0	1	0	0	2	1	0	13	19	14	1	0	0	2	1	0	0	34	69	97	2	3	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	428
8:45	17	88	17	1	2	0	0	0	0	0	24	16	21	2	0	1	1	1	0	0	40	68	93	2	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	399
9:00	37	117	27	1	3	0	0	0	0	0	22	29	7	1	2	1	0	0	0	0	31	76	93	2	2	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	455
9:15	18	97	13	0	4	1	0	1	0	0	13	16	14	1	0	0	1	0	0	0	30	62	54	1	1	1	3	2	2	0	0	0	0	0	0	0	0	0	0	0	335
9:30	14	80	18	0	3	0	0	0	0	0	16	21	11	0	0	0	0	0	0	0	24	53	53	3	2	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	304
9:45	13	66	4	0	2	0	0	1	0	0	16	16	13	1	0	0	0	0	0	0	32	62	36	1	1	2	4	0	1	0	0	0	0	0	0	0	0	0	0	0	271
10:00	28	59	9	0	2	0	0	1	1	0	15	9	14	1	3	0	0	0	0	0	30	57	36	1	2	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	271
Period2																																									
15:15	21	69	14	1	3	0	0	1	0	0	20	39	24	0	0	0	3	0	0	0	68	75	48	1	4	3	4	1	1	0	0	0	0	0	0	0	0	0	0	0	400
15:30	22	62	11	1	4	2	0	0	0	0	31	48	36	3	1	0	0	0	0	0	56	89	39	2	4	5	2	1	2	0	0	0	0	0	0	0	0	0	0	0	421
15:45	16	74	13	1	2	1	0	3	0	0	32	75	34	2	0	2	1	2	0	0	56	89	36	1	2	0	4	2	2	0	0	0	0	0	0	0	0	0	0	0	450
16:00	18	54	15	0	1	0	0	0	0	0	38	71	33	1	0	0	1	0	1	0	66	87	39	1	3	1	1	2	3	0	0	0	0	0	0	0	0	0	0	0	436
16:15	18	80	20	2	1	0	0	0	0	0	58	128	36	3	0	1	0	0	0	0	67	87	37	2	4	2	3	0	3	0	0	0	0	0	0	0	0	0	0	0	552
16:30	14	82	26	0	0	1	0	0	0	0	67	109	49	0	0	0	1	2	0	0	42	90	45	1	3	2	1	0	3	0	0	0	0	0	0	0	0	0	0	0	538
16:45	16	97	24	0	2	1	0	2	1	0	49	139	36	0	0	0	1	1	0	0	134	135	44	0	1	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0	690
17:00	27	100	12	0	1	0	0	0	0	0	82	128	50	0	0	0	2	2	0	0	63	122	37	1	5	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	637
17:15	17	91	18	0	1	0	0	0	0	0	56	123	41	1	0	0	2	0	0	0	104	130	44	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	633
17:30	25	90	15	0	1	0	0	1	0	0	47	134	33	0	0	0	1	1	0	0	66	103	39	2	0	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0	564
17:45	20	76	17	0	1	0	0	0	0	0	79	131	46	1	0	0	2	0	0	0	123	124	37	3	3	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	666
18:00	17	87	15	0	3	0	0	0	0	0	71	107	33	0	0	0	1	0	0	0	60	70	38	2	3	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	511
18:15	17	81	18	0	0	0	0	1	0	0	59	121	22	1	0	0	2	0	0	0	119	122	42	0	1	1	3	0	2	0	0	0	0	0	0	0	0	0	0	0	612
18:30	21	71	11	0	2	0	1	0	0	0	73	110	33	2	0	0	1	0	0	0	85	112	44	0	1	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	572
18:45	16	63	11	0	1	0	0	0	0	0	77	100	23	0	2	0	0	0	0	0	108	120	50	0	0	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	575
19:00	15	77	12	0	0	1	0	1	0	0	31	79	30	0	1	0	0	1	0	0	51	86	53	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	444

Ministry of Transportation
Ministère des Transports

Version: 1.0 Feb 1, 2016

Intersection Layout Sheet

Contract # 7015-E-0009
Work Order # 599

Date: OCT / 13 / 16 Day: THUR / Hrs: 06 - 10 + 15 - 19 + __ - __

Location: HWY 403 @ WATERDOWN RD IC - BURLINGTON Ramps: NORTH / 61

Reg/Mun: CR Town/City: BURLINGTON Area: -

File Name: 14830000000 Device: Gretch / Jamar Unit # 08 / Interval 1: (AM) / NN / PM

Observer: OXANA VYATKINA Weather: CLEAR / Road Condition: GOOD /

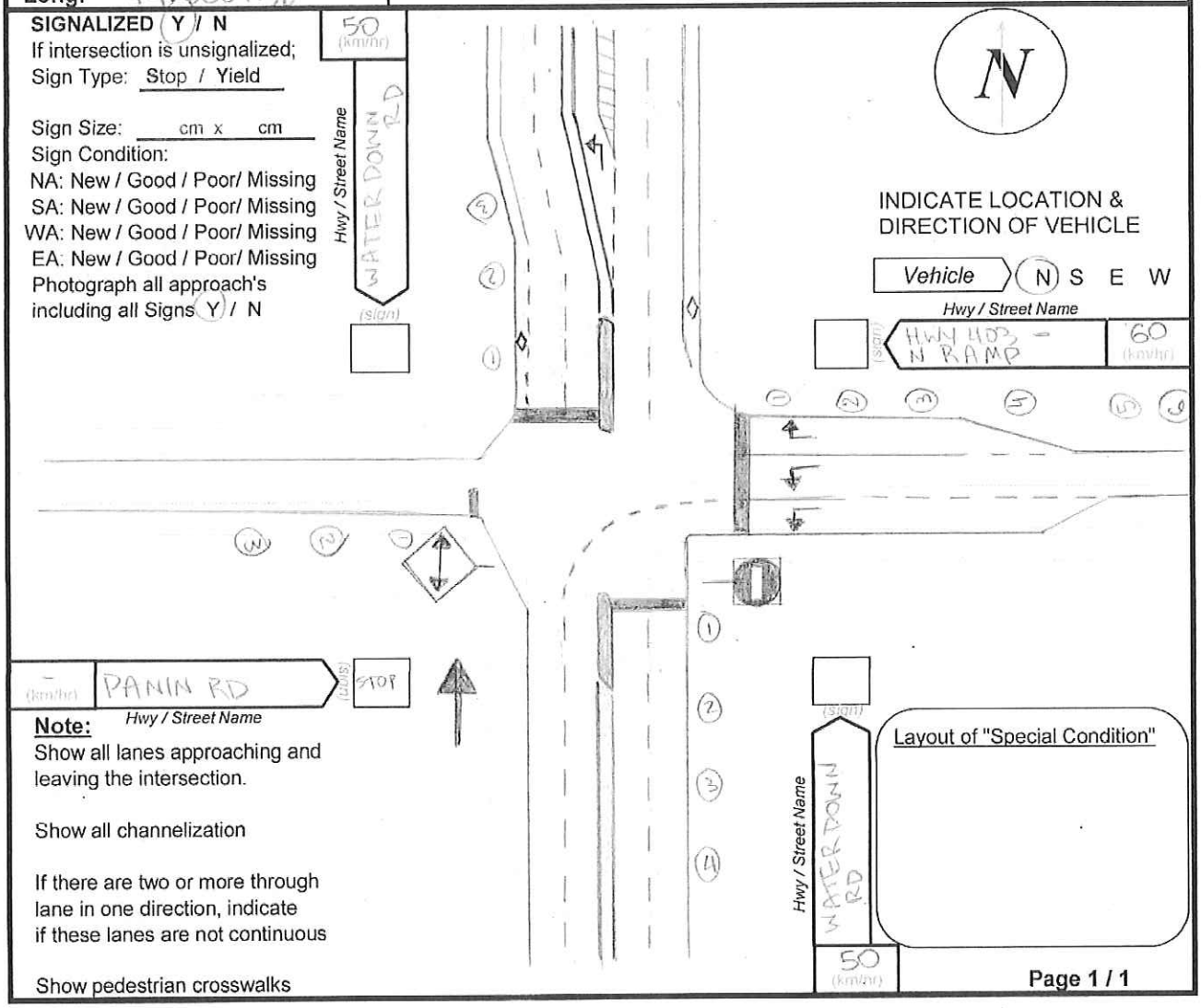
LHRS & O/S: 14830 — 0

GPS: G-STAR IV
Datum: WGS 84 (Y) / N
Lat: 43.312644
Long: -79.860736

Comments:

SIGNALIZED (Y) / N
If intersection is unsignalized;
Sign Type: Stop / Yield

Sign Size: ___ cm x ___ cm
Sign Condition:
NA: New / Good / Poor / Missing
SA: New / Good / Poor / Missing
WA: New / Good / Poor / Missing
EA: New / Good / Poor / Missing
Photograph all approach's including all Signs (Y) / N



Note:
Show all lanes approaching and leaving the intersection.

Show all channelization

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

Show pedestrian crosswalks

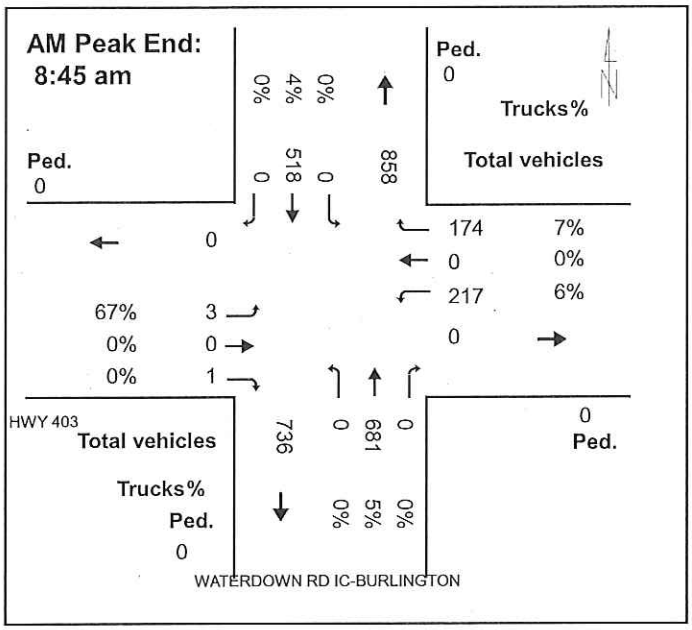
Layout of "Special Condition"

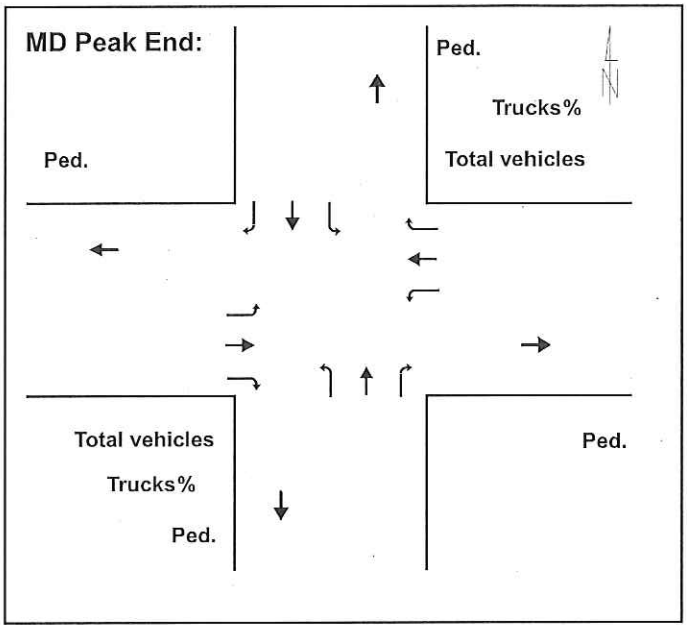
Ontario

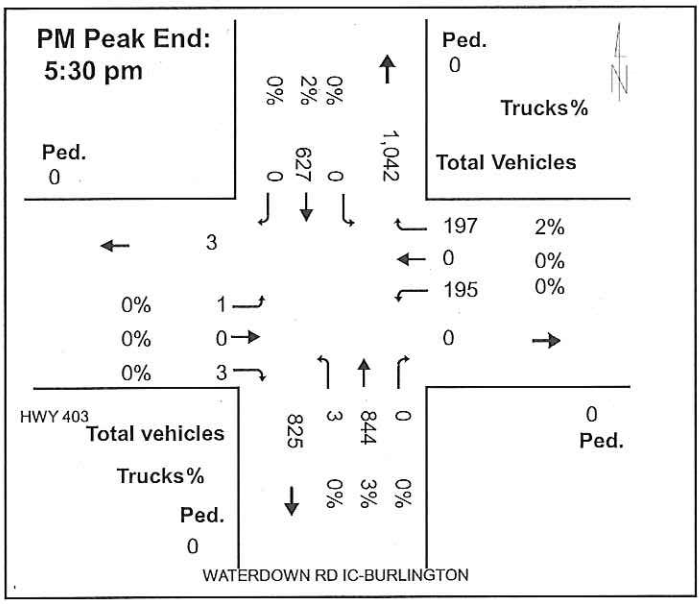
HWY 403 @ WATERDOWN RD IC-BURLINGTON

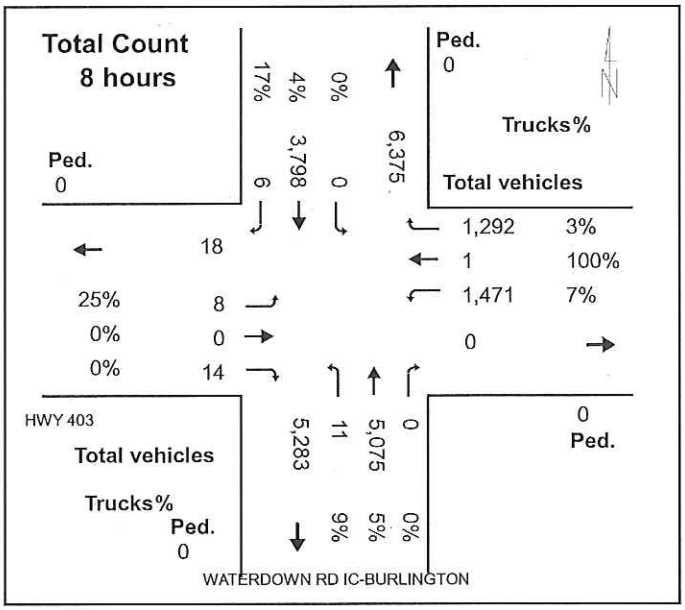
Central

Intersection ID:483000000(--N--) | Count Day: Thursday | Count Date: 13-Oct-2016









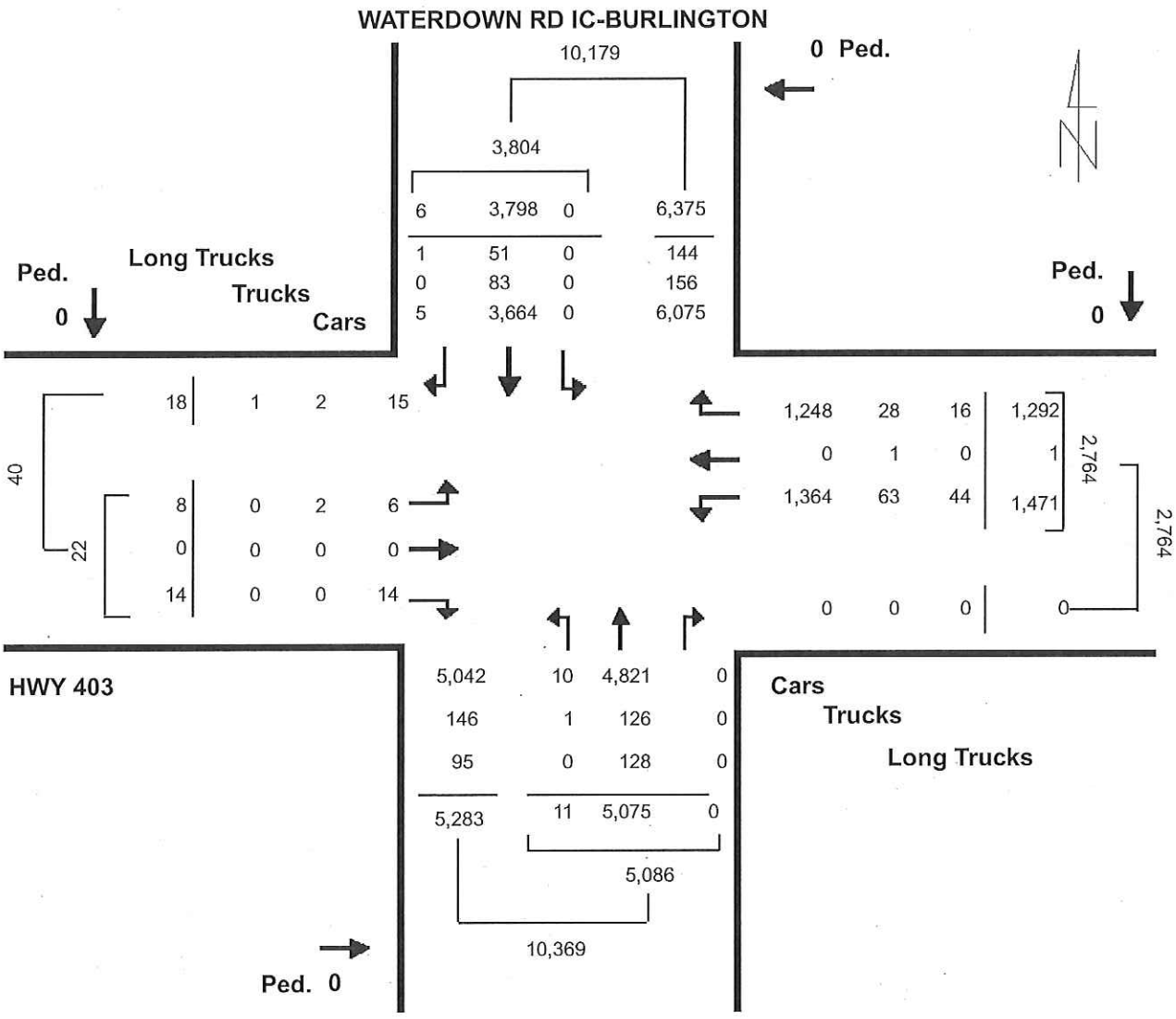
Traffic Engineering Software

COUNT TOTAL

HWY 403 @ WATERDOWN RD IC-BURLINGTON

Central

Intersection ID:483000000(--N--) **Date: 13-Oct-2016**



15 MIN REPORT

Intersection ID:483000000(--N--) **HWY 403 @ WATERDOWN RD IC-BURLINGTON** **Municipality: Central** **Date: 13-Oct-2016**

	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										
Time	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period1																																									
6:15	0	38	0	0	1	0	0	2	0	0	9	0	15	0	0	0	0	0	0	0	0	78	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	147
6:30	0	71	0	0	4	0	0	2	0	0	13	0	12	1	0	1	0	0	0	0	0	91	0	0	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	202
6:45	0	73	0	0	1	0	0	3	0	0	17	0	35	1	0	0	0	0	0	0	0	126	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	260
7:00	0	91	0	0	1	0	0	2	0	0	36	0	30	1	0	2	3	0	0	0	0	132	0	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	303
7:15	0	85	0	0	3	0	0	1	0	0	22	0	27	1	0	1	1	0	0	0	0	110	0	0	2	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	259
7:30	0	105	0	0	2	0	0	2	0	0	33	0	25	4	0	1	0	0	1	0	0	137	0	0	6	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	320
7:45	0	114	1	0	5	0	0	3	0	0	31	0	30	2	0	1	2	0	2	0	2	148	0	0	5	0	0	4	0	0	0	0	2	0	0	0	0	0	0	0	352
8:00	0	140	0	0	6	0	0	2	0	0	43	0	39	2	0	3	0	0	0	0	0	151	0	0	5	0	0	4	0	0	0	0	1	0	0	0	0	0	0	0	396
8:15	0	122	0	0	3	0	0	0	0	0	61	0	45	3	0	3	1	0	1	0	0	161	0	0	4	0	0	5	0	0	0	0	0	0	2	0	0	0	0	0	411
8:30	0	124	0	0	2	0	0	3	0	0	52	0	38	3	0	1	0	0	2	0	0	169	0	0	7	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	405
8:45	0	111	0	0	3	0	0	2	0	0	49	0	40	3	0	0	0	0	2	0	0	165	0	0	5	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	382
9:00	0	138	0	0	4	0	0	0	0	0	43	0	57	5	0	1	1	0	2	0	1	137	0	0	5	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	396
9:15	0	99	0	0	4	0	0	2	0	0	50	0	46	1	0	1	0	0	0	0	0	115	0	0	2	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	326
9:30	0	101	0	0	4	0	0	0	0	0	59	0	31	4	0	1	4	0	1	0	1	114	0	0	3	0	0	5	0	0	0	0	1	0	0	0	0	0	0	0	329
9:45	0	85	0	0	1	0	0	1	0	0	42	0	26	3	0	0	2	0	1	0	0	80	0	0	4	0	0	7	0	0	1	0	0	0	0	0	0	0	0	0	253
10:00	0	71	0	0	4	0	0	1	0	0	51	0	41	2	0	0	2	0	0	0	1	97	0	0	3	0	0	3	0	0	0	0	2	0	0	0	0	0	0	0	278
Period2																																									
15:15	0	90	0	0	5	0	0	2	0	0	56	0	46	4	0	0	1	0	1	0	0	148	0	0	5	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	365
15:30	0	96	0	0	6	0	0	2	0	0	54	0	53	3	0	1	5	0	0	0	0	114	0	0	8	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	347
15:45	0	106	0	0	4	0	0	2	0	0	48	0	48	3	0	0	4	0	1	0	0	131	0	0	6	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	360
16:00	0	95	0	0	3	0	0	2	0	0	41	0	48	0	0	3	4	0	0	0	0	133	0	0	3	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	338
16:15	0	131	0	0	2	0	0	0	0	0	36	0	38	3	0	0	1	0	1	0	1	162	0	0	4	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	386
16:30	0	141	0	0	0	0	0	1	0	0	47	0	48	0	0	0	2	0	0	0	0	132	0	0	6	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	380
16:45	0	152	0	0	2	0	0	2	0	0	58	0	45	5	0	0	2	0	0	0	0	240	0	0	4	0	0	5	0	0	0	0	2	0	0	0	0	0	0	0	517
17:00	0	163	0	0	1	0	0	2	0	0	47	0	60	0	0	1	3	0	0	0	0	170	0	0	4	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	453
17:15	0	144	0	0	2	0	0	2	0	0	35	0	48	1	0	1	2	0	1	0	2	238	0	0	4	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	484
17:30	0	154	0	0	1	0	0	2	0	0	40	0	40	2	0	1	0	0	0	0	1	167	0	0	4	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	416
17:45	0	143	1	0	1	0	0	2	1	0	38	0	39	1	1	2	0	0	0	0	0	235	0	0	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	471
18:00	0	165	2	0	3	0	0	1	0	0	44	0	38	2	0	3	0	0	0	0	0	107	0	0	4	0	0	2	0	0	1	0	1	0	0	0	0	0	0	0	373
18:15	0	130	0	0	0	0	0	2	0	0	54	0	31	2	0	0	1	0	0	0	0	253	0	1	2	0	0	4	0	0	0	0	3	0	0	0	0	0	0	0	483
18:30	0	137	0	0	3	0	0	3	0	0	45	0	39	1	0	0	1	0	0	0	1	213	0	0	2	0	0	5	0	0	0	0	1	0	0	0	0	0	0	0	451
18:45	0	138	0	0	1	0	0	0	0	0	61	0	50	0	0	0	2	0	0	0	0	197	0	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	454
19:00	0	111	1	0	1	0	0	0	0	0	49	0	40	0	0	0	0	0	0	0	0	170	0	0	4	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	379

Ministry of Transportation
Ministère des Transports

Intersection Layout Sheet

Version: 1.0 Feb 1, 2016

Contract # 1015-E-0001
Work Order # 600

Date: OCT / 13/16 Day: THUR / Hrs: 06 - 10 + 15 - 19 + ___ - ___

Location: HWY 403 @ WATERDOWN RD IC - BURLINGTON Ramps: SOUTH / 51

Reg/Mun: CR Town/City: BURLINGTON Area: ___

File Name: 24830000000 Device: Gretch / Jamar Unit # 04 / ___ Interval 1: AM / NN / PM

Observer: OXANA VYATKINA Weather: CLEAR / ___ Road Condition: GOOD / ___

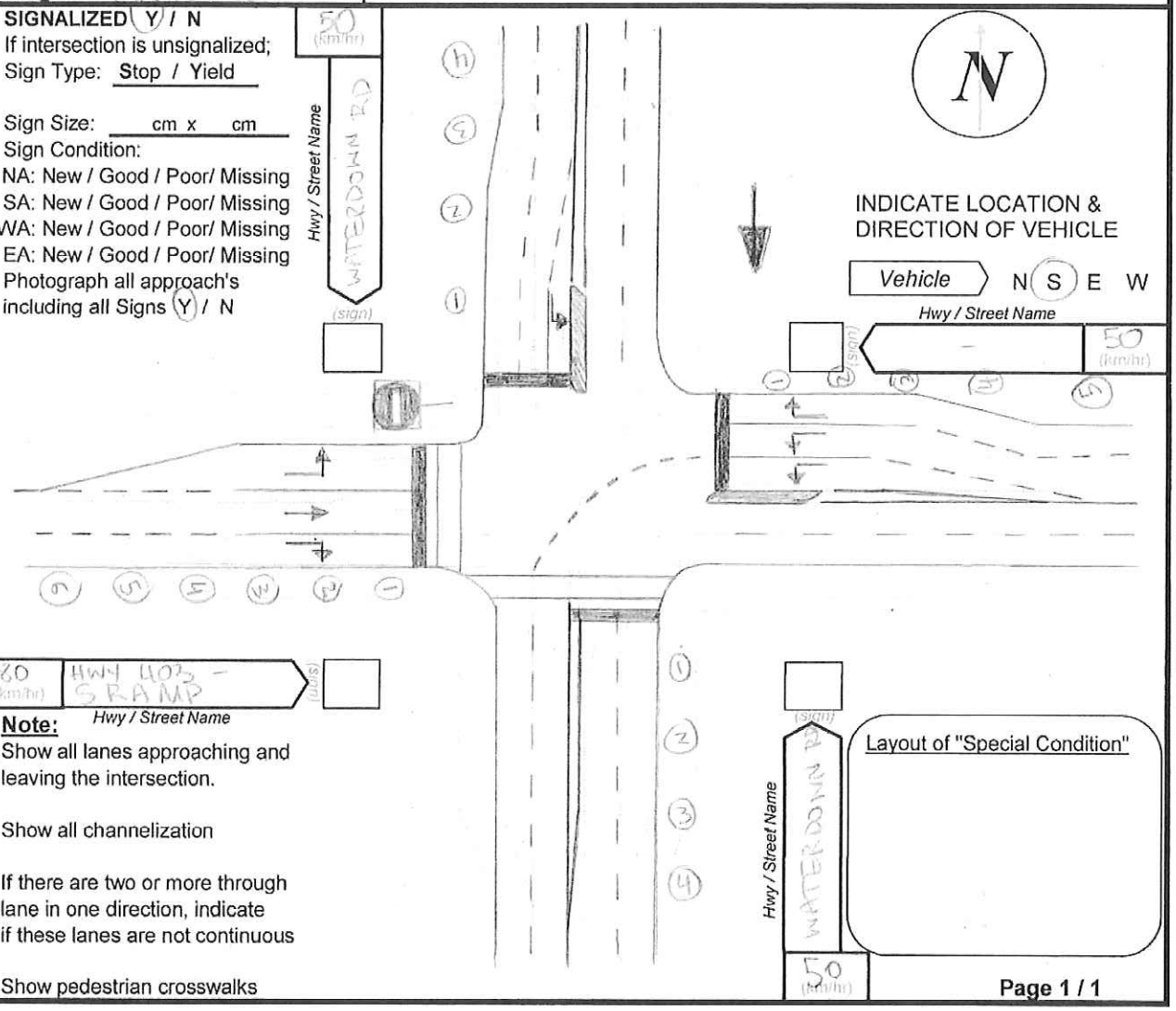
LHRS & O/S: 48500 — O

GPS: G-STAR IV
Datum: WGS 84 (Y) / N
Lat: 43.311426
Long: -79.856903

Comments:

SIGNALIZED (Y) / N
If intersection is unsignalized;
Sign Type: Stop / Yield

Sign Size: ___ cm x ___ cm
Sign Condition:
NA: New / Good / Poor/ Missing
SA: New / Good / Poor/ Missing
WA: New / Good / Poor/ Missing
EA: New / Good / Poor/ Missing
Photograph all approach's including all Signs (Y) / N



Note:
Show all lanes approaching and leaving the intersection.

Show all channelization

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

Show pedestrian crosswalks

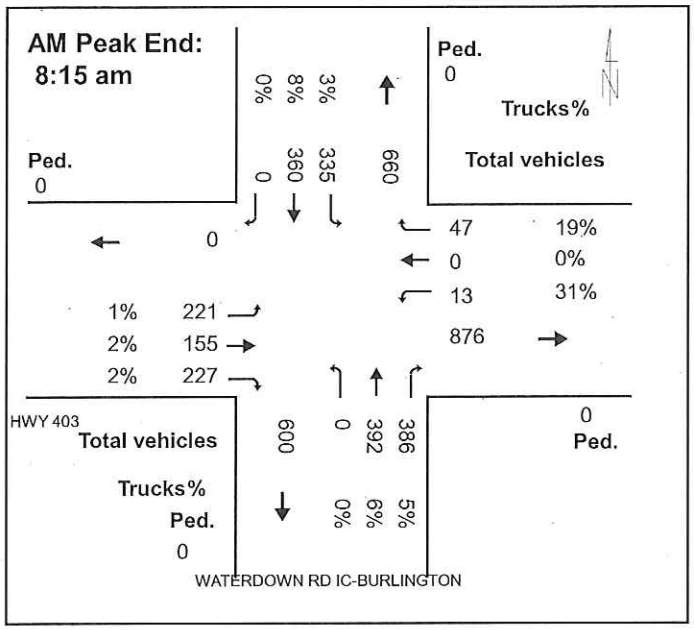
Layout of "Special Condition"

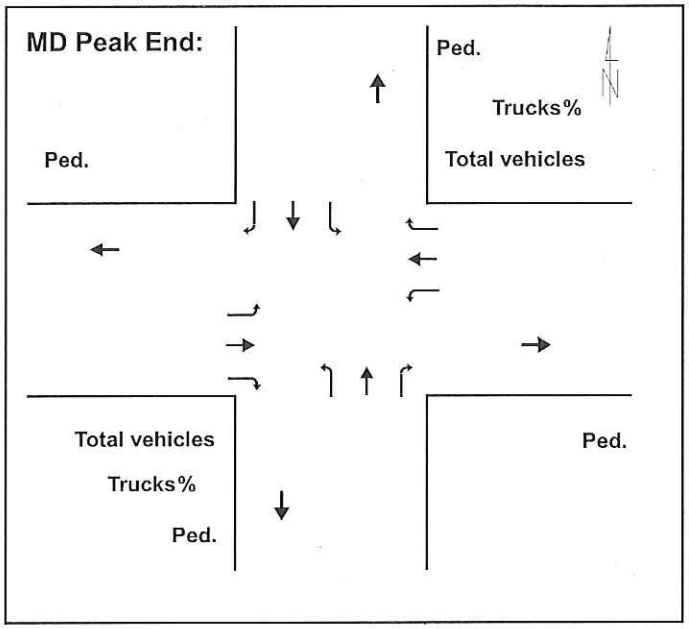
Ontario

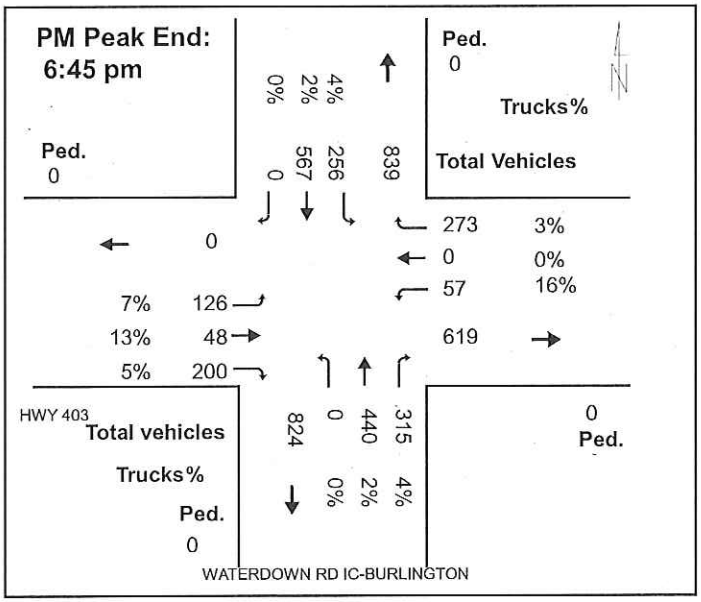
HWY 403 @ WATERDOWN RD IC-BURLINGTON

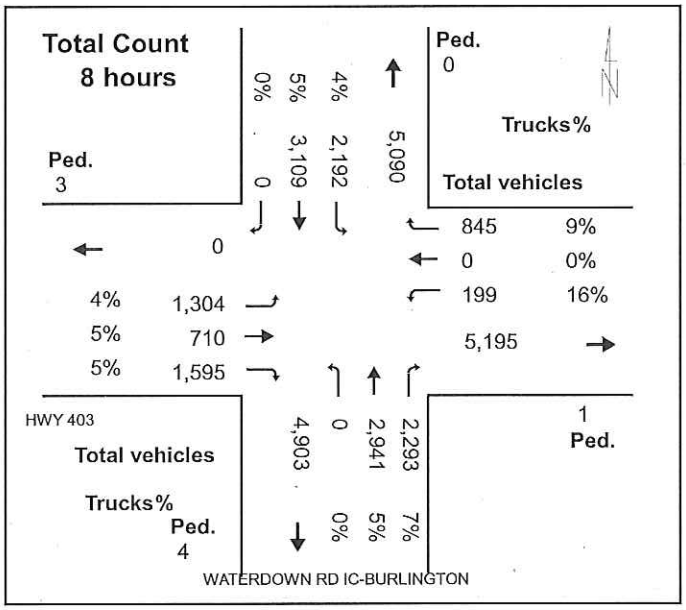
Central

Intersection ID:483000000(--S--) **Count Day: Thursday** **Count Date: 13-Oct-2016**









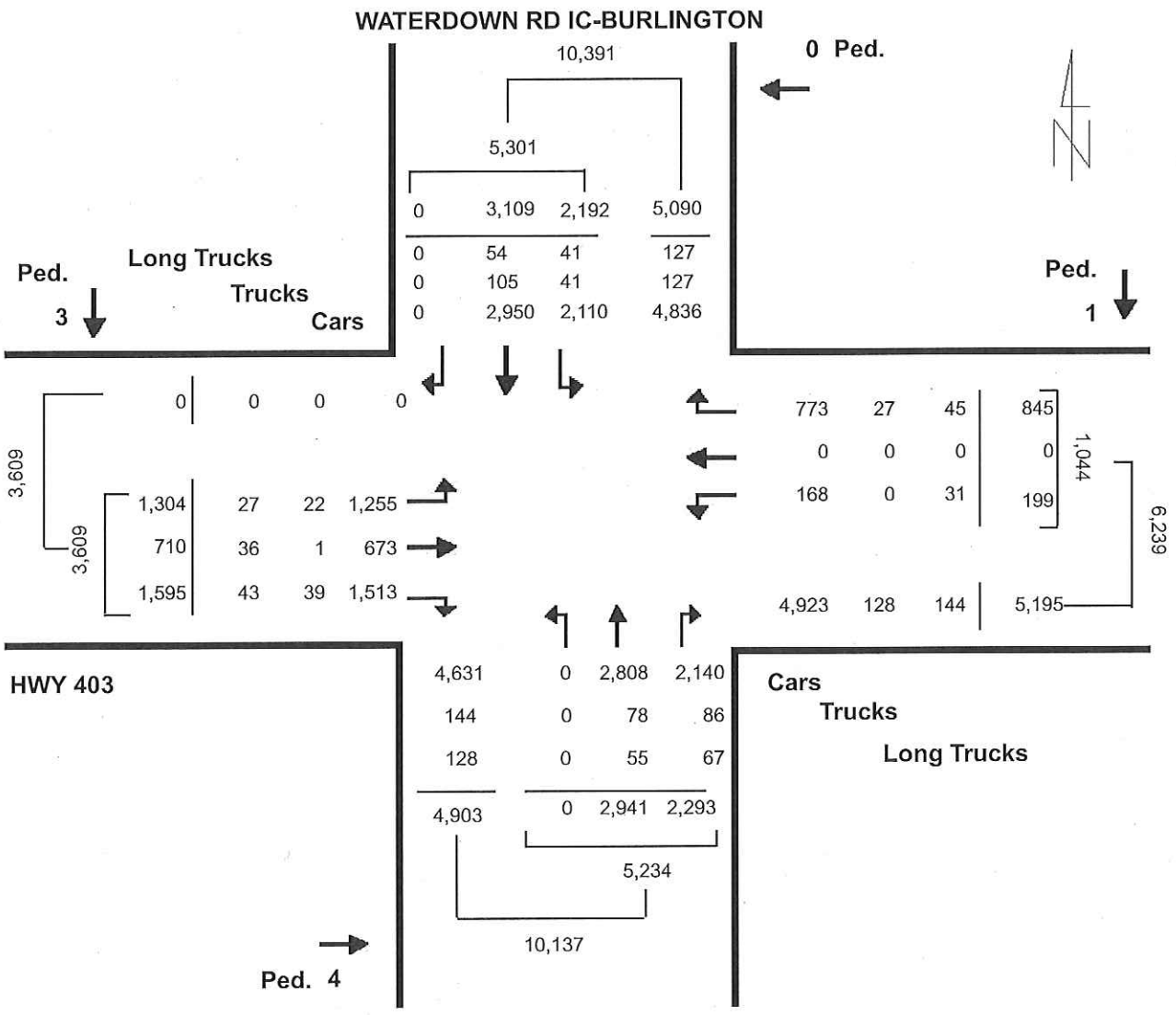
Traffic Engineering Software

COUNT TOTAL

HWY 403 @ WATERDOWN RD IC-BURLINGTON

Central

Intersection ID:483000000(--S--) **Date: 13-Oct-2016**



15 MIN REPORT

Intersection ID:483000000(--S--) **HWY 403 @ WATERDOWN RD IC-BURLINGTON** **Municipality: Central** **Date: 13-Oct-2016**

	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										
Time	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period1																																									
6:15	38	14	0	2	2	0	0	0	0	0	1	0	2	0	0	1	1	0	1	0	0	30	41	0	3	0	0	1	1	0	49	52	49	0	0	3	1	1	0	0	293
6:30	64	28	0	0	3	0	1	1	0	0	5	0	8	0	0	1	1	0	1	0	0	32	44	0	0	2	0	2	0	0	53	46	56	1	0	0	1	1	2	2	355
6:45	62	33	0	0	1	0	2	1	0	0	0	0	8	0	0	1	1	0	0	0	0	70	55	0	3	4	0	0	2	0	48	79	55	0	0	0	0	0	1	0	426
7:00	66	63	0	2	1	0	1	3	0	0	5	0	6	0	0	1	1	0	2	0	0	45	67	0	1	5	0	1	2	0	72	73	68	0	0	0	0	2	1	0	488
7:15	64	34	0	0	3	0	1	1	0	0	3	0	12	0	0	1	1	0	2	0	0	61	52	0	0	3	0	5	1	0	42	74	68	0	1	0	1	1	3	0	434
7:30	92	50	0	1	3	0	1	5	0	0	3	0	16	0	0	1	1	0	0	0	0	81	83	0	7	2	0	2	1	0	45	75	66	0	0	0	0	1	0	0	536
7:45	84	77	0	2	8	0	3	1	0	0	3	0	9	0	0	1	1	0	3	0	0	85	96	0	1	1	0	3	3	0	55	41	60	0	0	0	0	1	0	0	538
8:00	79	107	0	2	6	0	1	1	0	0	3	0	10	0	0	1	1	0	2	0	0	101	93	0	3	6	0	2	1	0	62	21	57	1	0	1	2	1	2	0	566
8:15	69	97	0	1	4	0	0	1	0	0	0	0	3	0	0	1	1	0	0	0	0	101	95	0	3	2	0	3	3	0	56	15	39	0	0	1	0	0	1	0	496
8:30	95	89	0	1	5	0	3	1	0	0	3	0	3	0	0	1	0	0	1	0	0	92	94	0	4	3	0	2	1	0	67	10	43	2	0	3	0	2	0	0	525
8:45	76	80	0	2	2	0	1	1	0	0	1	0	6	0	0	1	1	0	2	0	0	106	82	0	3	7	0	1	2	0	39	8	33	1	0	0	0	0	2	0	457
9:00	80	81	0	1	8	0	0	0	0	0	1	0	6	0	0	1	1	0	0	0	0	67	79	0	2	0	0	1	3	0	57	14	40	0	0	2	0	2	1	0	447
9:15	75	79	0	3	3	0	2	1	0	0	1	0	6	0	0	1	0	0	3	1	0	63	64	0	2	3	0	2	2	1	38	9	36	0	0	1	2	2	2	1	403
9:30	56	93	0	2	5	0	2	2	0	0	1	0	5	0	0	0	1	0	0	0	0	60	69	0	2	1	0	6	2	0	33	7	37	1	0	3	0	0	1	0	389
9:45	60	74	0	1	4	0	0	3	0	0	5	0	3	0	0	1	1	0	2	0	0	68	69	0	1	1	0	3	4	0	21	10	47	1	0	0	0	1	1	0	381
10:00	41	64	0	2	4	0	3	2	0	0	0	0	4	0	0	1	1	0	0	0	0	53	47	0	3	5	0	2	1	0	35	6	35	1	0	3	0	3	2	0	318
Period2																																									
15:15	66	85	0	2	7	0	2	2	0	0	3	0	10	0	0	1	1	0	1	0	0	99	65	0	5	3	0	3	2	0	29	4	34	2	0	0	0	2	5	0	433
15:30	59	94	0	2	6	0	0	6	0	0	3	0	13	0	0	0	1	0	3	0	0	85	70	0	4	5	0	1	2	0	29	7	46	1	0	0	2	0	1	0	440
15:45	56	89	0	2	6	0	3	1	0	0	3	0	8	0	0	1	1	0	1	0	0	95	51	0	4	5	0	3	4	0	31	11	42	1	0	1	3	3	1	0	426
16:00	52	92	0	1	2	0	1	2	0	0	1	0	36	0	0	0	1	0	1	0	0	89	48	0	2	3	0	1	5	0	32	8	40	0	0	2	3	0	2	0	424
16:15	63	112	0	2	3	0	0	3	0	0	4	0	12	0	0	1	1	0	3	0	0	98	58	0	4	7	0	1	3	0	20	4	32	1	0	2	1	3	2	0	440
16:30	74	128	0	0	0	0	0	3	0	0	1	0	5	0	0	1	1	0	0	0	0	87	53	0	3	1	0	1	4	0	43	6	47	1	0	2	2	0	0	0	463
16:45	79	115	0	1	7	0	1	2	0	0	12	0	69	0	0	1	1	0	4	0	0	144	69	0	2	7	0	0	1	0	36	5	64	0	0	1	1	1	3	0	626
17:00	79	138	0	1	0	0	2	3	0	0	5	0	32	0	0	1	1	0	3	0	0	110	60	0	4	0	0	0	2	0	29	10	61	2	0	1	0	1	2	0	547
17:15	66	126	0	1	2	0	2	2	0	0	9	0	60	0	0	1	1	0	0	0	0	130	71	0	1	0	0	0	2	1	39	13	44	0	0	2	1	1	4	0	579
17:30	56	117	0	1	2	0	1	1	0	0	15	0	31	0	0	0	2	0	1	0	0	109	57	0	3	1	0	4	2	1	31	8	54	0	0	1	0	1	0	0	499
17:45	54	145	0	2	2	0	2	0	0	0	20	0	92	0	0	1	0	0	2	0	0	137	54	0	1	2	0	0	3	0	14	6	28	4	0	3	0	0	1	0	573
18:00	55	151	0	2	1	0	1	0	0	0	4	0	18	0	0	1	2	0	0	0	0	91	78	0	1	1	0	0	3	0	20	14	40	1	0	3	3	1	0	0	491
18:15	72	126	0	0	2	0	3	2	0	0	25	0	96	0	0	1	1	0	2	0	0	128	87	0	3	2	0	1	1	0	27	7	57	1	0	1	1	1	1	0	648
18:30	58	131	0	1	3	0	0	2	0	0	13	0	61	0	0	1	0	0	2	0	0	91	69	0	0	2	0	1	1	0	39	16	64	0	0	2	2	2	2	0	563
18:45	62	148	0	1	0	0	1	1	0	0	10	0	89	0	0	0	2	0	2	0	0	123	67	0	0	2	0	1	2	0	31	5	30	0	0	0	1	2	0	0	580
19:00	58	90	0	0	0	0	1	0	0	0	5	0	34	0	0	1	1	0	1	0	0	77	53	0	3	0	0	2	1	1	33	9	41	0	0	1	0	0	0	0	412

Ministry of Transportation
Ministère des Transports

Intersection Layout Sheet

Version: 1.0 Feb 1, 2016

Contract # 9015-E-0006
Work Order # 602

Date: OCT /13/16 Day: THUR/ Hrs: 06 - 10 + 15 - 19 + - -

Location: HWY 403 @ WATERDOWN RD GO STATION Ramps: SOUTH/ 15

Reg/Mun: CR Town/City: BURLINGTON SOUTH RAMP Area:

File Name: 24832000000 Device: Gretch / Jamar Unit # 06 /

Interval 1: (AM) / NN / PM

Observer: EKATERINA VYATKINA Weather: CLEAR/ Road Condition: GOOD /

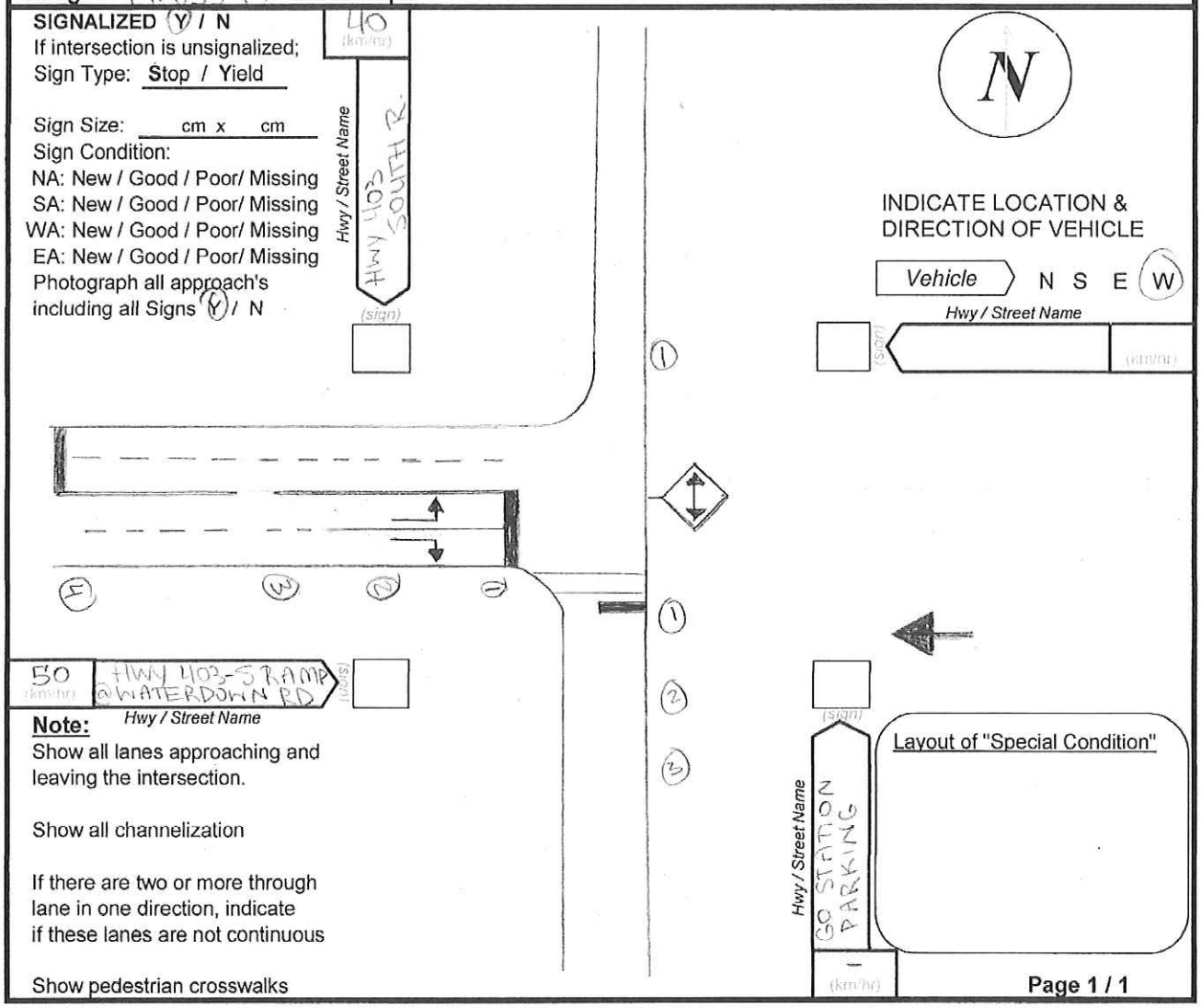
LHRS & O/S: 48300 — 0

GPS: G-STAR IN
Datum: WGS 84 (Y) / N
Lat: 43.314531
Long: -79.855441

Comments:

SIGNALIZED (Y) / N
If intersection is unsignalized;
Sign Type: Stop / Yield

Sign Size: cm x cm
Sign Condition:
NA: New / Good / Poor / Missing
SA: New / Good / Poor / Missing
WA: New / Good / Poor / Missing
EA: New / Good / Poor / Missing
Photograph all approach's including all Signs (Y) / N



Note:
Show all lanes approaching and leaving the intersection.

Show all channelization

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

Show pedestrian crosswalks

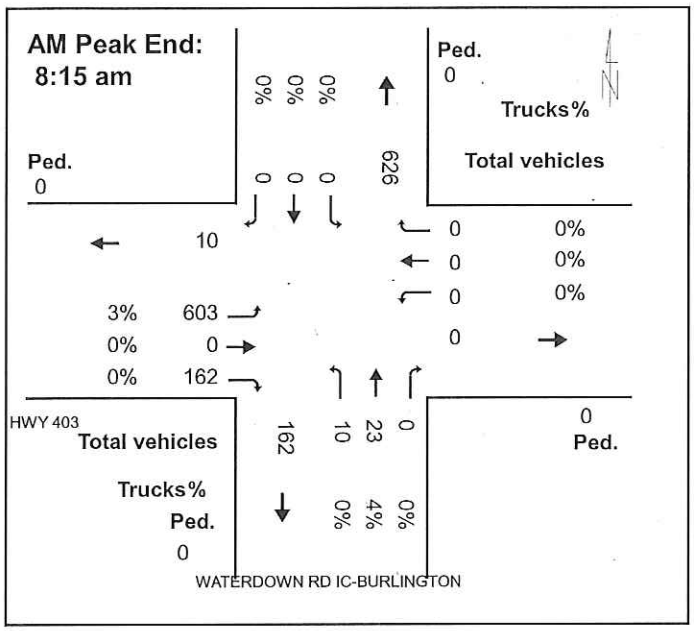
Layout of "Special Condition"

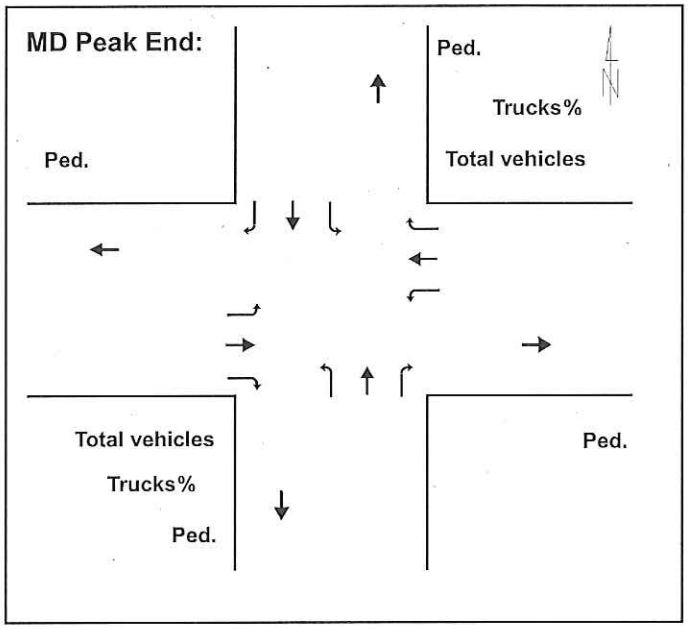
Ontario

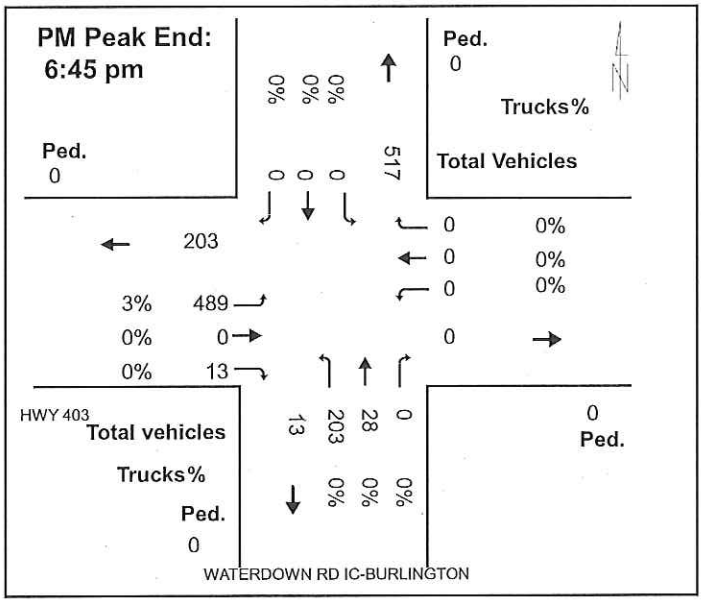
HWY 403 @ WATERDOWN RD IC-BURLINGTON

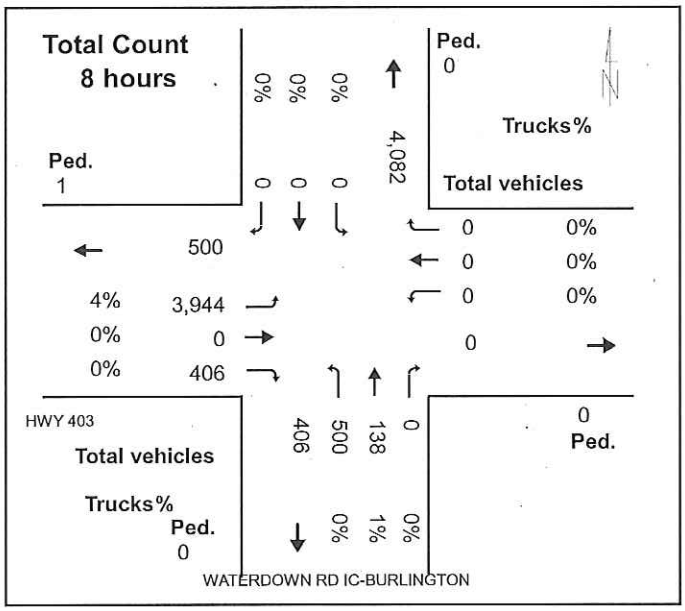
Central

Intersection ID:483000000 **Count Day: Thursday** **Count Date: 13-Oct-2016**









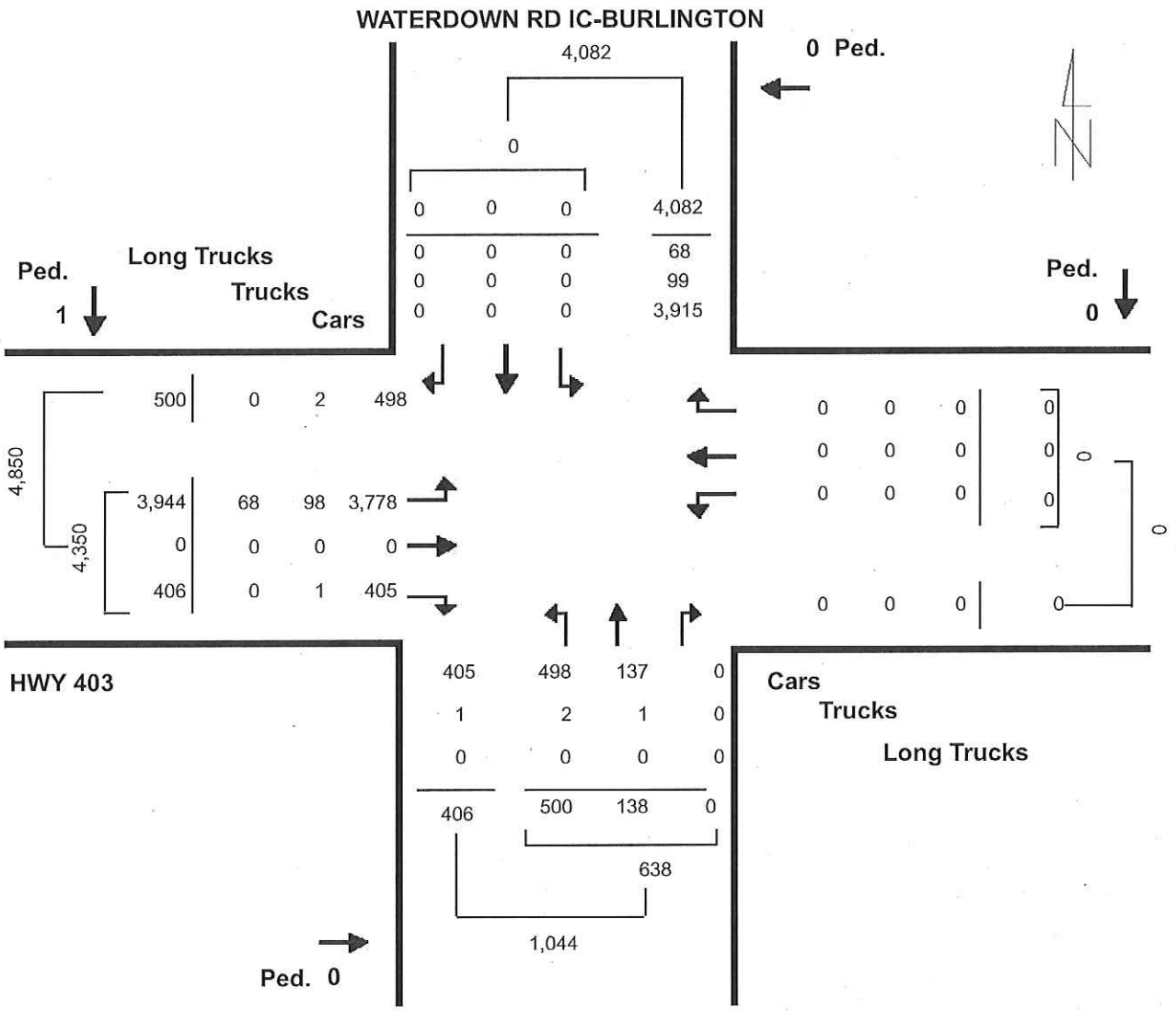
Traffic Engineering Software

COUNT TOTAL

HWY 403 @ WATERDOWN RD IC-BURLINGTON

Central

Intersection ID:483000000 **Date: 13-Oct-2016**



15 MIN REPORT

Intersection ID:483000000 **HWY 403 @ WATERDOWN RD IC-BURLINGTON** **Municipality: Central** **Date: 13-Oct-2016**

	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										
Time	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period1																																									
6:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	0	0	70	0	16	0	0	0	0	0	0	0	92
6:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	83	0	26	1	0	0	1	0	0	0	114
6:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	95	0	17	3	0	1	3	0	0	0	123
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	5	0	0	0	0	0	0	0	0	102	0	44	2	0	0	0	0	0	0	159
7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0	97	0	53	5	0	0	1	0	0	0	162
7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	8	0	0	0	0	0	0	0	0	118	0	80	1	0	0	1	0	0	0	211
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	0	0	1	0	0	0	0	0	145	0	39	2	0	0	4	0	0	0	201
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7	0	0	0	0	0	0	0	0	163	0	26	7	0	0	2	0	0	0	206
8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	156	0	17	2	0	0	2	0	0	0	180
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	177	0	16	3	0	0	3	0	0	0	201
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	147	0	8	4	0	0	5	0	0	0	169
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	159	0	9	1	0	0	2	0	0	0	173
9:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	133	0	2	5	0	0	4	0	0	1	148
9:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	129	0	5	2	0	0	3	0	0	0	144
9:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	121	0	0	1	0	0	2	0	0	0	125
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	90	0	2	6	0	0	2	0	0	0	104
Period2																																									
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	4	0	0	0	0	0	0	0	0	130	0	6	6	0	0	1	0	0	0	154
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	1	0	0	0	0	0	0	0	0	116	0	2	5	0	0	3	0	0	0	139
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	1	0	0	0	0	0	0	105	0	1	7	0	0	6	0	0	0	127
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	2	0	0	0	0	0	0	0	0	95	0	1	4	0	0	3	0	0	0	120
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	5	0	0	0	0	0	0	0	0	108	0	3	5	0	0	2	0	0	0	129
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	120	0	1	4	0	0	2	0	0	0	129
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	7	0	1	0	0	0	0	0	0	125	0	4	6	0	0	2	0	0	0	187
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	4	0	0	0	0	0	0	0	0	111	0	1	1	0	0	1	0	0	0	139
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	5	0	0	0	0	0	0	0	0	104	0	4	0	0	0	2	0	0	0	154
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	10	0	0	0	0	0	0	0	0	106	0	4	2	0	0	2	0	0	0	147
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	6	0	0	0	0	0	0	0	0	97	0	3	2	0	0	3	0	0	0	187
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	3	0	0	0	0	0	0	0	0	103	0	5	3	0	0	3	0	0	0	134
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73	13	0	0	0	0	0	0	0	0	143	0	3	1	0	0	1	0	0	0	234
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	5	0	0	0	0	0	0	0	0	114	0	3	3	0	0	0	0	0	0	175
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	7	0	0	0	0	0	0	0	0	112	0	2	4	0	0	2	0	0	0	190
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	4	0	0	0	0	0	0	0	0	104	0	2	0	0	0	0	0	0	0	132

Intersection Name:	Group No:	TS ID:	Model:	Controller Make:	IP address:
Waterdown Rd @ NSR		106	ACS/3	Econolite	172.22.13.2

Type of Operation:				8 Phase Semi-Actuated	
No	Date			Description	Prepared By
	Y	M	D		
1	2015	1	28	Implement timings in Centracs	MA
2	2020	12	21	Update All-Red Intervals, Phase 8 FDW	JR

*- Start from Main Manu

PHASE DESCRIPTION			
Ph1	SBLT - Waterdown Rd	Ph5	NBLT - Waterdown Rd
Ph2	NB -Waterdown Rd	Ph6	SB -Waterdown Rd
Ph3		Ph7	
Ph4		Ph8	WB - NSR

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

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

CONTROLLER TIMING DATA - VEHICLE TIMING * - 2 - 1

Timing Plan: 1	Phase:	1	2	3	4	5	6	7	8
Minimum Green	:	7	8			7	8		8
Walk	:		15				15		10
Ped. Clearance	:		8				8		22
Vehicle Extension	:	3	3			3	3		3
MAX 1	:	15	40			20	40		30
MAX 2	:	15	40			20	40		30
Yellow Change	:	3	4			3	4		4
Red Clearance	:	0	4			0	4		4

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

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

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

Coordinator Pattern (CP)	Cycle Length	Offset (sec)	Timing Plan	Split Pattern	Phases (sec)							
					1	2	3	4	5	6	7	8
1	100	48	1	1	25	55			22	58		20
2	90	50	1	2	17	39			22	34		34
3	110	97	1	3	11	62			21	52		37
10			1	10								

CP # 1, 2, 10	Phase:	1	2	3	4	5	6	7	8
Coord Phase	:		X				X		
Vehicle Recall	:								
Pedestrian Recall *(3-3, 5-2)	:		X				X		
Recall to MAX Time	:								

Phase Omit	:								
Special Function Outputs	:								

Coordinator Pattern #	Prefer.	Phase							
		1	2	3	4	5	6	7	8
	1								
	2								

X - select "." deselect

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

Day Plan	Sched. #	Action Plan	Time Period	Pattern	Timing Plan
1	1	1	06:00	1	1
1	1	2	09:00	2	1
1	1	3	15:30	3	1
1	1	10	19:00	10	1
2	2	2	08:00	2	1
2	2	10	19:00	10	1
3	3	2	09:00	2	1
3	3	10	19:00	3	1

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

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

Action Plan 10 = free (254)

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

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

Sum of 1&2 = 5&6		**Sum of 3&4 = 7&8**		**Culculated**	
				Total 1-4	Total 5-8
1&2	5&6	3&4	7&8	Actual Cycle	Actual Cycle
80	80	0	20	80	100
56	56	0	34	56	90
73	73	0	37	73	110
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Intersection Name:	Group No:	TS ID:	Model:	Controller Make:	IP address:
Waterdown Rd @ 403 North Ramp		31	ACS/3	Econolite	172.22.12.2

Type of Operation:				8 Phase Semi-Actuated	
No	Date			Description	Prepared By
	Y	M	D		
1	2015	1		Implement timings in Centracs	MA
2	2020	12	21	Update Phase 2&6 All-Red	JR

*- Start from Main Manu

PHASE DESCRIPTION			
Ph1		Ph5	
Ph2	NB -Waterdown Rd	Ph6	SB -Waterdown Rd
Ph3		Ph7	WB - North Ramp
Ph4		Ph8	EB - Private Entrance

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

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

CONTROLLER TIMING DATA - VEHICLE TIMING * - 2 - 1

Timing Plan: 1

Phase:	1	2	3	4	5	6	7	8
Minimum Green :		8				8	8	8
Walk :		8				8		
Ped. Clearance :		16				16		
Vehicle Extension :		3				3	3	3
MAX 1 :		40				40	30	15
MAX 2 :		40				40	30	15
Yellow Change :		4				4	4	4
Red Clearance :		3				3	3	3

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

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

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

Coordinator Pattern (CP)	Cycle Length	Offset (sec)	Timing Plan	Split Pattern	Phases (sec)							
					1	2	3	4	5	6	7	8
1	100	55	1	1		55				55	27	18
2	90	49	1	2		45				45	27	18
3	110	94	1	3		65				65	26	19
10			1	10								

CP # 1, 2, 10 Phase:	1	2	3	4	5	6	7	8
Coord Phase :		X				X		
Vehicle Recall :								
Pedestrian Recall *(3-3, 5-2) :		X				X		
Recall to MAX Time :								
Phase Omit :								
Special Function Outputs :								

Coordinator Pattern #	Prefer.	Phase							
		1	2	3	4	5	6	7	8
	1								
	2								

X - select "." deselect

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

Day Plan	Sched. #	Action Plan	Time Period	Pattern	Timing Plan
1	1	1	06:00	1	1
1	1	2	09:00	2	1
1	1	3	15:30	3	1
1	1	10	19:00	10	1
2	2	2	08:00	2	1
2	2	10	19:00	10	1
3	3	2	09:00	2	1
3	3	10	19:00	3	1

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

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

Action Plan 10 = free (254)

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

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

Sum of 1&2 = 5&6		Sum of 3&4 = 7&8		Culculated	
				Total 1-4	Total 5-8
				Actual	Actual
1&2	5&6	3&4	7&8	Cycle	Cycle
55	55	0	45	55	100
45	45	0	45	45	90
65	65	0	45	65	110
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Intersection Name:	Group No:	TS ID:	Model:	Controller Make:	IP address:
Waterdown Rd @ 403 South Ramp		105	ACS/3	Econolite	172.22.9.2

Type of Operation:				8 Phase Semi-Actuated	
No	Date Y	M	D	Description	Prepared By
2	2015	2	27	Change Split 1	MA
3	2020	12	21	Update All-Red Intervals	JR

*- Start from Main Manu

PHASE DESCRIPTION			
Ph1	SBLT - Waterdown Rd	Ph5	
Ph2	NB -Waterdown Rd	Ph6	SB -Waterdown Rd
Ph3	WB -403 EB on Ramp	Ph7	
Ph4	EB - 403 EB off Ramp	Ph8	

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

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

CONTROLLER TIMING DATA - VEHICLE TIMING * - 2 - 1

Timing Plan: 1	Phase:	1	2	3	4	5	6	7	8
Minimum Green	:	6	8	8	8		8		
Walk	:		8		8		8		
Ped. Clearance	:		14		14		14		
Vehicle Extension	:	3	3	3	3		3		
MAX 1	:	15	40	20	30		40		
MAX 2	:	15	40	20	30		40		
Yellow Change	:	3	4	4	4		4		
Red Clearance	:	0	3	4	4		3		

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

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

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

Coordinator Pattern (CP)	Cycle Length	Offset (sec)	Timing Plan	Split Pattern	Phases (sec) 1	2	3	4	5	6	7	8
1	100	54	1	1	15	35	20	30		50		
2	90	46	1	2	12	32	16	30		44		
3	110	99	1	3	17	44	22	27		61		
10			1	10								

CP # 1, 2, 10	Phase:	1	2	3	4	5	6	7	8
Coord Phase	:		X				X		
Vehicle Recall	:								
Pedestrian Recall *(3-3, 5-2)	:		X				X		
Recall to MAX Time	:								

Phase Omit	:								
Special Function Outputs	:								

Coordinator Pattern #	Prefer.	Phase							
		1	2	3	4	5	6	7	8
	1								
	2								

X - select "." deselect

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

Day Plan	Sched. #	Action Plan	Time Period	Pattern	Timing Plan
1	1	1	06:00	1	1
1	1	2	09:00	2	1
1	1	3	15:30	3	1
1	1	10	19:00	10	1
2	2	2	08:00	2	1
2	2	10	19:00	10	1
3	3	2	09:00	2	1
3	3	10	19:00	3	1

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

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

Action Plan 10 = free (254)

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

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

Sum of 1&2 = 5&6		Sum of 3&4 = 7&8		Culculated	
				Total 1-4	Total 5-8
1&2	5&6	3&4	7&8	Actual Cycle	Actual Cycle
50	50	50	0	100	50
44	44	46	0	90	44
61	61	49	0	110	61
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Intersection Name:	TS ID:	Line No:	IP address:
Aldershot Go Stn @ Bus Entrance	33	4	172.22.11.2

Controller Make:	Model:
Econolite	ACS/3

Type of Operation: 8 Phase Semi-Actuated

No	Date Y	M	D	Description	Prepared by
1	2015	2	4	Implement timings in Centracs	MA

*- Start from Main Manu

PHASE DESCRIPTION

Ph1		Ph5	
Ph2	EB -403 On Ramp	Ph6	EB -403 On Ramp
Ph3		Ph7	
Ph4	NB - Go Access	Ph8	

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

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

CONTROLLER TIMING DATA - VEHICLE TIMING * - 2 - 1

Timing Plan: 1 Phase:	1	2	3	4	5	6	7	8
Minimum Green :		8		8		8		
Walk :		15				15		
Ped. Clearance :		8				8		
Vehicle Extension :		3		5		3		
MAX 1 :		30		35		30		
MAX 2 :		30		35		30		
Yellow Change :		4		4		4		
Red Clearance :		2		3		2		

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

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

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

Coordinator Pattern (CP)	Cycle Length	Offset (sec)	Timing Plan	Split Pattern	Phases (sec) 1	2	3	4	5	6	7	8
10				10								

Intersection Name:	TS ID:	Line No:	IP address:
Aldershot Go Stn @ Bus Entrance	33	4	172.22.11.2

Controller Make:	Model:
Econolite	ACS/3

CP # 1, 2, 10	Phase:	1	2	3	4	5	6	7	8
Coord Phase	:		X				X		
Vehicle Recall	:								
Pedestrian Recall *(3-3, 5-2)	:		X				X		
Recall to MAX Time	:								
Phase Omit	:								
Special Function Outputs	:								

Coordinator Pattern #	Prefer.	Phase							
		1	2	3	4	5	6	7	8
	1								
	2								

X - select "." deselect

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

Day Plan	Sched. #	Action Plan	Time Period	Pattern	Timing Plan
1	1	10	00:00	10	1

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

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

Action Plan 10 = free (254)

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

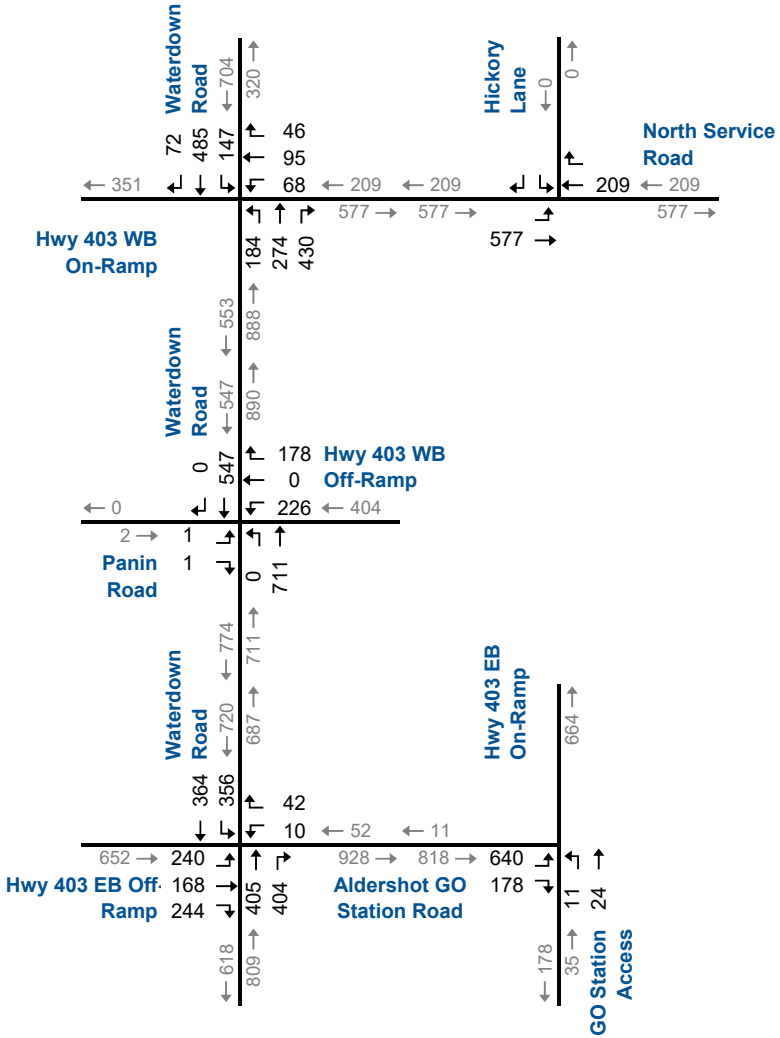
Events	Exception Day		MON/ MON	DOW/ DOW	WOM/ Year	Day Plan
New Year's Day	1	Fixed	1	1	0	3
Family Day	2	Float	2	2	3	3
Good Friday	3	Float	4	6	1	3
Victoria Day	4	Float	5	2	3	3
Canada Day	5	Fixed	7	1	0	3
Civic Day	6	Float	8	2	1	3
Labour Day	7	Float	9	2	1	3
Thanksgiving	8	Float	10	2	2	3
Christmas Day	9	Fixed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

Appendix C

Base Year Traffic Volumes by Vehicle Type

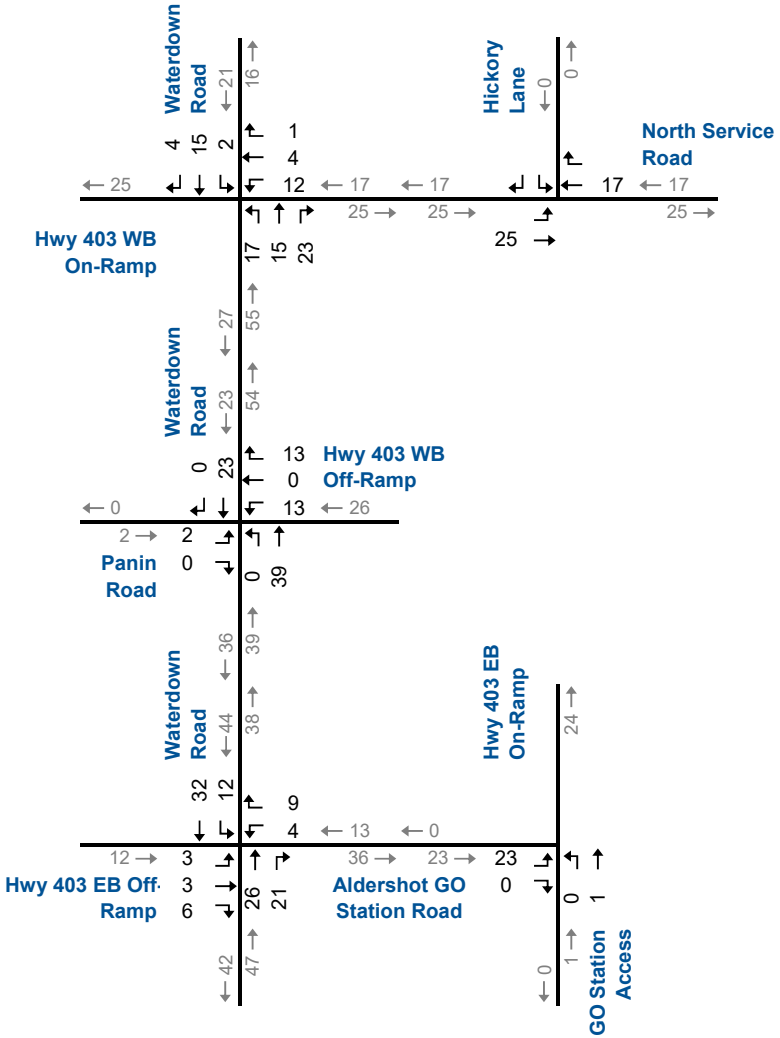
Base Year AM Peak Hour

Light Vehicles



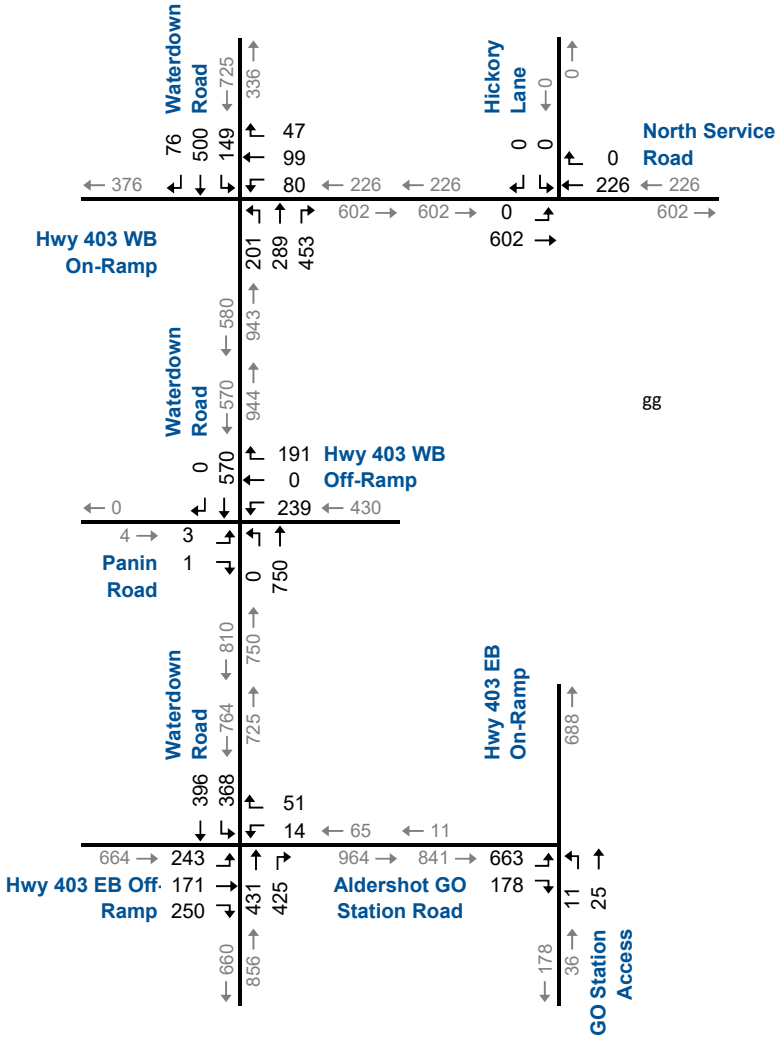
Base Year AM Peak Hour

Medium & Articulated Trucks



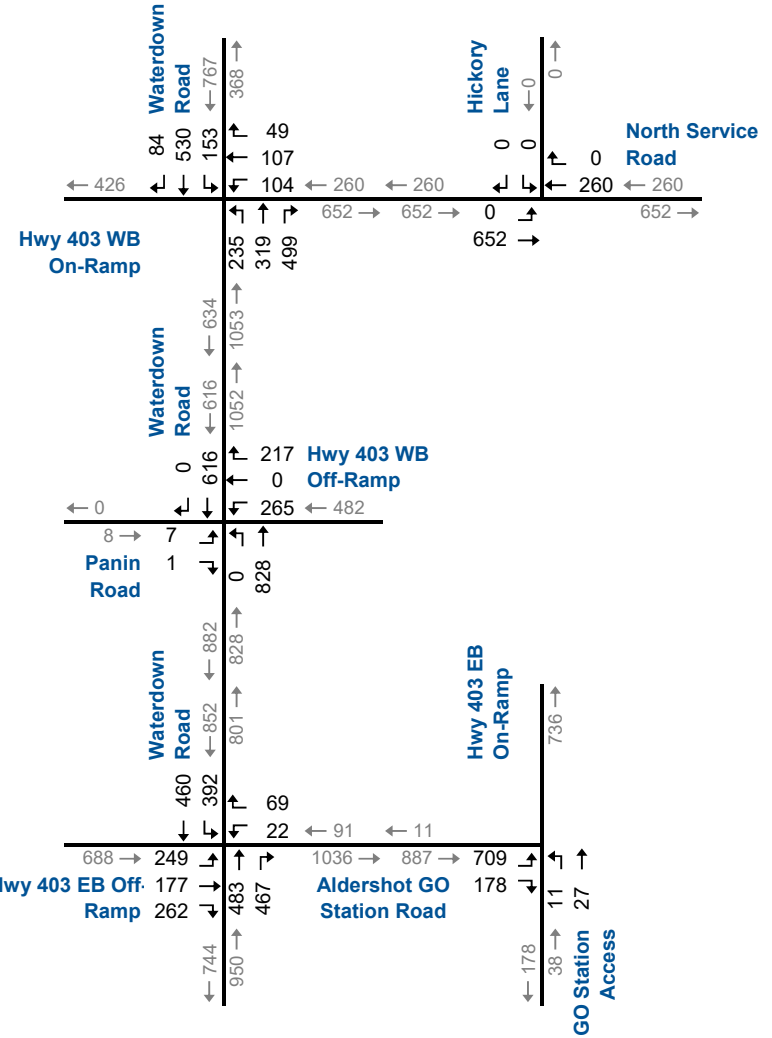
Base Year AM Peak Hour

Total Count Volume (Light + Medium + Articulated)



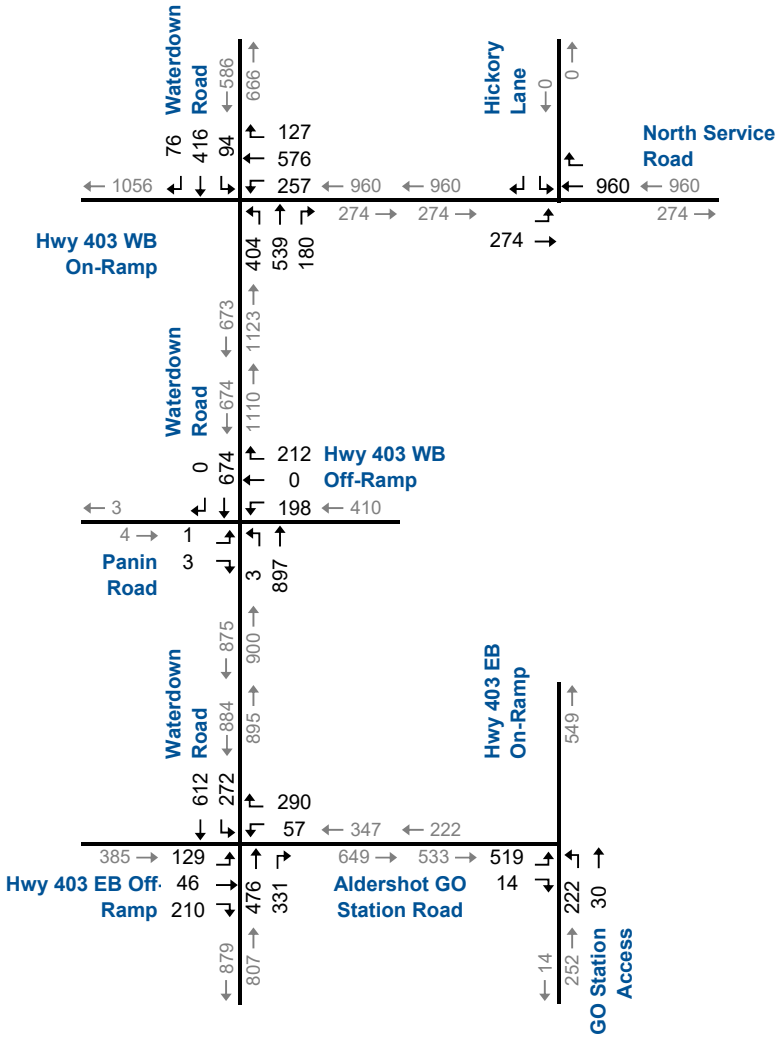
Base Year AM Peak Hour

Passenger Car Equivalents (PCE)



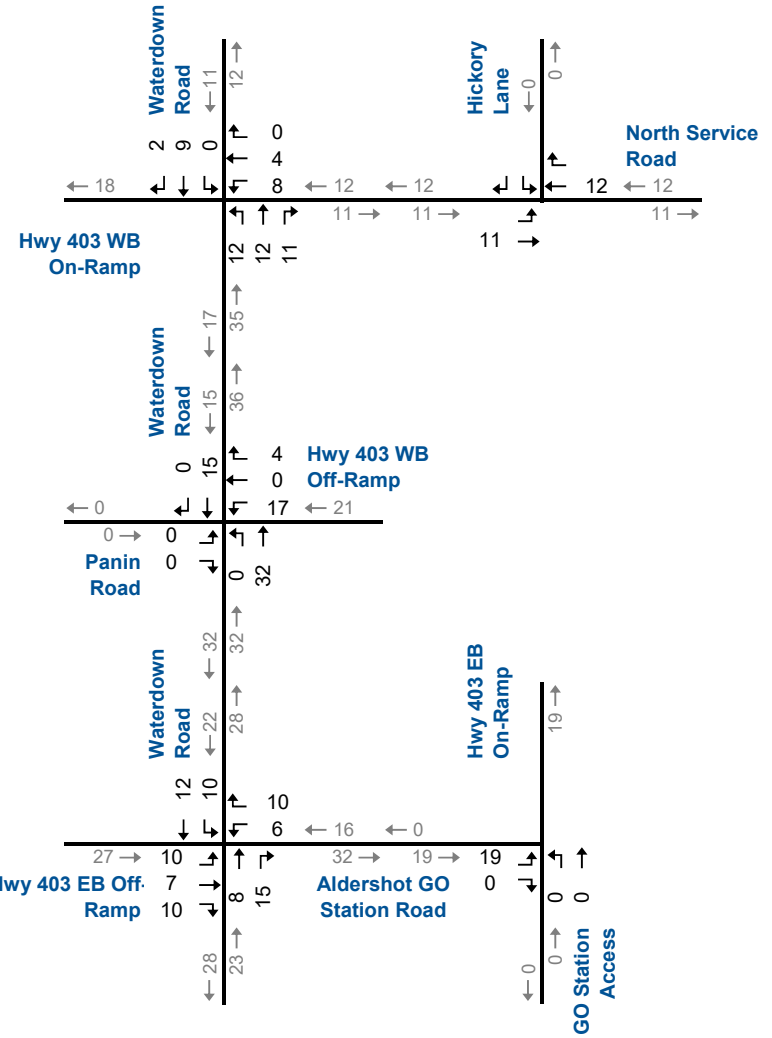
Base Year PM Peak Hour

Light Vehicles



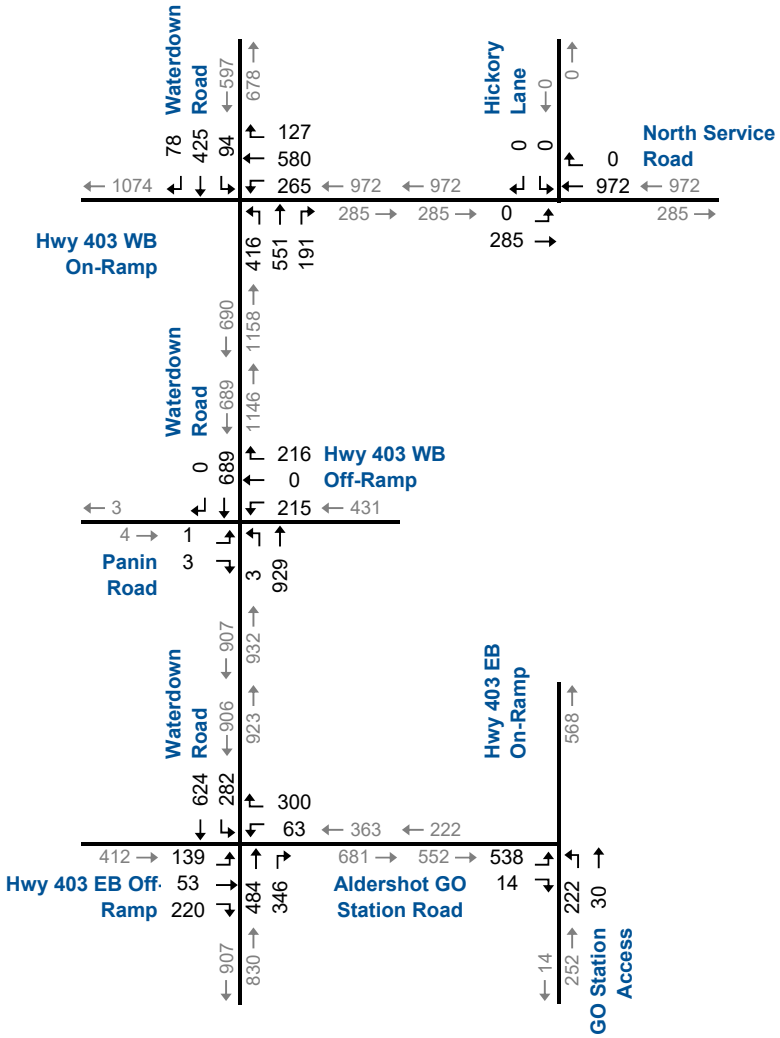
Base Year PM Peak Hour

Medium & Articulated Trucks



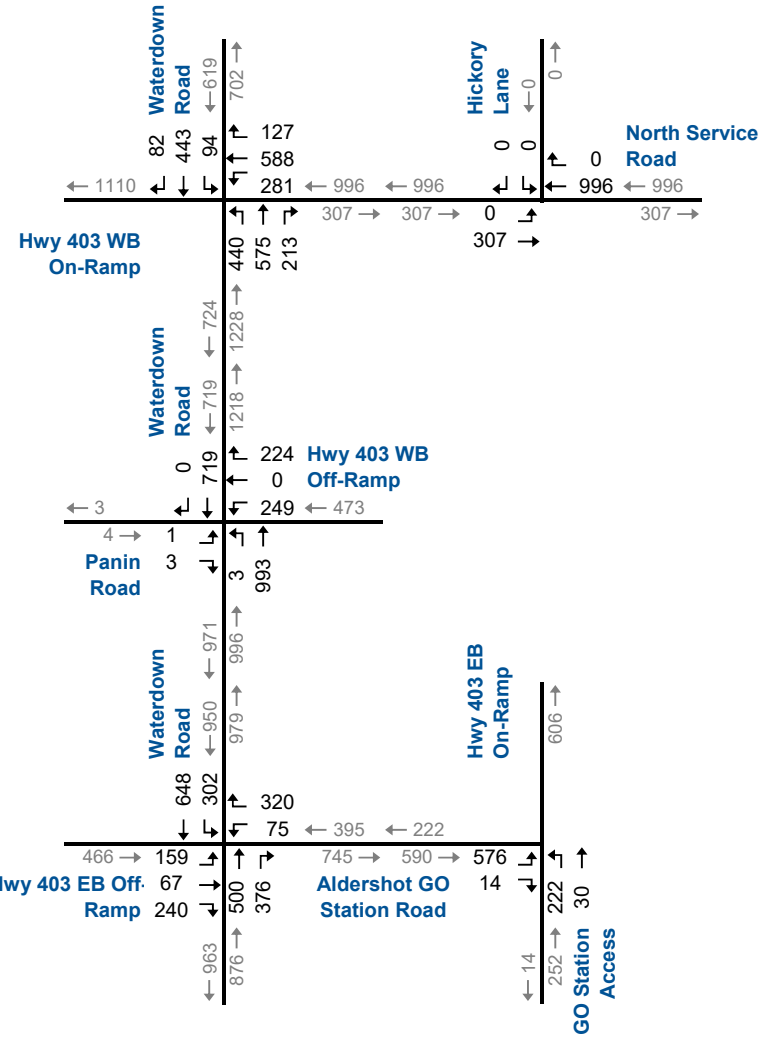
Base Year PM Peak Hour

Total Count Volume (Light + Medium + Articulated)



Base Year PM Peak Hour

Passenger Car Equivalents (PCE)



Appendix D

Base Year Traffic Operations



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	104	107	49	235	319	499	153	530	84
Future Volume (vph)	0	0	0	104	107	49	235	319	499	153	530	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.909			0.979	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3281	0	1745	3534	0
Flt Permitted				0.950			0.380			0.307		
Satd. Flow (perm)	0	0	0	1745	1900	1597	698	3281	0	564	3534	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						87		509			28	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	106	109	50	240	326	509	156	541	86
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	106	109	50	240	835	0	156	627	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.5	31.0	
Total Split (s)				20.0	20.0	20.0	22.0	55.0		25.0	58.0	
Total Split (%)				20.0%	20.0%	20.0%	22.0%	55.0%		25.0%	58.0%	
Maximum Green (s)				12.0	12.0	12.0	19.0	47.0		22.0	50.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				14.6	14.6	14.6	74.7	66.5		72.1	65.2	
Actuated g/C Ratio				0.15	0.15	0.15	0.75	0.66		0.72	0.65	
v/c Ratio				0.42	0.39	0.16	0.40	0.36		0.32	0.27	
Control Delay				43.8	42.8	3.5	5.3	2.0		5.0	7.7	
Queue Delay				0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay				43.8	42.8	3.5	5.3	2.1		5.0	7.7	
LOS				D	D	A	A	A		A	A	
Approach Delay					35.8			2.8			7.2	
Approach LOS					D			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 48 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.42			
Intersection Signal Delay: 8.5		Intersection LOS: A	
Intersection Capacity Utilization 50.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd





Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	106	109	50	240	835	156	627
v/c Ratio	0.42	0.39	0.16	0.40	0.36	0.32	0.27
Control Delay	43.8	42.8	3.5	5.3	2.0	5.0	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	43.8	42.8	3.5	5.3	2.1	5.0	7.7
Queue Length 50th (m)	19.7	20.2	0.0	7.6	3.5	6.6	24.8
Queue Length 95th (m)	36.3	36.8	3.7	15.7	9.0	11.8	37.0
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	279	304	328	728	2351	684	2313
Starvation Cap Reductn	0	0	0	0	406	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.36	0.15	0.33	0.43	0.23	0.27

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	104	107	49	235	319	499	153	530	84
Future Volume (vph)	0	0	0	104	107	49	235	319	499	153	530	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.91		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3280		1745	3536	
Flt Permitted				0.95	1.00	1.00	0.38	1.00		0.31	1.00	
Satd. Flow (perm)				1745	1900	1597	697	3280		563	3536	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	106	109	50	240	326	509	156	541	86
RTOR Reduction (vph)	0	0	0	0	0	43	0	171	0	0	10	0
Lane Group Flow (vph)	0	0	0	106	109	7	240	664	0	156	617	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				10.6	10.6	10.6	71.7	62.5		69.1	61.2	
Effective Green, g (s)				14.6	14.6	14.6	69.7	66.5		67.1	65.2	
Actuated g/C Ratio				0.15	0.15	0.15	0.70	0.66		0.67	0.65	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				254	277	233	571	2181		459	2305	
v/s Ratio Prot					0.06		c0.03	0.20		0.02	0.17	
v/s Ratio Perm				c0.06		0.00	c0.26			0.20		
v/c Ratio				0.42	0.39	0.03	0.42	0.30		0.34	0.27	
Uniform Delay, d1				38.8	38.7	36.6	5.5	7.0		6.1	7.3	
Progression Factor				1.00	1.00	1.00	1.08	0.59		1.00	1.00	
Incremental Delay, d2				1.1	0.9	0.1	0.5	0.3		0.4	0.3	
Delay (s)				39.9	39.6	36.7	6.5	4.5		6.6	7.6	
Level of Service				D	D	D	A	A		A	A	
Approach Delay (s)		0.0			39.2			4.9			7.4	
Approach LOS		A			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.40				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	50.0%	ICU Level of Service		A	
Analysis Period (min)	15				

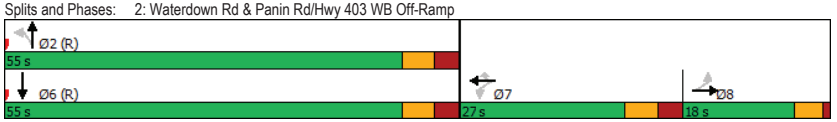
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	265	0	217	0	828	0	0	616	0
Future Volume (vph)	7	0	1	265	0	217	0	828	0	0	616	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.983				0.850						
Flt Protected		0.958		0.950	0.950							
Satd. Flow (prot)	0	1789	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.875	0.875							
Satd. Flow (perm)	0	1868	0	1527	1579	1597	0	3610	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		120				224						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	0	1	273	0	224	0	854	0	0	635	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	136	137	224	0	854	0	0	635	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	18.0	18.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	18.0	18.0		27.0	27.0	27.0	55.0	55.0			55.0	
Total Split (%)	18.0%	18.0%		27.0%	27.0%	27.0%	55.0%	55.0%			55.0%	
Maximum Green (s)	13.5	13.5		20.0	20.0	20.0	48.0	48.0			48.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		17.2	17.2	17.2		72.8			72.8	
Actuated g/C Ratio		0.06		0.17	0.17	0.17		0.73			0.73	
v/c Ratio		0.04		0.52	0.51	0.49		0.32			0.24	
Control Delay		0.2		43.9	43.2	8.4		5.1			4.6	
Queue Delay		0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay		0.2		43.9	43.2	8.4		5.1			4.6	
LOS		A		D	D	A		A			A	
Approach Delay		0.3			27.7			5.1			4.6	
Approach LOS		A			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 55 (55%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.52			
Intersection Signal Delay: 10.6		Intersection LOS: B	
Intersection Capacity Utilization 50.5%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	8	136	137	224	854	635
v/c Ratio	0.04	0.52	0.51	0.49	0.32	0.24
Control Delay	0.2	43.9	43.2	8.4	5.1	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.2	43.9	43.2	8.4	5.1	4.6
Queue Length 50th (m)	0.0	26.8	26.9	0.0	34.1	15.0
Queue Length 95th (m)	0.0	44.1	44.2	18.8	m49.2	19.1
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	364	351	363	539	2628	2628
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	0.39	0.38	0.42	0.32	0.24

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	265	0	217	0	828	0	0	616	0
Future Volume (vph)	7	0	1	265	0	217	0	828	0	0	616	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.98		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.96		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1790		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.88	0.88	1.00		1.00			1.00	
Satd. Flow (perm)		1868		1527	1579	1597		3610			3610	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	7	0	1	273	0	224	0	854	0	0	635	0
RTOR Reduction (vph)	0	8	0	0	0	185	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	136	137	39	0	854	0	0	635	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		14.2	14.2	14.2		66.2			66.2	
Effective Green, g (s)		1.6		17.2	17.2	17.2		69.2			69.2	
Actuated g/C Ratio		0.02		0.17	0.17	0.17		0.69			0.69	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		29		262	271	274		2498			2498	
v/s Ratio Prot								c0.24			0.18	
v/s Ratio Perm		c0.00		c0.09	0.09	0.02						
v/c Ratio		0.00		0.52	0.51	0.14		0.34			0.25	
Uniform Delay, d1		48.4		37.6	37.5	35.1		6.2			5.8	
Progression Factor		1.00		1.00	1.00	1.00		0.82			0.80	
Incremental Delay, d2		0.1		1.7	1.5	0.2		0.3			0.2	
Delay (s)		48.5		39.4	39.0	35.4		5.3			4.8	
Level of Service		D		D	D	D		A			A	
Approach Delay (s)		48.5			37.5			5.3			4.8	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

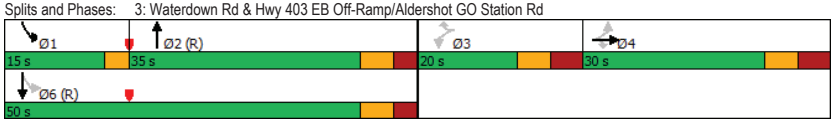
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	249	177	262	22	0	69	0	483	467	392	460	0
Future Volume (vph)	249	177	262	22	0	69	0	483	467	392	460	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.926				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3343	0	1805	3610	0
Flt Permitted	0.950			0.348						0.136		
Satd. Flow (perm)	1745	1900	1597	1240	0	1597	0	3343	0	258	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			279			164		254				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
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 (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	265	188	279	23	0	73	0	514	497	417	489	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	265	188	279	23	0	73	0	1011	0	417	489	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	30.0	30.0	30.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	30.0	30.0	30.0	20.0		20.0		35.0		15.0	50.0	
Total Split (%)	30.0%	30.0%	30.0%	20.0%		20.0%		35.0%		15.0%	50.0%	
Maximum Green (s)	22.0	22.0	22.0	12.0		12.0		28.0		12.0	43.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	23.5	23.5	23.5	13.1		13.1		31.0		54.6	54.6	
Actuated g/C Ratio	0.24	0.24	0.24	0.13		0.13		0.31		0.55	0.55	
v/c Ratio	0.65	0.42	0.47	0.14		0.21		0.83		0.94	0.25	
Control Delay	41.9	34.8	6.5	39.9		1.3		31.1		61.7	9.8	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	41.9	34.8	6.5	39.9		1.3		31.1		61.7	9.8	
LOS	D	C	A	D		A		C		E	A	
Approach Delay		26.6			10.6			31.1			33.7	
Approach LOS		C			B			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 54 (54%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 30.0		Intersection LOS: C	
Intersection Capacity Utilization 79.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	265	188	279	23	73	1011	417	489
v/c Ratio	0.65	0.42	0.47	0.14	0.21	0.83	0.94	0.25
Control Delay	41.9	34.8	6.5	39.9	1.3	31.1	61.7	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.9	34.8	6.5	39.9	1.3	31.1	61.7	9.8
Queue Length 50th (m)	47.9	31.9	0.0	2.2	0.0	77.3	~69.6	27.9
Queue Length 95th (m)	74.2	51.9	19.8	5.9	0.0	104.8	#163.0	36.6
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	459	500	626	198	393	1211	443	1970
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.38	0.45	0.12	0.19	0.83	0.94	0.25

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	249	177	262	22	0	69	0	483	467	392	460	0
Future Volume (vph)	249	177	262	22	0	69	0	483	467	392	460	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.93		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3344		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.35		1.00		1.00		0.14	1.00	
Satd. Flow (perm)	1745	1900	1597	1239		1597		3344		259	3610	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	265	188	279	23	0	73	0	514	497	417	489	0
RTOR Reduction (vph)	0	0	213	0	0	65	0	179	0	0	0	0
Lane Group Flow (vph)	265	188	66	23	0	8	0	832	0	417	489	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	19.5	19.5	19.5	7.5		7.5		26.4		50.0	50.0	
Effective Green, g (s)	23.5	23.5	23.5	11.5		11.5		29.4		49.0	53.0	
Actuated g/C Ratio	0.24	0.24	0.24	0.12		0.12		0.29		0.49	0.53	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	410	446	375	142		183		983		429	1913	
v/s Ratio Prot		0.10						0.25		c0.19	0.14	
v/s Ratio Perm	c0.15		0.04	c0.02		0.01				c0.29		
v/c Ratio	0.65	0.42	0.17	0.16		0.05		0.85		0.97	0.26	
Uniform Delay, d1	34.5	32.5	30.5	39.9		39.4		33.2		28.5	12.8	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.00		1.24	0.68	
Incremental Delay, d2	3.5	0.6	0.2	0.5		0.1		8.9		35.4	0.3	
Delay (s)	38.0	33.1	30.7	40.4		39.5		42.1		70.7	9.1	
Level of Service	D	C	C	D		D		D		E	A	
Approach Delay (s)		34.0			39.7			42.1			37.4	
Approach LOS		C			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	79.4%	ICU Level of Service	D	
Analysis Period (min)	15			

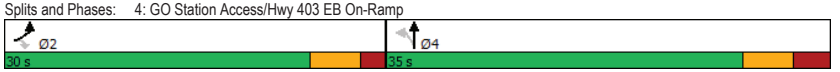
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	709	178	11	27	0	0
Future Volume (vph)	709	178	11	27	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.985		
Satd. Flow (prot)	1745	1597	0	1872	0	0
Flt Permitted	0.950			0.985		
Satd. Flow (perm)	1745	1597	0	1872	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		187				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	746	187	12	28	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	746	187	0	40	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	30.0	30.0	35.0	35.0		
Total Split (%)	46.2%	46.2%	53.8%	53.8%		
Maximum Green (s)	24.0	24.0	28.0	28.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	Max	Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	41.7	41.7		11.0		
Actuated g/C Ratio	0.92	0.92		0.24		
v/c Ratio	0.47	0.13		0.09		
Control Delay	3.8	0.9		14.3		
Queue Delay	0.0	0.0		0.0		
Total Delay	3.8	0.9		14.3		
LOS	A	A		B		
Approach Delay	3.2			14.3		
Approach LOS	A			B		

Intersection Summary		
Area Type:	Other	
Cycle Length: 65		
Actuated Cycle Length: 45.4		
Natural Cycle: 70		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.47		
Intersection Signal Delay: 3.7		Intersection LOS: A
Intersection Capacity Utilization 52.6%		ICU Level of Service A
Analysis Period (min) 15		

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	746	187	40
v/c Ratio	0.47	0.13	0.09
Control Delay	3.8	0.9	14.3
Queue Delay	0.0	0.0	0.0
Total Delay	3.8	0.9	14.3
Queue Length 50th (m)	0.0	0.0	2.6
Queue Length 95th (m)	71.9	5.1	8.4
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1604	1483	1278
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.47	0.13	0.03

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	709	178	11	27	0	0
Future Volume (vph)	709	178	11	27	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.99		
Satd. Flow (prot)	1745	1597		1872		
Flt Permitted	0.95	1.00		0.99		
Satd. Flow (perm)	1745	1597		1872		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	746	187	12	28	0	0
RTOR Reduction (vph)	0	46	0	0	0	0
Lane Group Flow (vph)	746	141	0	40	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	36.5	36.5		1.5		
Effective Green, g (s)	38.5	38.5		4.5		
Actuated g/C Ratio	0.75	0.75		0.09		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1317	1205		165		
v/s Ratio Prot	c0.43					
v/s Ratio Perm		0.09		0.02		
v/c Ratio	0.57	0.12		0.24		
Uniform Delay, d1	2.7	1.7		21.7		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	1.8	0.2		0.8		
Delay (s)	4.4	1.9		22.4		
Level of Service	A	A		C		
Approach Delay (s)	3.9			22.4	0.0	
Approach LOS	A			C	A	

Intersection Summary				
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.53			
Actuated Cycle Length (s)	51.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	52.6%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	652	260	0	0	0
Future Volume (vph)	0	652	260	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1900	1900	0	1900	0
Flt Permitted						
Satd. Flow (perm)	0	1900	1900	0	1900	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		201.6	103.7		212.7	
Travel Time (s)		12.1	6.2		15.3	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	665	265	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	665	265	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	652	260	0	0	0
Future Volume (Veh/h)	0	652	260	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	0	665	265	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	265				930	265
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	265				930	265
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1311				299	779

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	665	265	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1311	1700	1700
Volume to Capacity	0.00	0.16	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	L	T	TR	L	T	TR	T
Maximum Queue (m)	45.8	42.2	14.4	41.9	44.6	53.9	41.6	74.3	55.4	3.0
Average Queue (m)	22.9	20.5	6.7	19.2	18.9	23.5	16.9	35.7	17.6	0.1
95th Queue (m)	40.0	36.6	12.7	34.5	37.4	43.8	31.4	59.2	42.3	2.1
Link Distance (m)		281.2			124.2	124.2		83.3		88.5
Upstream Blk Time (%)								0		
Queuing Penalty (veh)								0		
Storage Bay Dist (m)	150.0		130.0	90.0			70.0		70.0	
Storage Blk Time (%)								0	0	
Queuing Penalty (veh)								1	0	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	14.3	44.4	50.0	51.8	49.8	50.1	30.3	22.2
Average Queue (m)	2.4	25.7	27.0	19.8	20.6	20.6	10.8	5.6
95th Queue (m)	9.2	43.8	46.3	38.4	40.3	41.1	23.6	16.1
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	82.2	70.6	41.2	18.0	3.5	21.7	183.4	206.5	37.4	119.7	90.6
Average Queue (m)	44.6	31.3	20.0	6.0	0.2	8.8	96.6	124.9	34.1	48.5	28.7
95th Queue (m)	70.7	56.0	33.4	15.1	2.1	16.7	195.0	227.3	42.6	115.5	75.1
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)										0	
Queuing Penalty (veh)										1	
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)									34	0	
Queuing Penalty (veh)									79	1	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	72.4	18.4	18.9
Average Queue (m)	26.6	5.6	8.1
95th Queue (m)	60.1	15.2	16.7
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: North Service Rd & Hickory Lane

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 82

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	281	588	127	440	575	213	94	443	82
Future Volume (vph)	0	0	0	281	588	127	440	575	213	94	443	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.959			0.977	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3462	0	1745	3527	0
Flt Permitted				0.950			0.319			0.303		
Satd. Flow (perm)	0	0	0	1745	1900	1597	586	3462	0	557	3527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						140		73			24	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	309	646	140	484	632	234	103	487	90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	309	646	140	484	866	0	103	577	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.0	31.0	
Total Split (s)				37.0	37.0	37.0	21.0	62.0		11.0	52.0	
Total Split (%)				33.6%	33.6%	33.6%	19.1%	56.4%		10.0%	47.3%	
Maximum Green (s)				29.0	29.0	29.0	18.0	54.0		8.0	44.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				33.0	33.0	33.0	69.0	58.4		54.7	48.1	
Actuated g/C Ratio				0.30	0.30	0.30	0.63	0.53		0.50	0.44	
v/c Ratio				0.59	1.13	0.24	0.89	0.46		0.30	0.37	
Control Delay				38.3	116.6	6.0	31.5	8.2		11.6	20.7	
Queue Delay				0.0	0.0	0.0	0.0	0.2		0.0	0.0	
Total Delay				38.3	116.6	6.0	31.5	8.4		11.6	20.7	
LOS				D	F	A	C	A		B	C	
Approach Delay					80.3			16.7			19.3	
Approach LOS					F			B			B	

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 4 (4%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 90		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.13		
Intersection Signal Delay: 39.6	Intersection LOS: D	
Intersection Capacity Utilization 80.2%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 1: Waterdown Rd & North Service Rd





Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	309	646	140	484	866	103	577
v/c Ratio	0.59	1.13	0.24	0.89	0.46	0.30	0.37
Control Delay	38.3	116.6	6.0	31.5	8.2	11.6	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	38.3	116.6	6.0	31.5	8.4	11.6	20.7
Queue Length 50th (m)	59.2	~170.2	0.0	56.0	41.3	8.5	43.1
Queue Length 95th (m)	89.2	#241.3	14.3	#49.1	53.1	15.5	57.4
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	523	570	577	546	1870	354	1555
Starvation Cap Reductn	0	0	0	0	309	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	1.13	0.24	0.89	0.55	0.29	0.37

Intersection Summary

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	281	588	127	440	575	213	94	443	82
Future Volume (vph)	0	0	0	281	588	127	440	575	213	94	443	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3464		1745	3526	
Flt Permitted				0.95	1.00	1.00	0.32	1.00		0.30	1.00	
Satd. Flow (perm)				1745	1900	1597	586	3464		557	3526	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	309	646	140	484	632	234	103	487	90
RTOR Reduction (vph)	0	0	0	0	0	98	0	34	0	0	14	0
Lane Group Flow (vph)	0	0	0	309	646	42	484	832	0	103	563	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				29.0	29.0	29.0	65.0	54.4		51.7	44.1	
Effective Green, g (s)				33.0	33.0	33.0	64.0	58.4		49.7	48.1	
Actuated g/C Ratio				0.30	0.30	0.30	0.58	0.53		0.45	0.44	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				523	570	479	519	1839		322	1541	
v/s Ratio Prot					c0.34		c0.14	0.24		0.02	0.16	
v/s Ratio Perm				0.18		0.03	c0.40			0.13		
v/c Ratio				0.59	1.13	0.09	0.93	0.45		0.32	0.37	
Uniform Delay, d1				32.8	38.5	27.7	15.7	15.9		17.6	20.7	
Progression Factor				1.00	1.00	1.00	1.08	0.51		1.00	1.00	
Incremental Delay, d2				1.8	80.1	0.1	22.2	0.7		0.6	0.7	
Delay (s)				34.5	118.6	27.8	39.3	8.8		18.2	21.4	
Level of Service				C	F	C	D	A		B	C	
Approach Delay (s)		0.0			83.3			19.7			20.9	
Approach LOS		A			F			B			C	

Intersection Summary				
HCM 2000 Control Delay	42.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	80.2%	ICU Level of Service	D	
Analysis Period (min)	15			

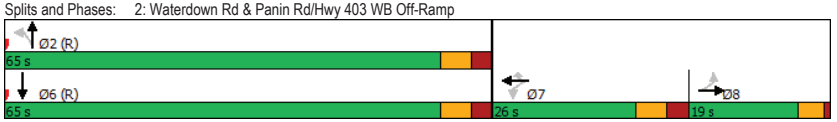
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	249	0	224	3	993	0	0	719	0
Future Volume (vph)	1	0	3	249	0	224	3	993	0	0	719	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.899				0.850						
Flt Protected		0.988		0.950	0.950							
Satd. Flow (prot)	0	1688	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.261	0.261			0.954				
Satd. Flow (perm)	0	1708	0	455	471	1597	0	3444	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109				249						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	0	3	277	0	249	3	1103	0	0	799	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	4	0	138	139	249	0	1106	0	0	799	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	19.0	19.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	19.0	19.0		26.0	26.0	26.0	65.0	65.0			65.0	
Total Split (%)	17.3%	17.3%		23.6%	23.6%	23.6%	59.1%	59.1%			59.1%	
Maximum Green (s)	14.5	14.5		19.0	19.0	19.0	58.0	58.0			58.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		22.0	22.0	22.0		78.0			78.0	
Actuated g/C Ratio		0.05		0.20	0.20	0.20		0.71			0.71	
v/c Ratio		0.02		1.52	1.48	0.48		0.45			0.31	
Control Delay		0.2		313.5	297.4	8.1		5.7			5.8	
Queue Delay		0.0		0.0	0.0	0.0		0.0			0.2	
Total Delay		0.2		313.5	297.4	8.1		5.7			6.0	
LOS		A		F	F	A		A			A	
Approach Delay		0.3			164.7			5.7			6.0	
Approach LOS		A			F			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 94 (85%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.52			
Intersection Signal Delay: 40.1		Intersection LOS: D	
Intersection Capacity Utilization 55.6%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	4	138	139	249	1106	799
v/c Ratio	0.02	1.52	1.48	0.48	0.45	0.31
Control Delay	0.2	313.5	297.4	8.1	5.7	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2
Total Delay	0.2	313.5	297.4	8.1	5.7	6.0
Queue Length 50th (m)	0.0	~45.8	~45.5	0.0	34.1	29.6
Queue Length 95th (m)	0.0	#88.5	#88.3	21.1	65.4	57.8
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	327	91	94	518	2441	2559
Starvation Cap Reductn	0	0	0	0	0	929
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.52	1.48	0.48	0.45	0.49

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	249	0	224	3	993	0	0	719	0
Future Volume (vph)	1	0	3	249	0	224	3	993	0	0	719	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.90		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.99		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1687		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.26	0.26	1.00		0.95			1.00	
Satd. Flow (perm)		1708		455	471	1597		3442			3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1	0	3	277	0	249	3	1103	0	0	799	0
RTOR Reduction (vph)	0	4	0	0	0	199	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	138	139	50	0	1106	0	0	799	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		19.0	19.0	19.0		71.4			71.4	
Effective Green, g (s)		1.6		22.0	22.0	22.0		74.4			74.4	
Actuated g/C Ratio		0.01		0.20	0.20	0.20		0.68			0.68	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		91	94	319		2328			2441	
v/s Ratio Prot											0.22	
v/s Ratio Perm		c0.00		c0.30	0.30	0.03		c0.32				
v/c Ratio		0.00		1.52	1.48	0.16		0.48			0.33	
Uniform Delay, d1		53.4		44.0	44.0	36.3		8.5			7.4	
Progression Factor		1.00		1.00	1.00	1.00		0.71			0.86	
Incremental Delay, d2		0.0		280.5	263.7	0.2		0.5			0.3	
Delay (s)		53.5		324.5	307.7	36.6		6.5			6.7	
Level of Service		D		F	F	D		A			A	
Approach Delay (s)		53.5			183.8			6.5			6.7	
Approach LOS		D			F			A			A	

Intersection Summary

HCM 2000 Control Delay	44.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

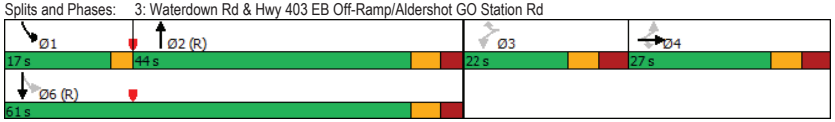
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	159	67	240	75	0	320	0	500	376	302	648	0
Future Volume (vph)	159	67	240	75	0	320	0	500	376	302	648	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.936				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3379	0	1805	3610	0
Flt Permitted	0.950			0.237						0.100		
Satd. Flow (perm)	1745	1900	1597	844	0	1597	0	3379	0	190	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			253			364		194				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	181	76	273	85	0	364	0	568	427	343	736	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	181	76	273	85	0	364	0	995	0	343	736	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	27.0	27.0	27.0	22.0		22.0		44.0		17.0	61.0	
Total Split (%)	24.5%	24.5%	24.5%	20.0%		20.0%		40.0%		15.5%	55.5%	
Maximum Green (s)	19.0	19.0	19.0	14.0		14.0		37.0		14.0	54.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	19.8	19.8	19.8	16.9		16.9		40.0		61.2	61.2	
Actuated g/C Ratio	0.18	0.18	0.18	0.15		0.15		0.36		0.56	0.56	
v/c Ratio	0.58	0.22	0.55	0.65		0.66		0.74		0.96	0.37	
Control Delay	48.3	39.0	10.7	67.7		10.6		28.0		64.3	21.7	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	48.3	39.0	10.7	67.7		10.6		28.0		64.3	21.7	
LOS	D	D	B	E		B		C		E	C	
Approach Delay		27.6			21.4			28.0			35.2	
Approach LOS		C			C			C			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 99 (90%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 29.5		Intersection LOS: C	
Intersection Capacity Utilization 68.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Queues

200584

3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Base Year PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	181	76	273	85	364	995	343	736
v/c Ratio	0.58	0.22	0.55	0.65	0.66	0.74	0.96	0.37
Control Delay	48.3	39.0	10.7	67.7	10.6	28.0	64.3	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	39.0	10.7	67.7	10.6	28.0	64.3	21.7
Queue Length 50th (m)	37.4	14.7	3.8	9.3	0.0	83.1	~54.8	59.6
Queue Length 95th (m)	57.7	27.0	24.9	#19.8	24.5	104.4 m	#105.0	m62.8
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	364	397	534	138	565	1352	358	2009
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.19	0.51	0.62	0.64	0.74	0.96	0.37

Intersection Summary

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

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

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

200584

3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Base Year PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	159	67	240	75	0	320	0	500	376	302	648	0
Future Volume (vph)	159	67	240	75	0	320	0	500	376	302	648	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3378		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.24		1.00		1.00		0.10	1.00	
Satd. Flow (perm)	1745	1900	1597	843		1597		3378		190	3610	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	181	76	273	85	0	364	0	568	427	343	736	0
RTOR Reduction (vph)	0	0	207	0	0	308	0	123	0	0	0	0
Lane Group Flow (vph)	181	76	66	85	0	56	0	872	0	343	736	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	15.8	15.8	15.8	12.9		12.9		37.1		58.3	58.3	
Effective Green, g (s)	19.8	19.8	19.8	16.9		16.9		40.1		57.3	61.3	
Actuated g/C Ratio	0.18	0.18	0.18	0.15		0.15		0.36		0.52	0.56	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	314	342	287	129		245		1231		351	2011	
v/s Ratio Prot		0.04						0.26		c0.15	0.20	
v/s Ratio Perm	c0.10		0.04	c0.10		0.04				c0.36		
v/c Ratio	0.58	0.22	0.23	0.66		0.23		0.71		0.98	0.37	
Uniform Delay, d1	41.3	38.5	38.6	43.8		40.8		29.9		32.7	13.5	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.00		1.04	1.47	
Incremental Delay, d2	2.6	0.3	0.4	11.5		0.5		3.5		36.3	0.4	
Delay (s)	43.8	38.9	39.0	55.4		41.3		33.4		70.5	20.4	
Level of Service	D	D	D	E		D		C		E	C	
Approach Delay (s)		40.6			44.0			33.4			36.3	
Approach LOS		D			D			C			D	

Intersection Summary				
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	68.1%	ICU Level of Service	C	
Analysis Period (min)	15			

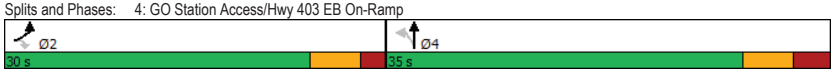
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	576	14	222	30	0	0
Future Volume (vph)	576	14	222	30	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.958		
Satd. Flow (prot)	1745	1597	0	1820	0	0
Flt Permitted	0.950			0.958		
Satd. Flow (perm)	1745	1597	0	1820	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		18				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	738	18	285	38	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	738	18	0	323	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	30.0	30.0	35.0	35.0		
Total Split (%)	46.2%	46.2%	53.8%	53.8%		
Maximum Green (s)	24.0	24.0	28.0	28.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	Max	Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	26.2	26.2		17.1		
Actuated g/C Ratio	0.51	0.51		0.33		
v/c Ratio	0.83	0.02		0.53		
Control Delay	23.3	4.4		17.2		
Queue Delay	0.0	0.0		0.0		
Total Delay	23.3	4.4		17.2		
LOS	C	A		B		
Approach Delay	22.8			17.2		
Approach LOS	C			B		

Intersection Summary		
Area Type:	Other	
Cycle Length: 65		
Actuated Cycle Length: 51.3		
Natural Cycle: 70		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.83		
Intersection Signal Delay: 21.1		Intersection LOS: C
Intersection Capacity Utilization 52.5%		ICU Level of Service A
Analysis Period (min) 15		

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	738	18	323
v/c Ratio	0.83	0.02	0.53
Control Delay	23.3	4.4	17.2
Queue Delay	0.0	0.0	0.0
Total Delay	23.3	4.4	17.2
Queue Length 50th (m)	54.1	0.0	24.4
Queue Length 95th (m)	#108.0	2.3	35.5
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	890	823	1106
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.83	0.02	0.29

Intersection Summary

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	576	14	222	30	0	0
Future Volume (vph)	576	14	222	30	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.96		
Satd. Flow (prot)	1745	1597		1820		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1745	1597		1820		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	738	18	285	38	0	0
RTOR Reduction (vph)	0	9	0	0	0	0
Lane Group Flow (vph)	738	9	0	323	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	24.1	24.1		14.1		
Effective Green, g (s)	26.1	26.1		17.1		
Actuated g/C Ratio	0.51	0.51		0.33		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	889	814		607		
v/s Ratio Prot	c0.42					
v/s Ratio Perm		0.01		0.18		
v/c Ratio	0.83	0.01		0.53		
Uniform Delay, d1	10.7	6.2		13.8		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	8.9	0.0		0.9		
Delay (s)	19.5	6.2		14.7		
Level of Service	B	A		B		
Approach Delay (s)	19.2			14.7	0.0	
Approach LOS	B			B	A	

Intersection Summary				
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	51.2	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	52.5%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	307	996	0	0	0
Future Volume (vph)	0	307	996	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1900	1900	0	1900	0
Flt Permitted						
Satd. Flow (perm)	0	1900	1900	0	1900	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		201.6	103.7		212.7	
Travel Time (s)		12.1	6.2		15.3	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	337	1095	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	337	1095	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	307	996	0	0	0
Future Volume (Veh/h)	0	307	996	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	337	1095	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1095				1432	1095
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1095				1432	1095
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	645				149	262

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	337	1095	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	645	1700	1700
Volume to Capacity	0.00	0.64	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		55.8%	ICU Level of Service B
Analysis Period (min)		15	

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	B16	B18	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	T	T	L	T	TR	L	T	TR	T
Maximum Queue (m)	157.5	302.5	137.5	948.9	187.2	90.4	103.0	79.8	45.0	83.3	69.3	3.7
Average Queue (m)	143.7	302.5	103.0	751.5	89.3	47.9	49.0	27.4	15.3	47.6	30.7	0.2
95th Queue (m)	206.4	302.5	197.0	1214.2	236.9	86.3	88.1	66.8	33.3	71.4	59.6	3.2
Link Distance (m)		281.2		927.3	186.9		124.2	124.2		83.3		88.5
Upstream Blk Time (%)		64		52	3		0	0		0		
Queuing Penalty (veh)		634		520	33		3	1		0		
Storage Bay Dist (m)	150.0		130.0			90.0			70.0		70.0	
Storage Blk Time (%)	0	67	0			2	0			1	0	
Queuing Penalty (veh)	0	272	1			7	0			2	0	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	8.7	50.4	56.8	59.8	72.2	47.7	33.5	21.1
Average Queue (m)	1.3	21.7	32.1	23.9	31.1	12.1	12.8	2.9
95th Queue (m)	6.1	41.5	51.2	44.7	58.8	32.9	27.3	12.3
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	61.8	40.6	42.8	28.1	35.0	56.4	94.1	102.1	37.4	72.8	76.9
Average Queue (m)	34.1	15.8	21.5	13.1	7.0	29.1	51.9	57.2	30.5	39.2	36.2
95th Queue (m)	55.3	32.0	36.9	23.8	22.1	49.0	82.3	92.2	43.5	70.1	61.8
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)						0			14	5	
Queuing Penalty (veh)						0			45	14	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	78.4	9.9	46.7
Average Queue (m)	41.1	1.8	27.0
95th Queue (m)	66.6	7.4	45.1
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			1
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: North Service Rd & Hickory Lane

Movement	WB
Directions Served	TR
Maximum Queue (m)	97.6
Average Queue (m)	41.5
95th Queue (m)	120.3
Link Distance (m)	93.0
Upstream Blk Time (%)	39
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Bend

Movement	NW
Directions Served	T
Maximum Queue (m)	2.8
Average Queue (m)	0.1
95th Queue (m)	2.0
Link Distance (m)	83.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1533

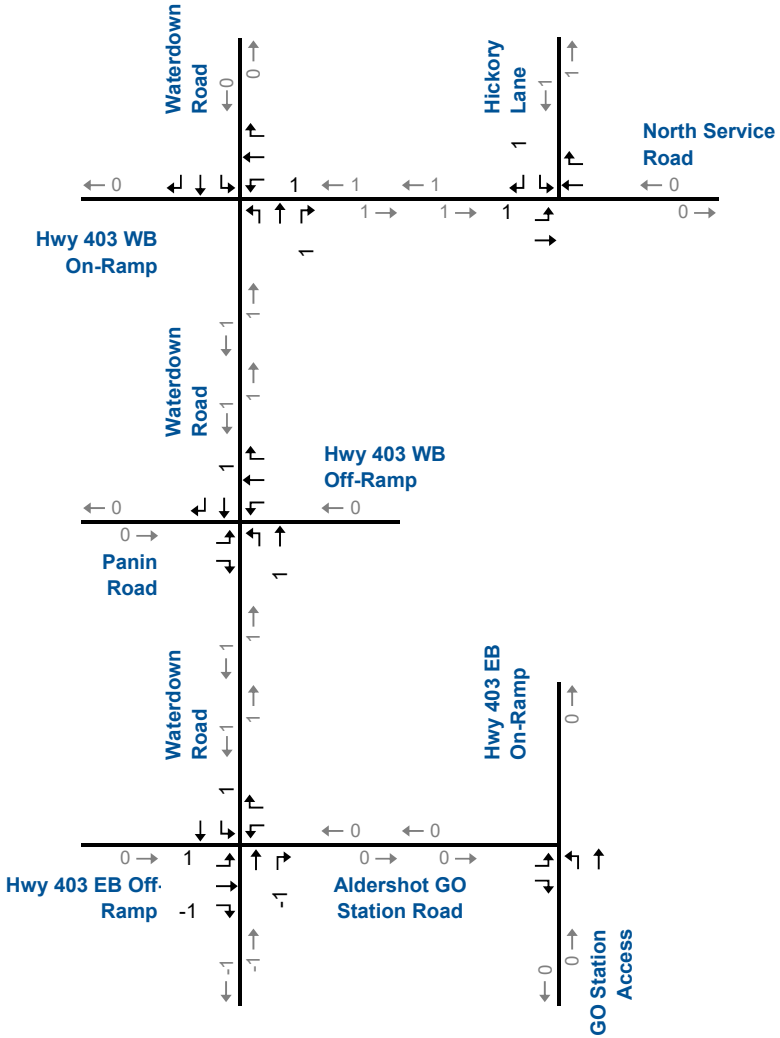
Appendix E

Site Traffic Volumes by Vehicle Type



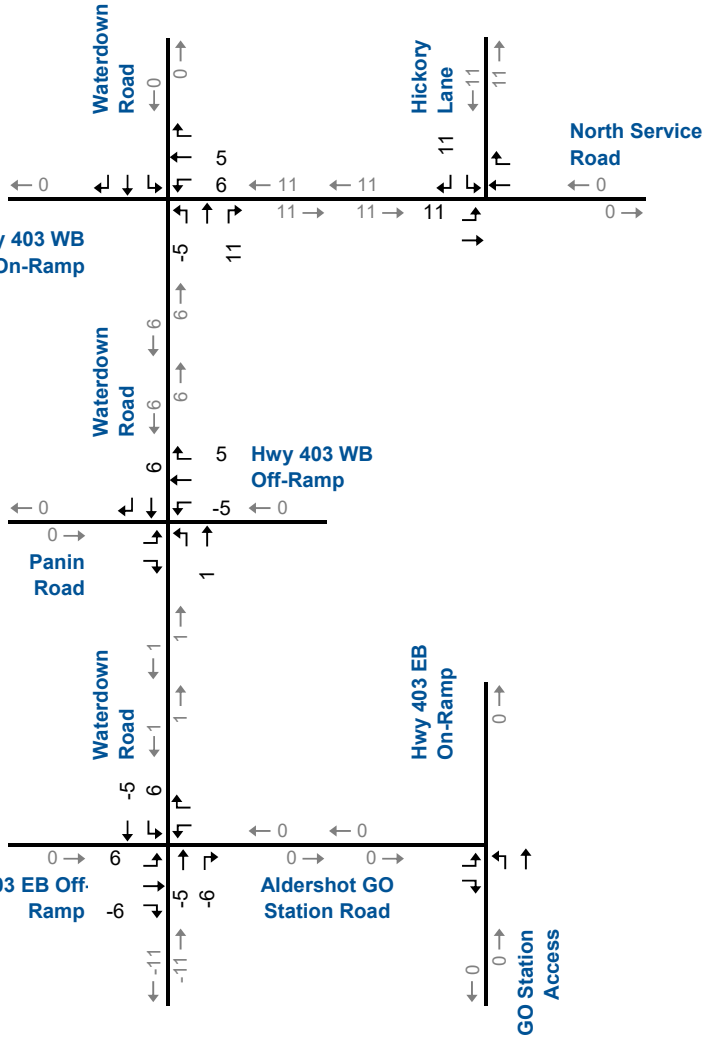
Site Traffic AM Peak Hour

Light Vehicles



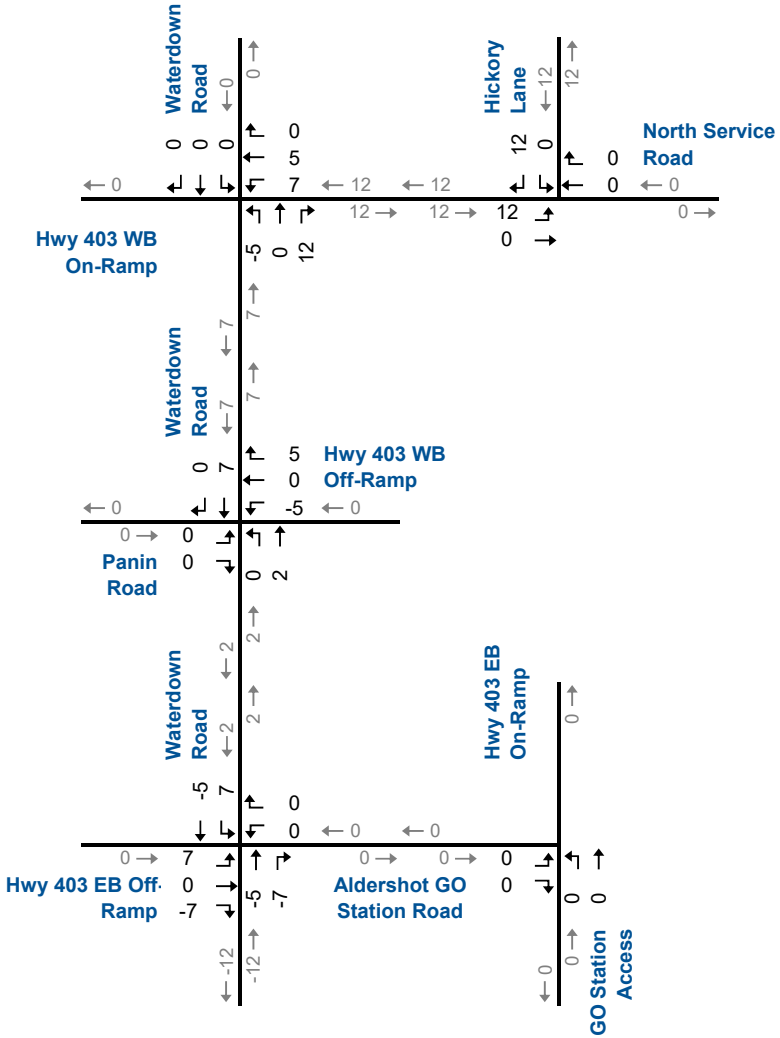
Site Traffic AM Peak Hour

Medium & Articulated Trucks



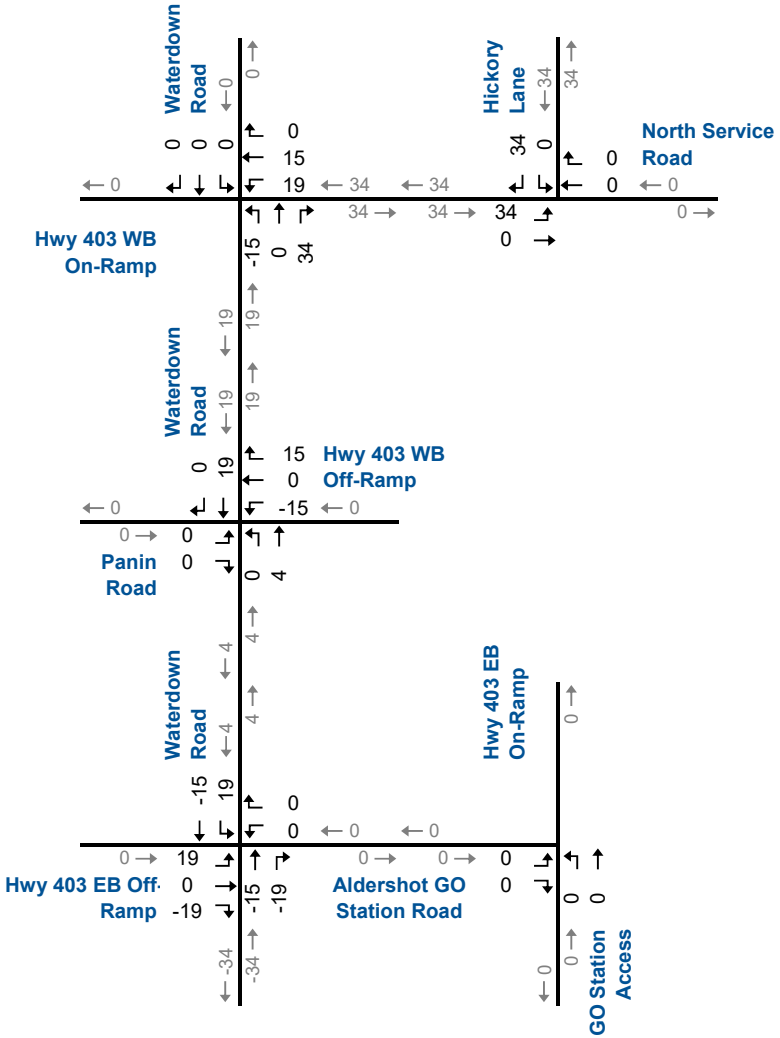
Site Traffic AM Peak Hour

Total Count Volume (Light + Medium + Articulated)



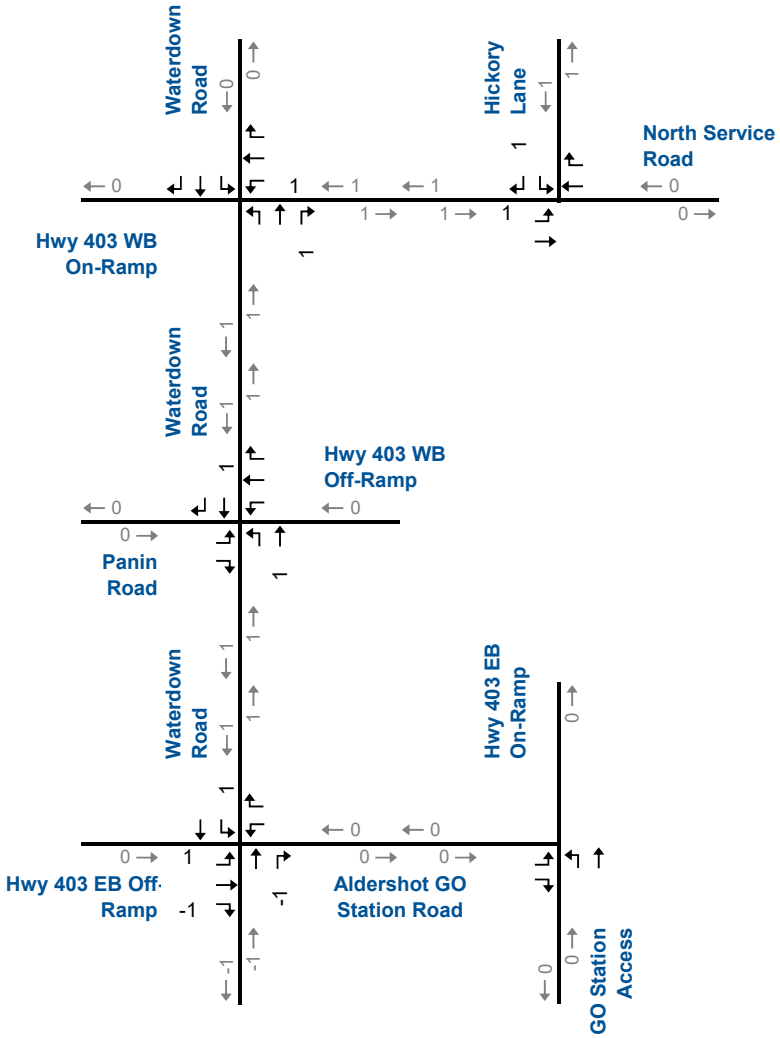
Site Traffic AM Peak Hour

Passenger Car Equivalents (PCE)



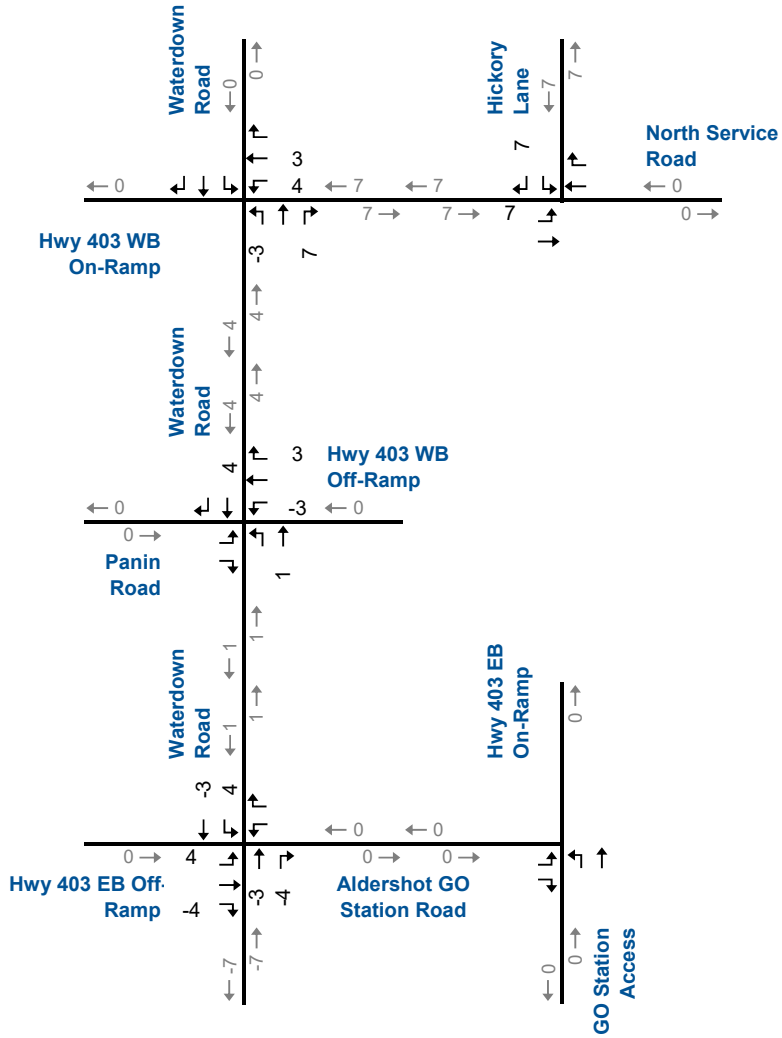
Site Traffic PM Peak Hour

Light Vehicles



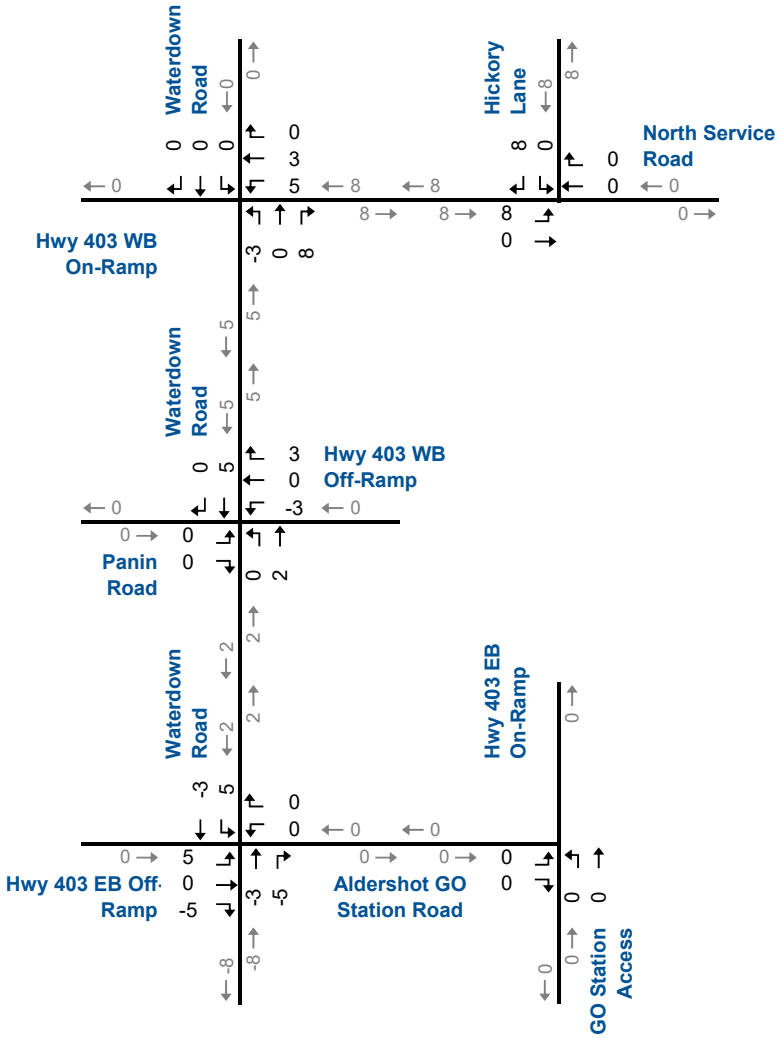
Site Traffic PM Peak Hour

Medium & Articulated Trucks



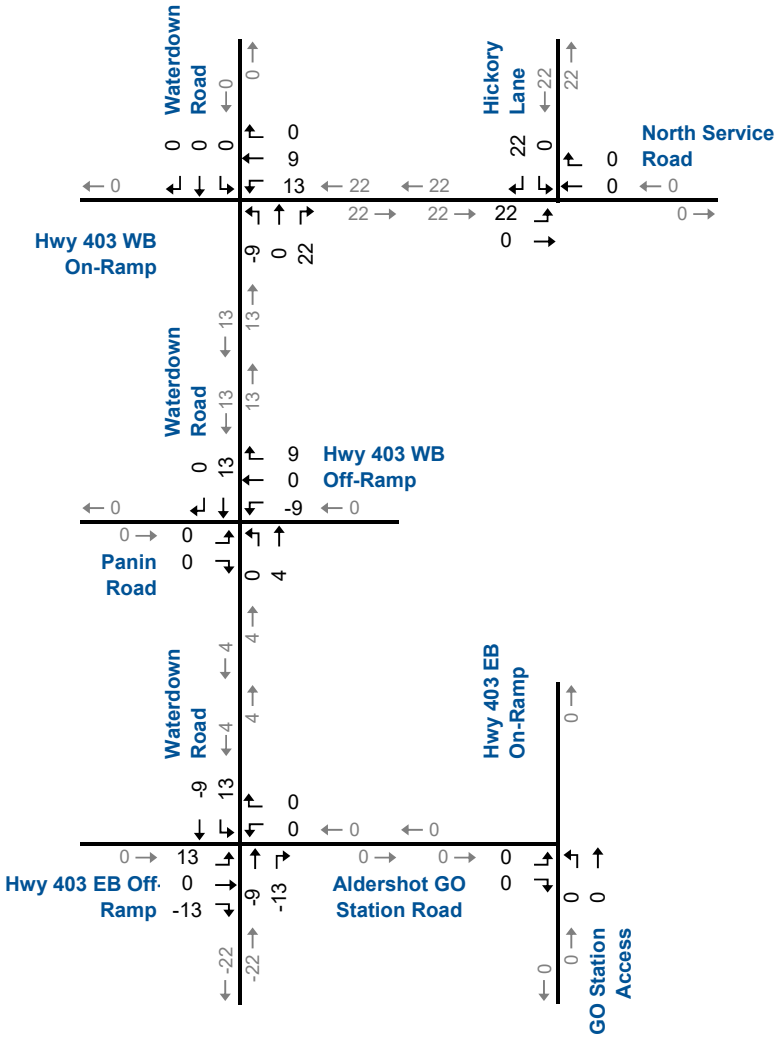
Site Traffic PM Peak Hour

Total Count Volume (Light + Medium + Articulated)



Site Traffic PM Peak Hour

Passenger Car Equivalents (PCE)

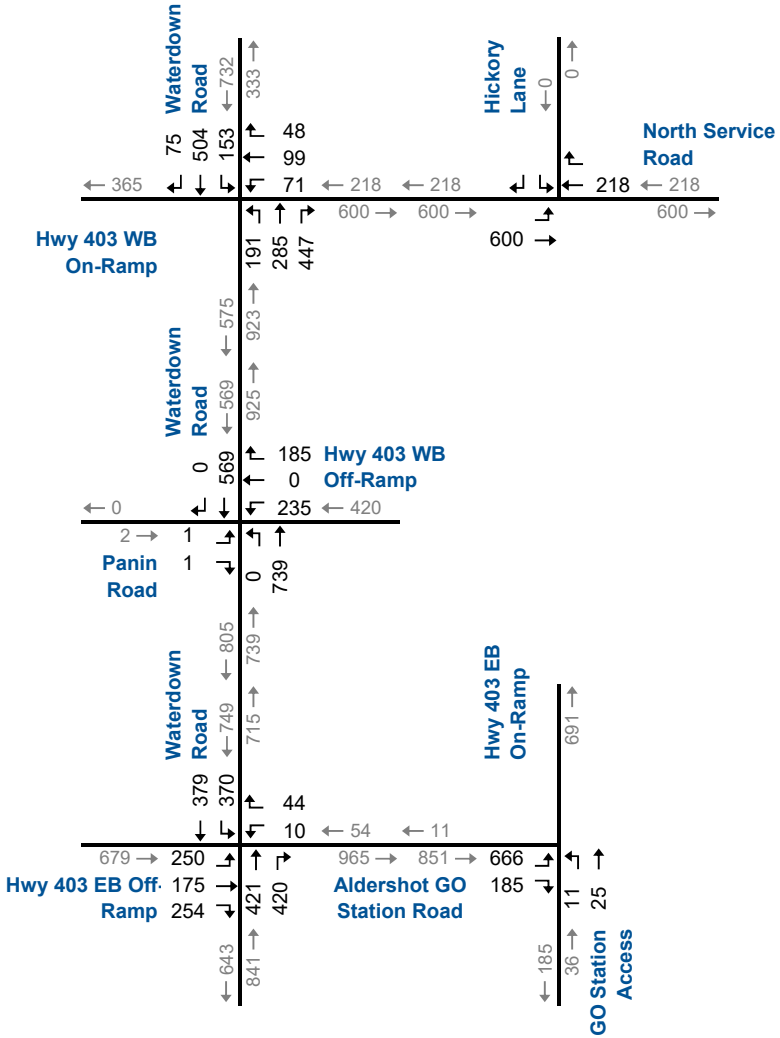


Appendix F

Forecast Traffic Volumes by Vehicle Type

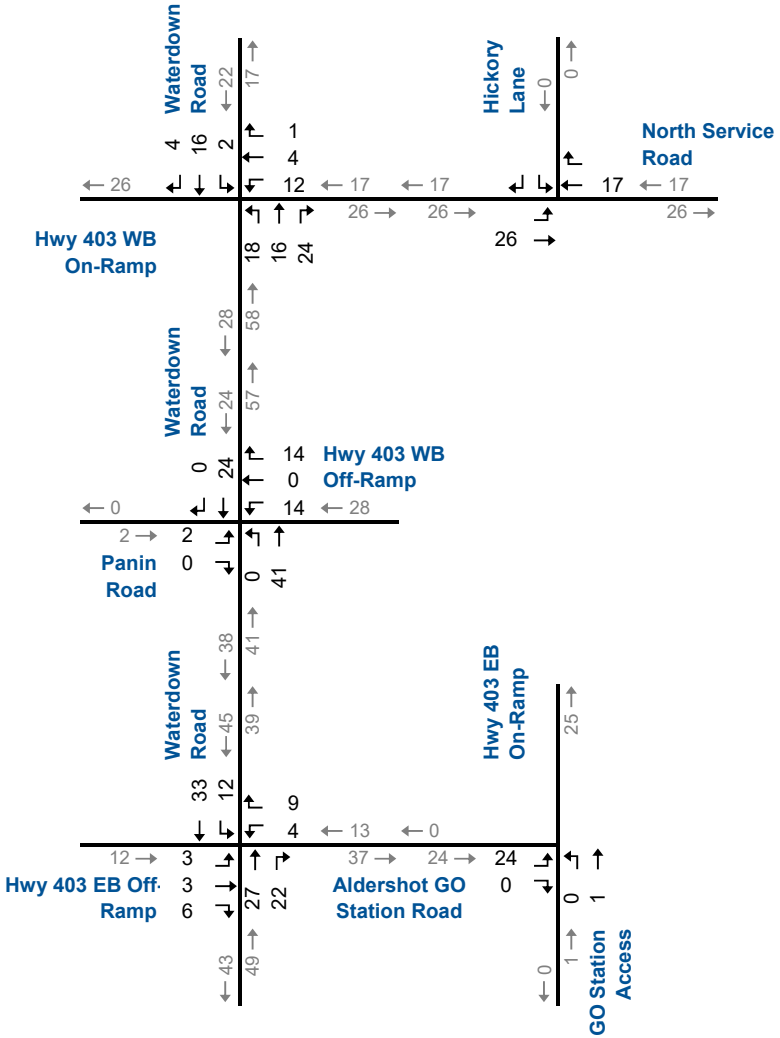
Background 2023 AM Peak Hour

Light Vehicles



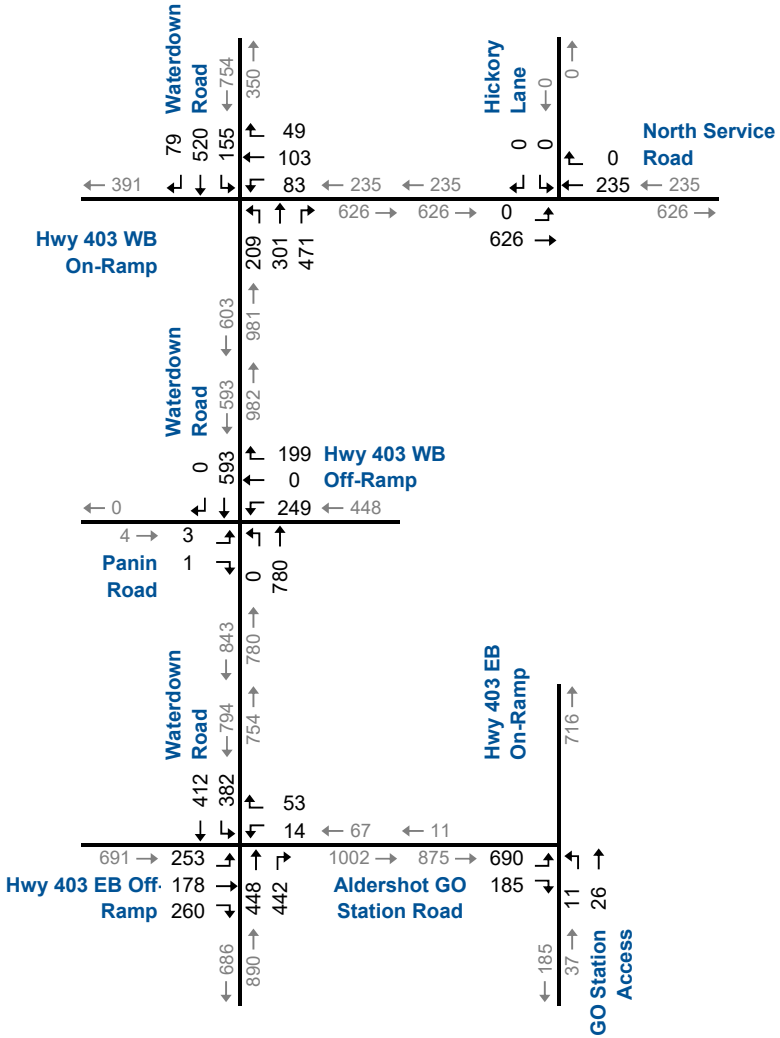
Background 2023 AM Peak Hour

Medium & Articulated Trucks



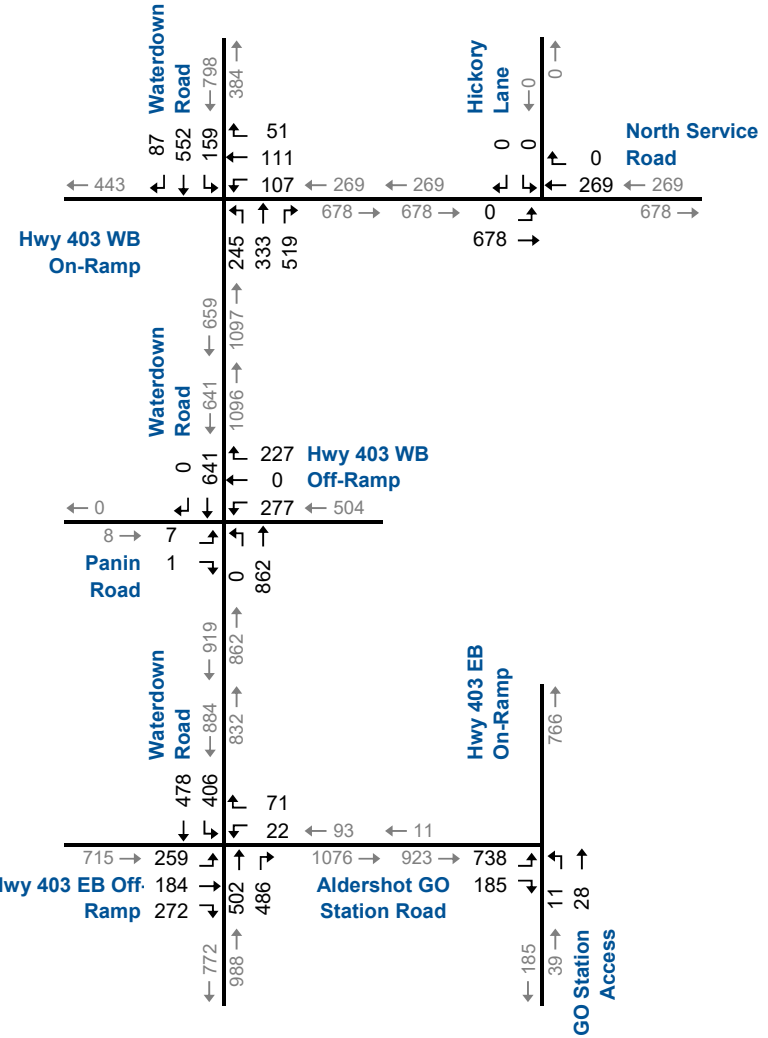
Background 2023 AM Peak Hour

Total Count Volume (Light + Medium + Articulated)



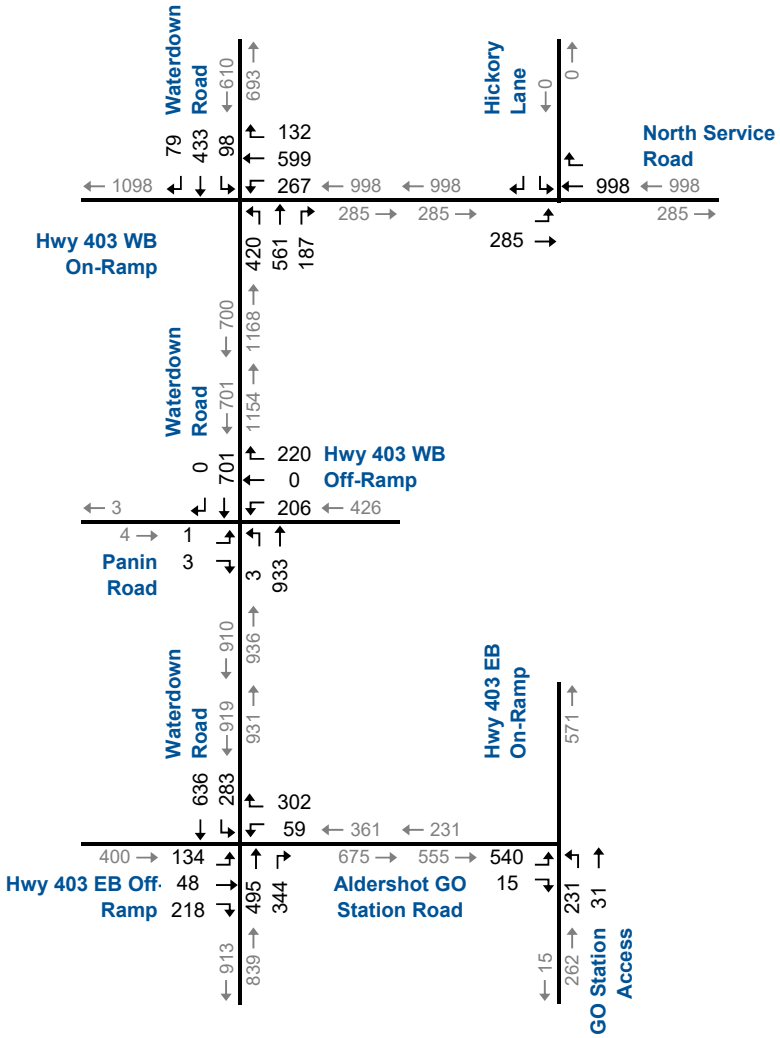
Background 2023 AM Peak Hour

Passenger Car Equivalents (PCE)



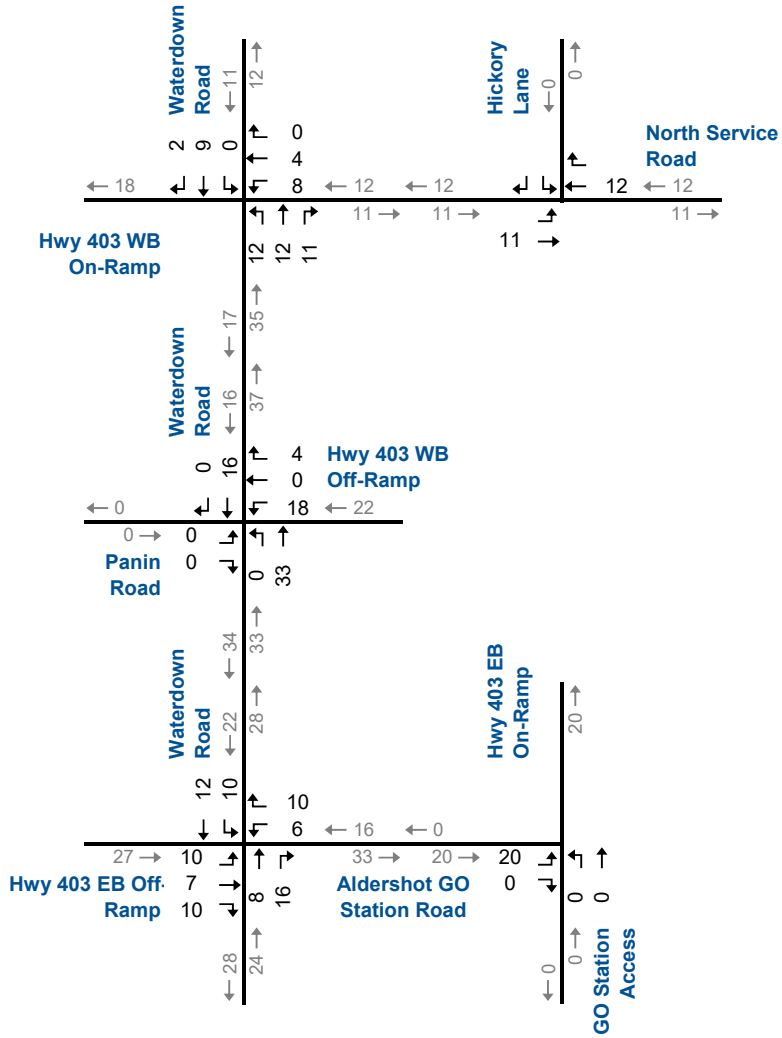
Background 2023 PM Peak Hour

Light Vehicles



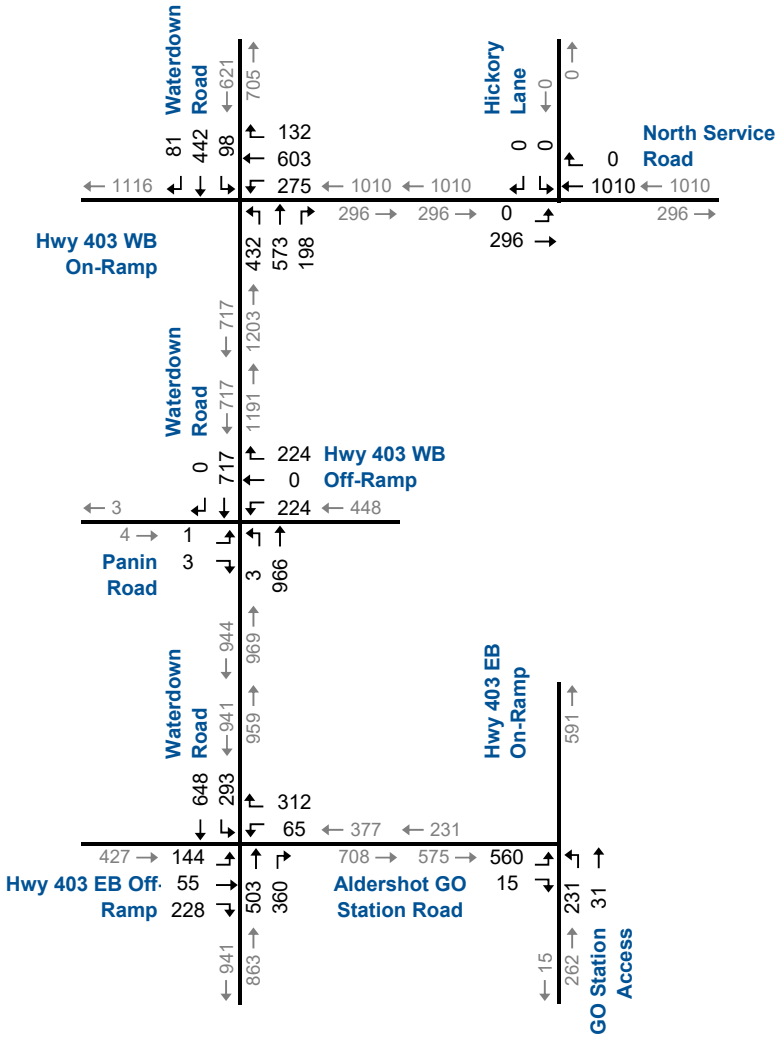
Background 2023 PM Peak Hour

Medium & Articulated Trucks



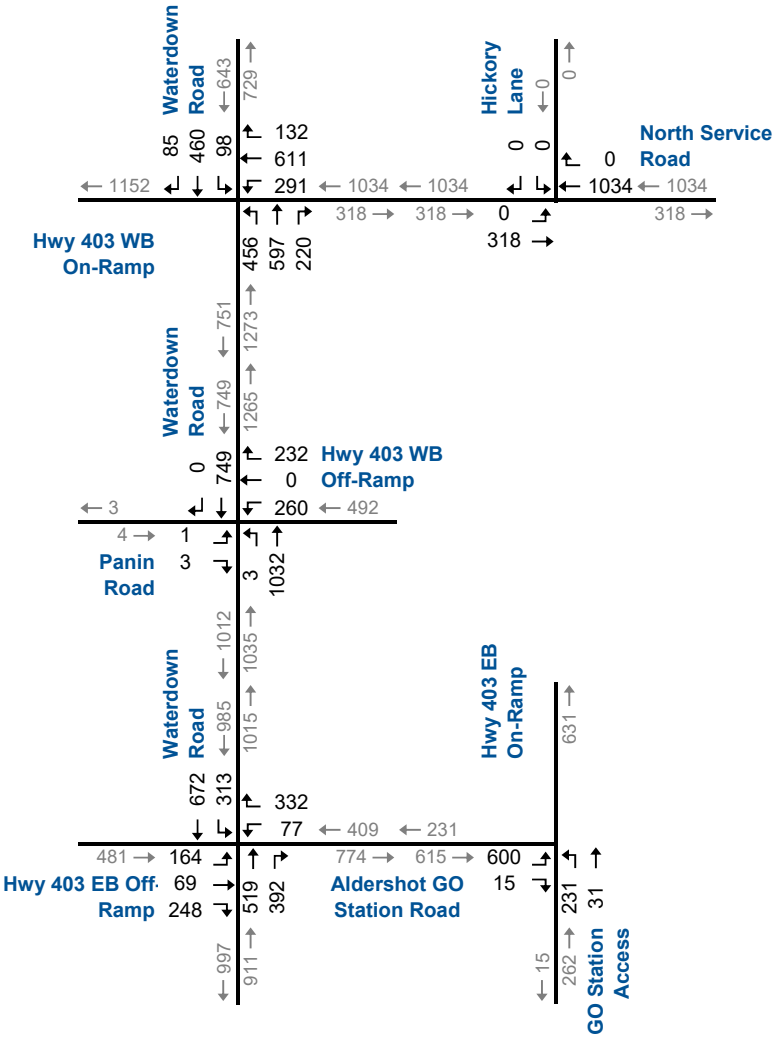
Background 2023 PM Peak Hour

Total Count Volume (Light + Medium + Articulated)



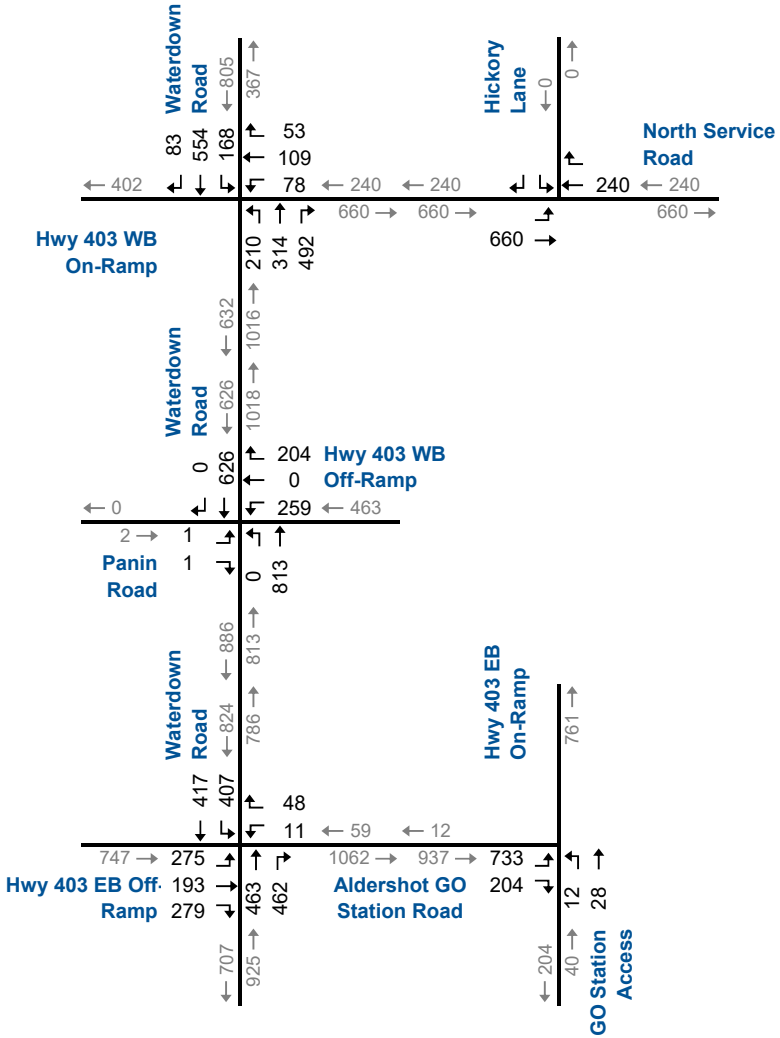
Background 2023 PM Peak Hour

Passenger Car Equivalents (PCE)



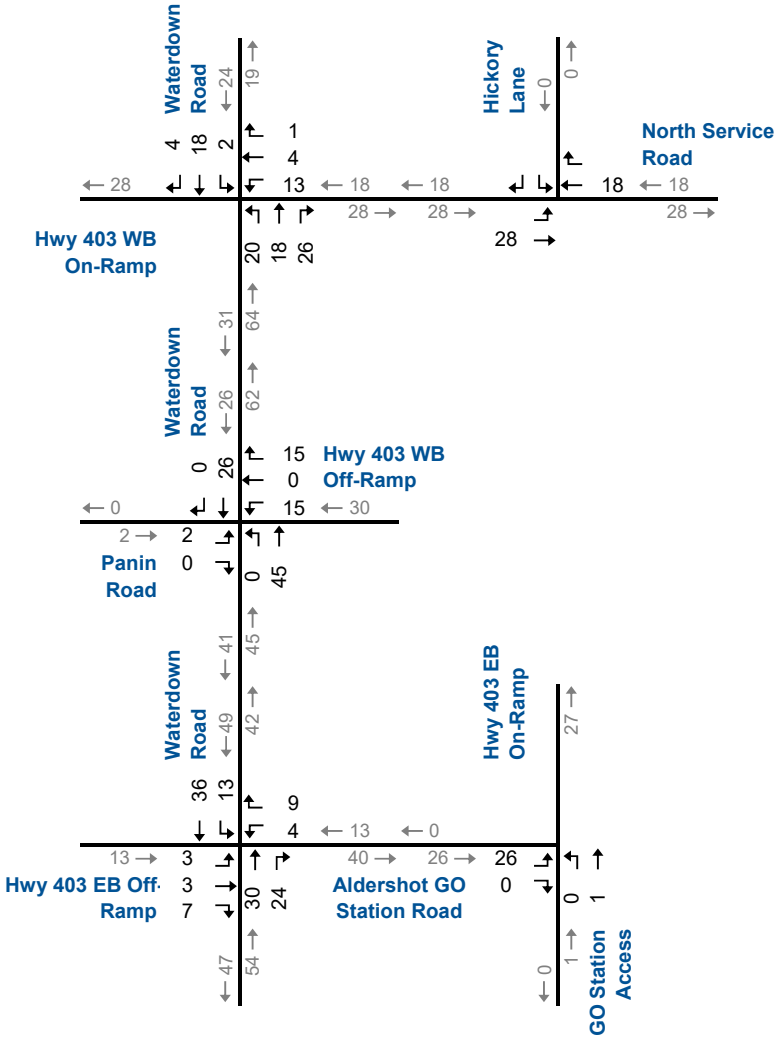
Background 2028 AM Peak Hour

Light Vehicles



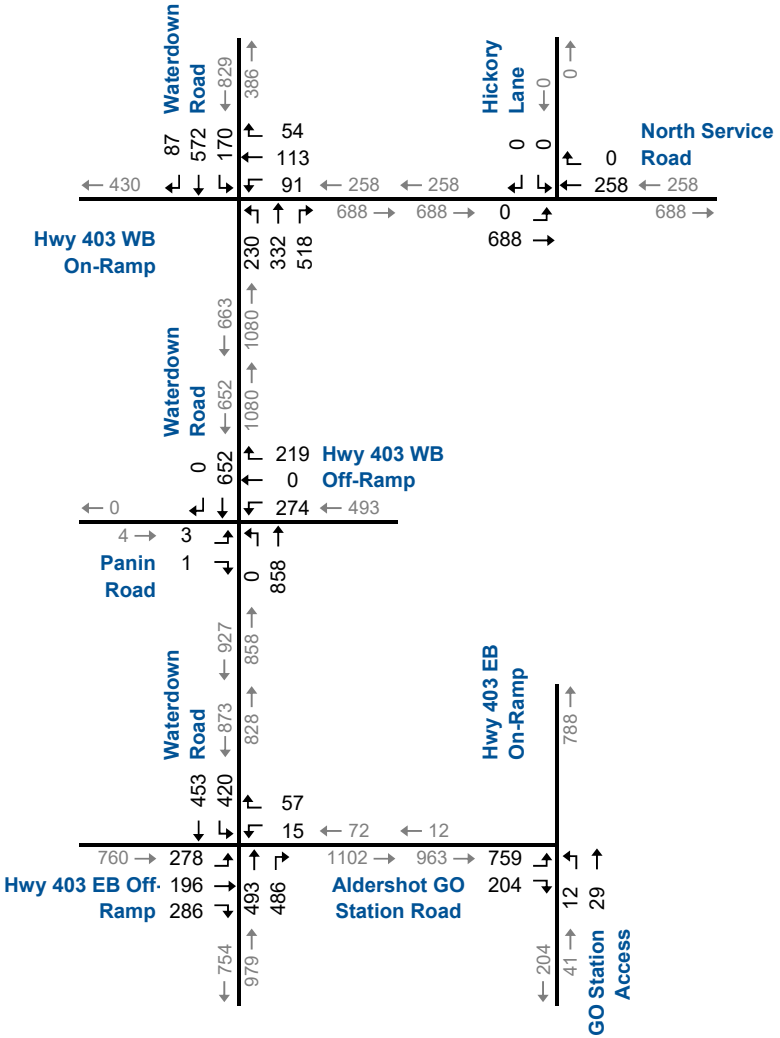
Background 2028 AM Peak Hour

Medium & Articulated Trucks



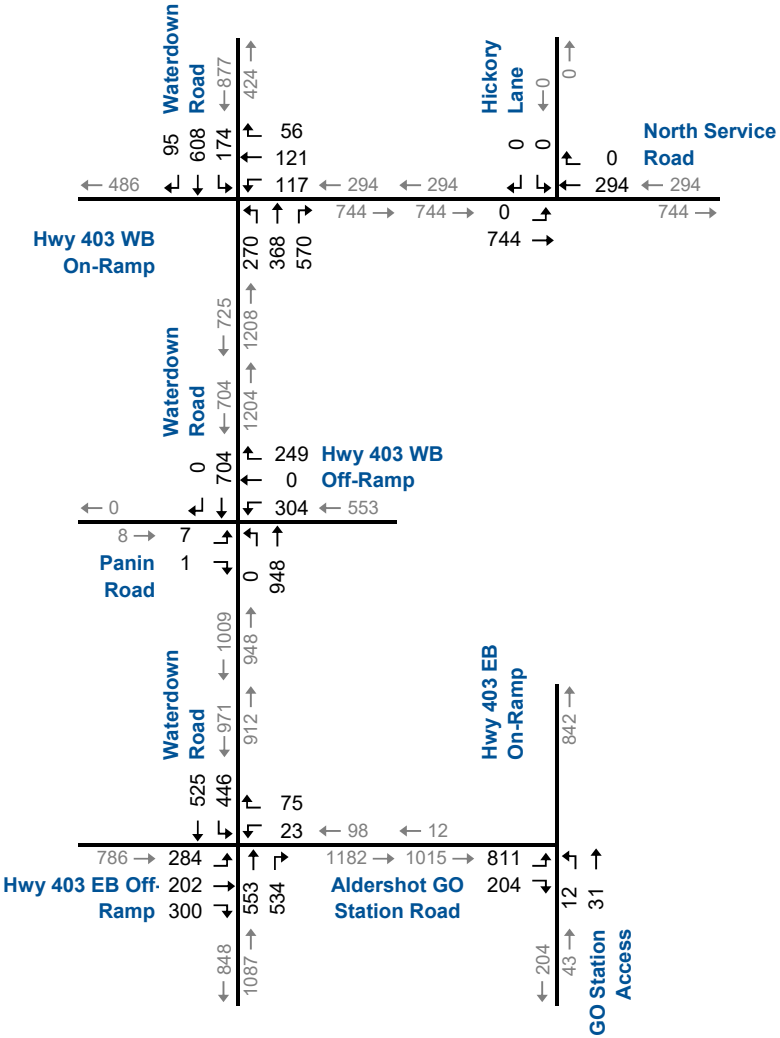
Background 2028 AM Peak Hour

Total Count Volume (Light + Medium + Articulated)



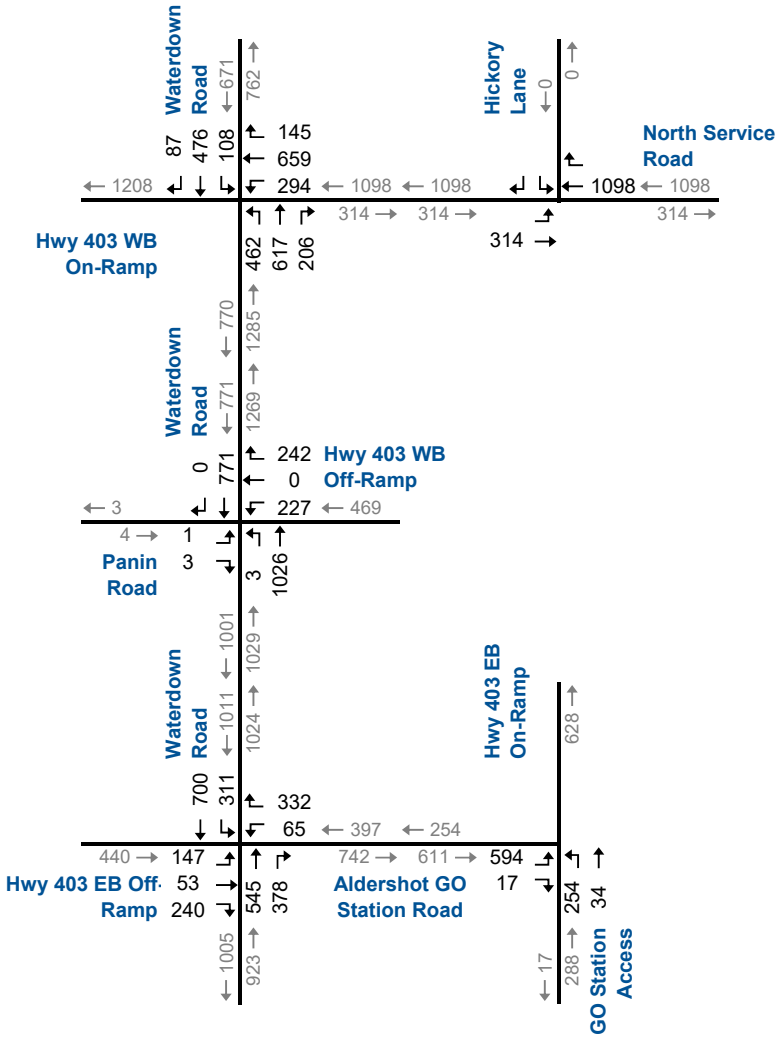
Background 2028 AM Peak Hour

Passenger Car Equivalents (PCE)



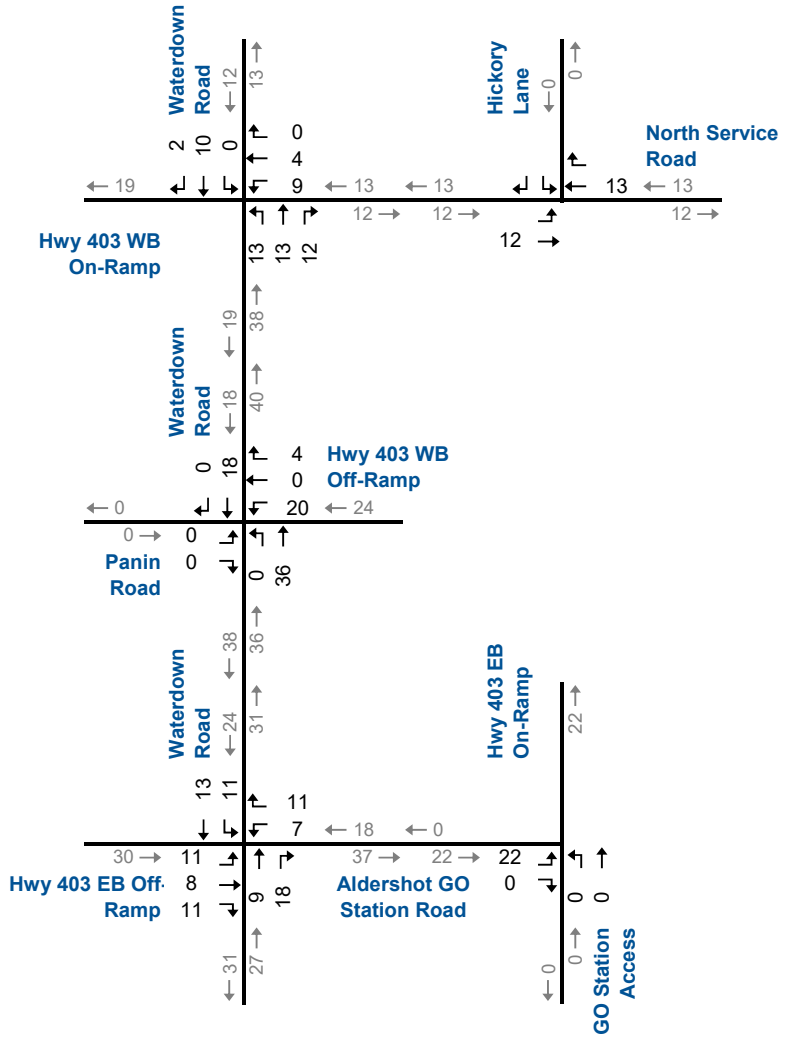
Background 2028 PM Peak Hour

Light Vehicles



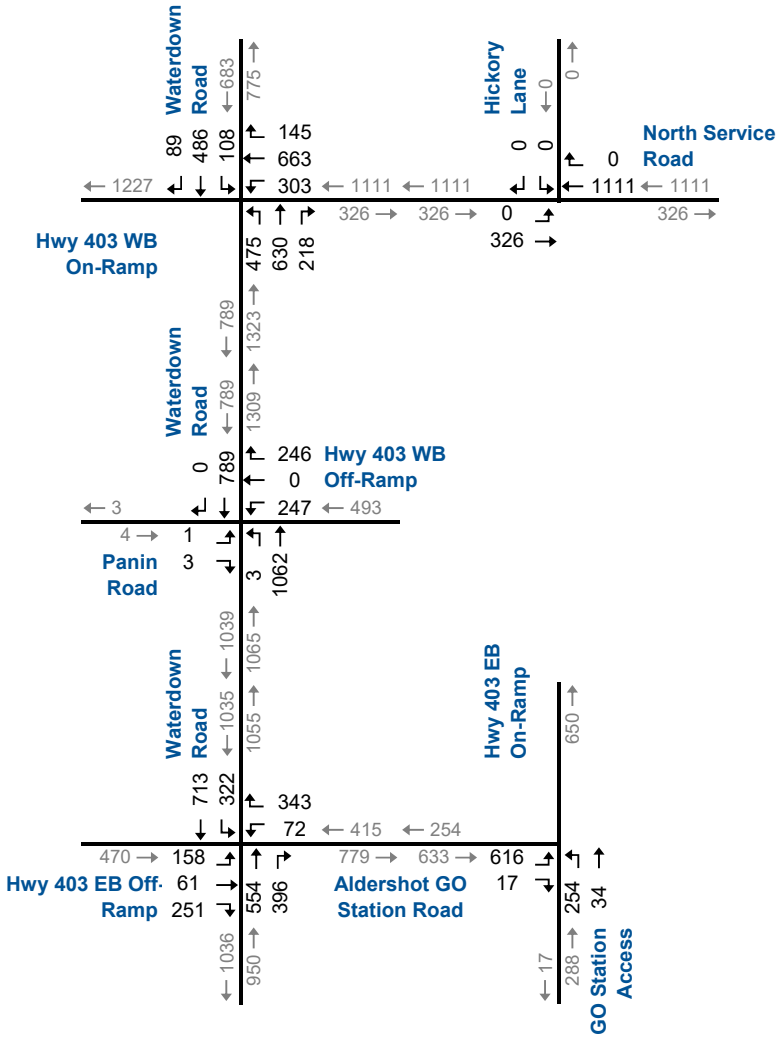
Background 2028 PM Peak Hour

Medium & Articulated Trucks



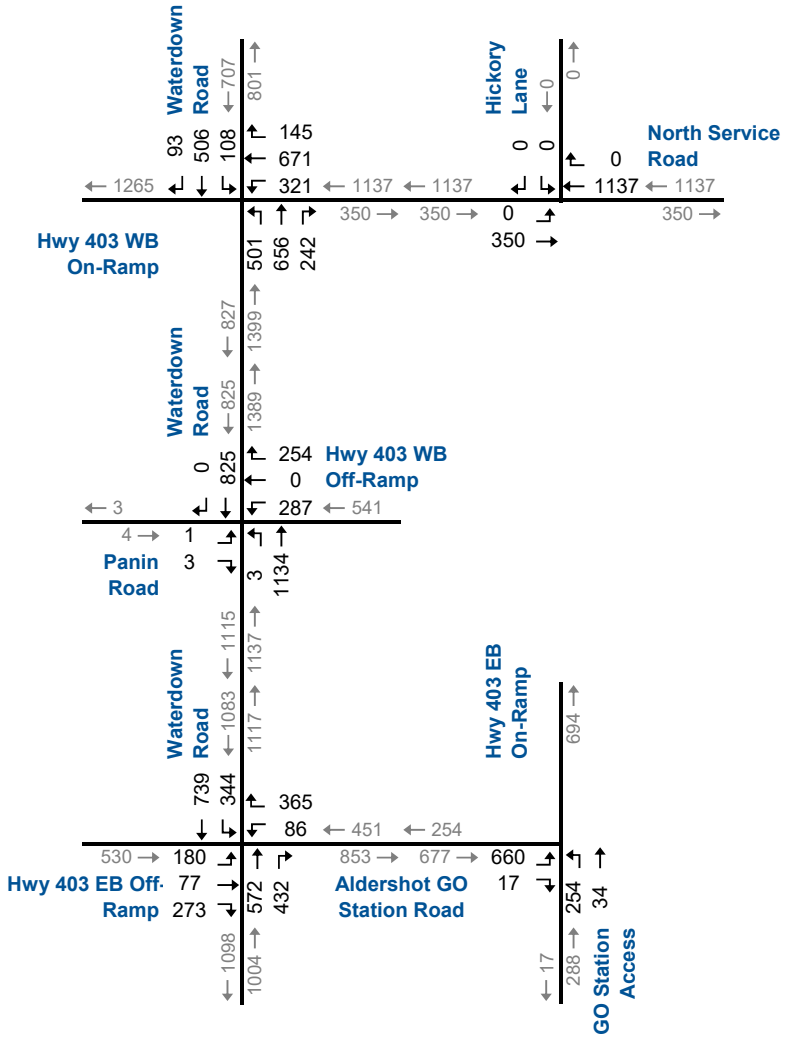
Background 2028 PM Peak Hour

Total Count Volume (Light + Medium + Articulated)



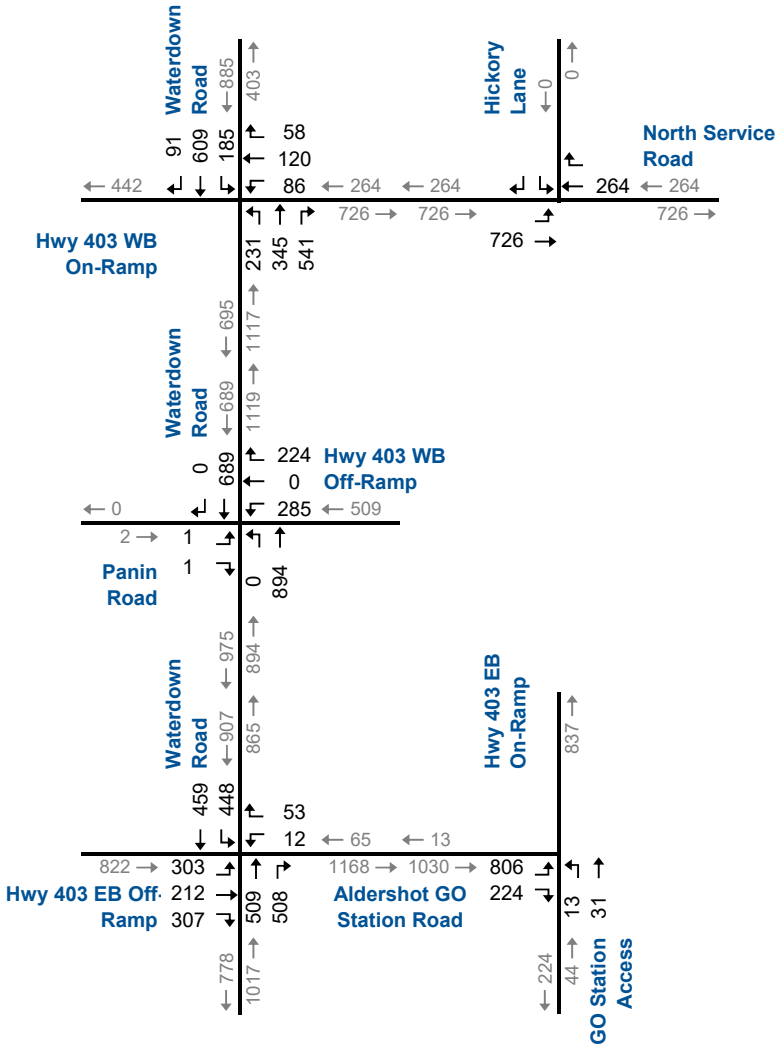
Background 2028 PM Peak Hour

Passenger Car Equivalents (PCE)



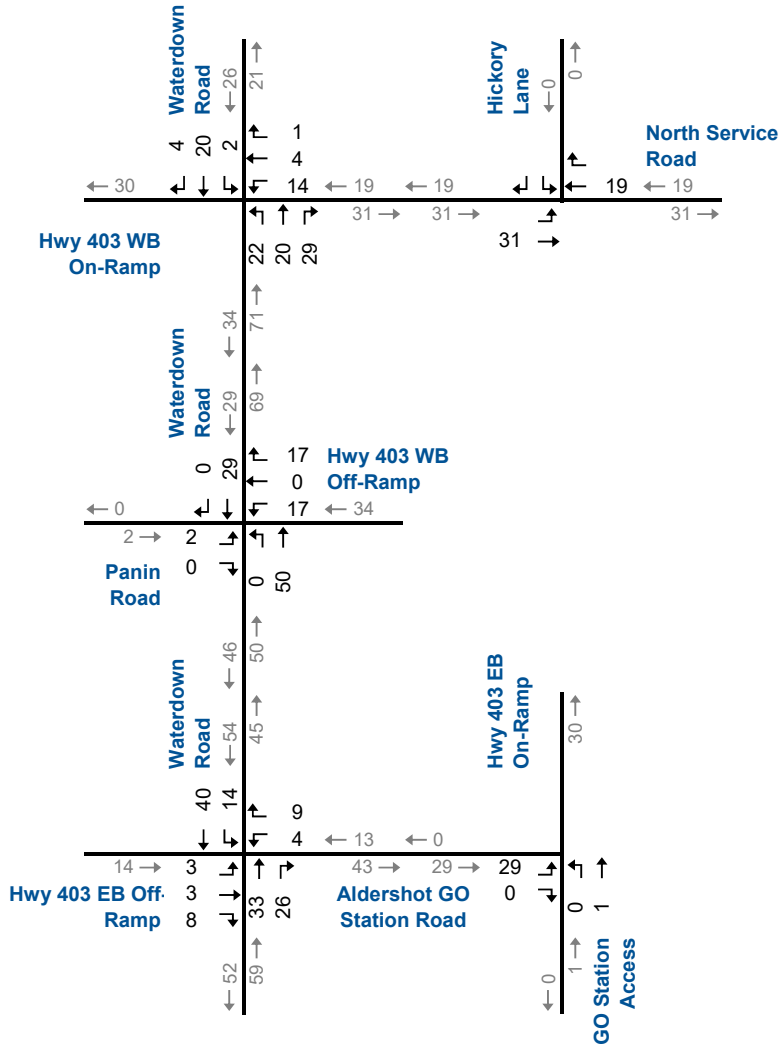
Background 2033 AM Peak Hour

Light Vehicles



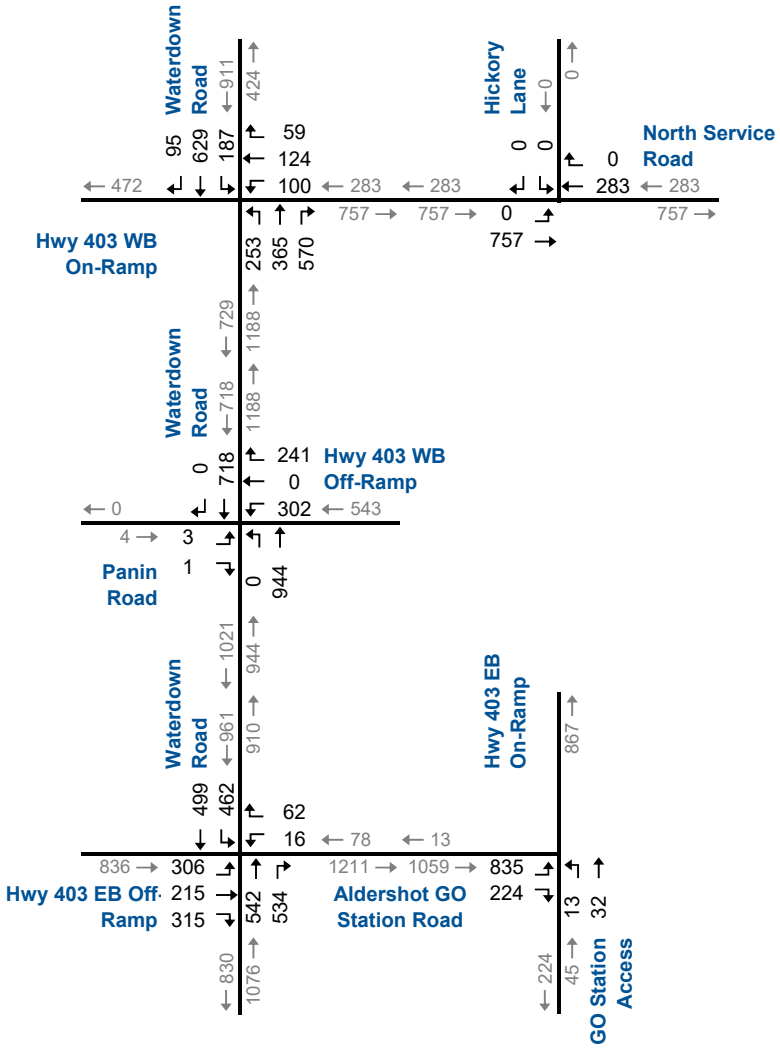
Background 2033 AM Peak Hour

Medium & Articulated Trucks



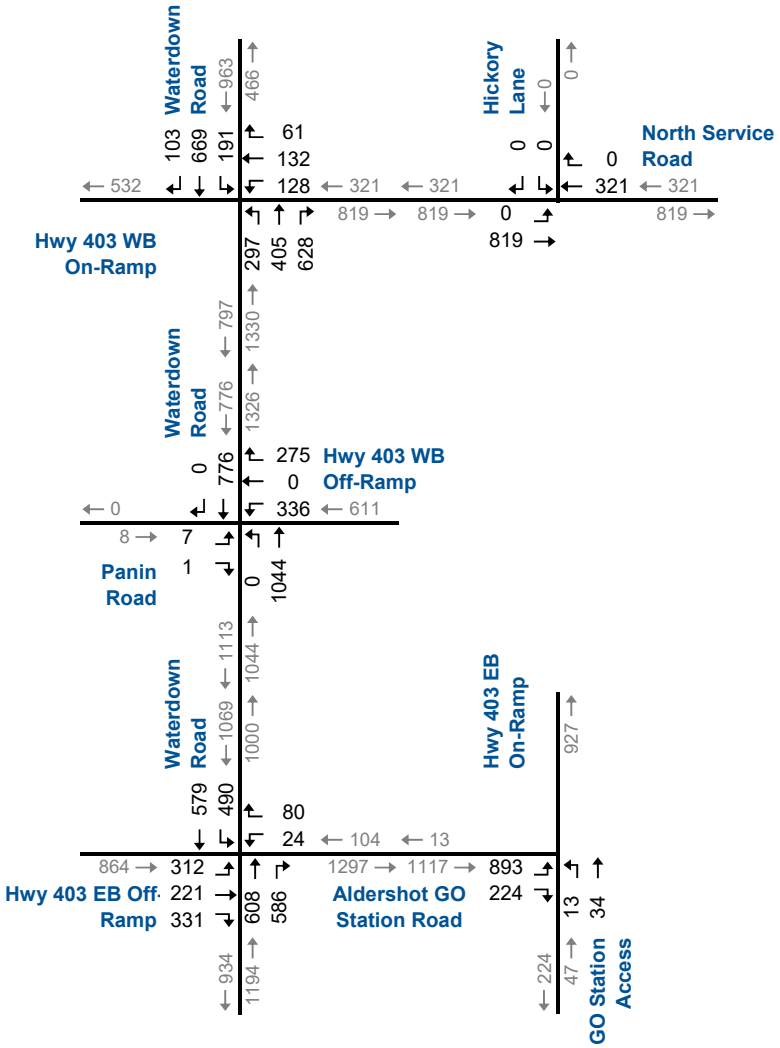
Background 2033 AM Peak Hour

Total Count Volume (Light + Medium + Articulated)



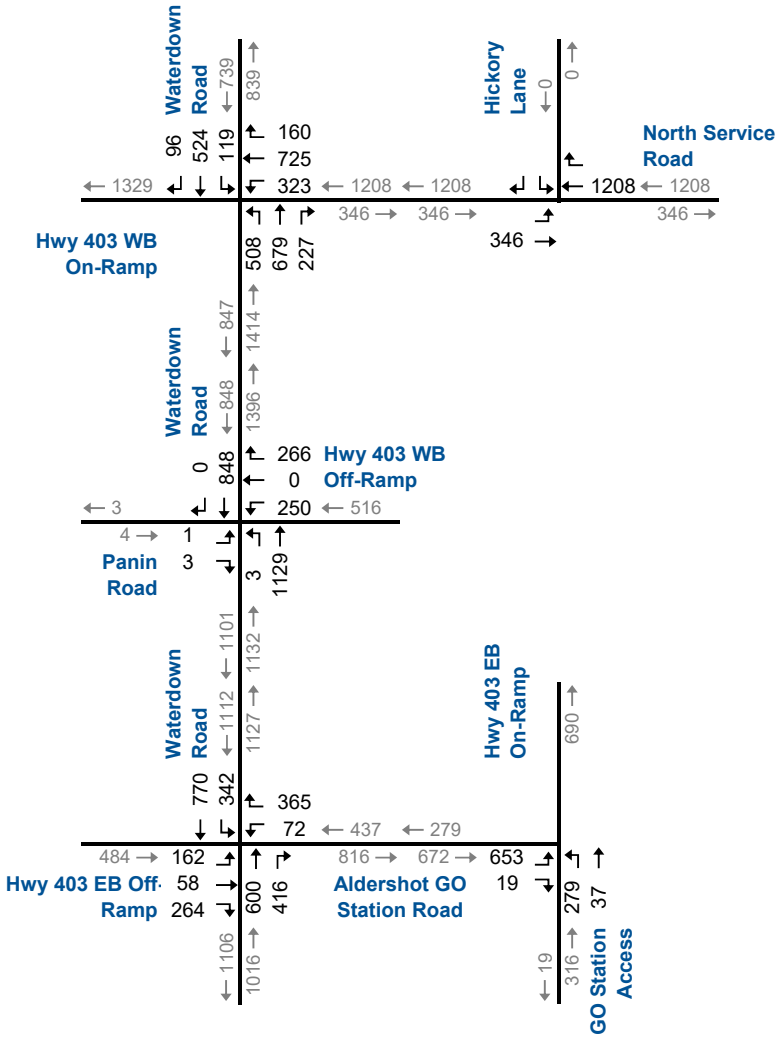
Background 2033 AM Peak Hour

Passenger Car Equivalents (PCE)



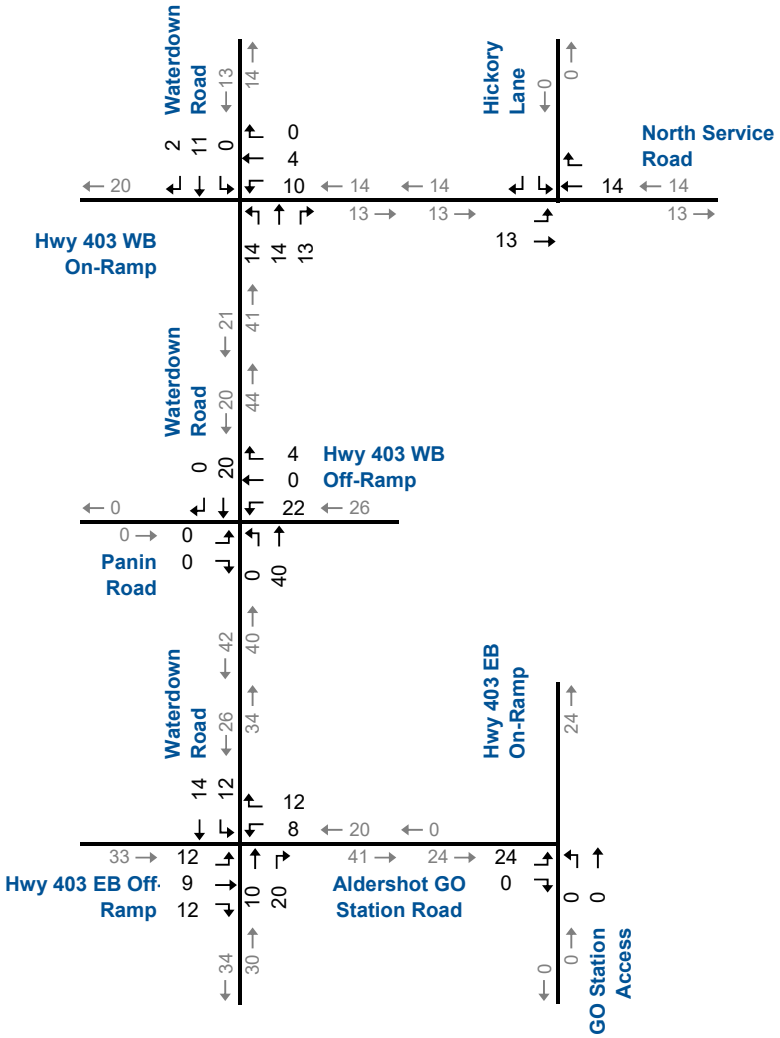
Background 2033 PM Peak Hour

Light Vehicles



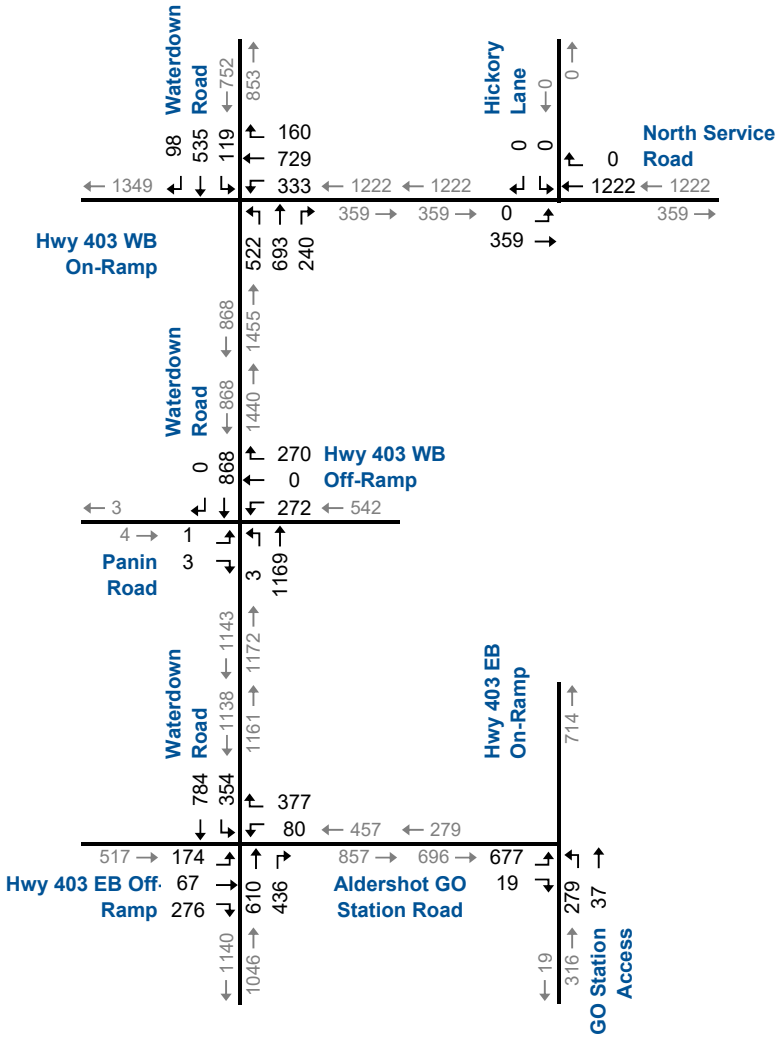
Background 2033 PM Peak Hour

Medium & Articulated Trucks



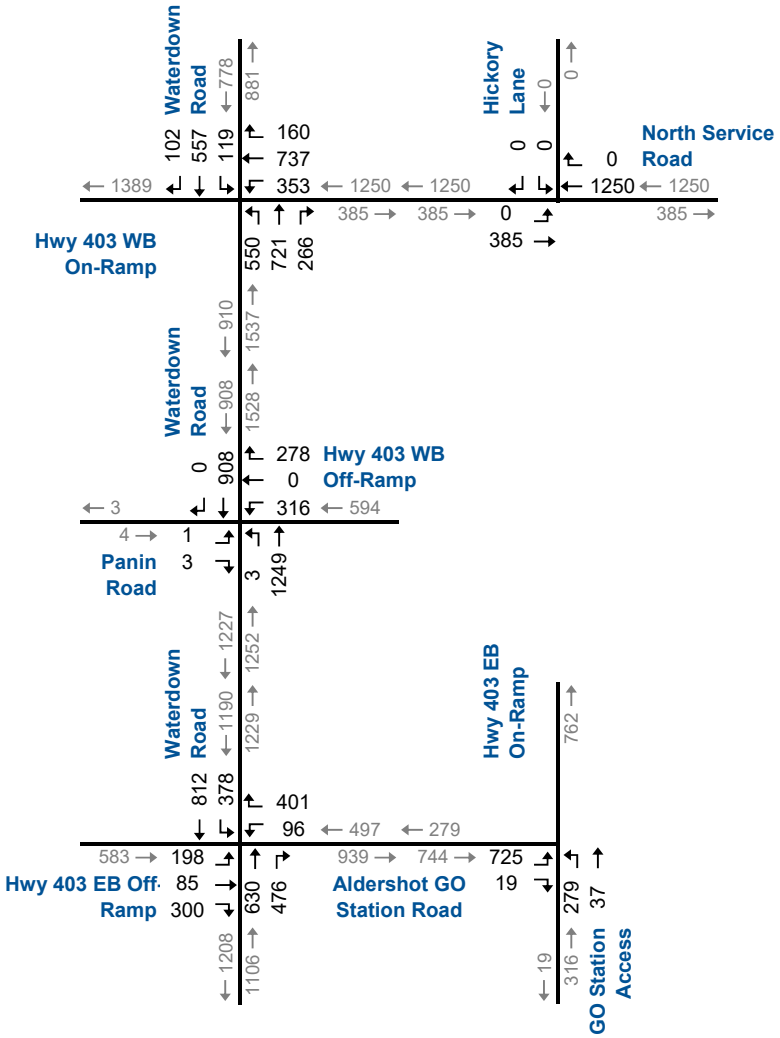
Background 2033 PM Peak Hour

Total Count Volume (Light + Medium + Articulated)



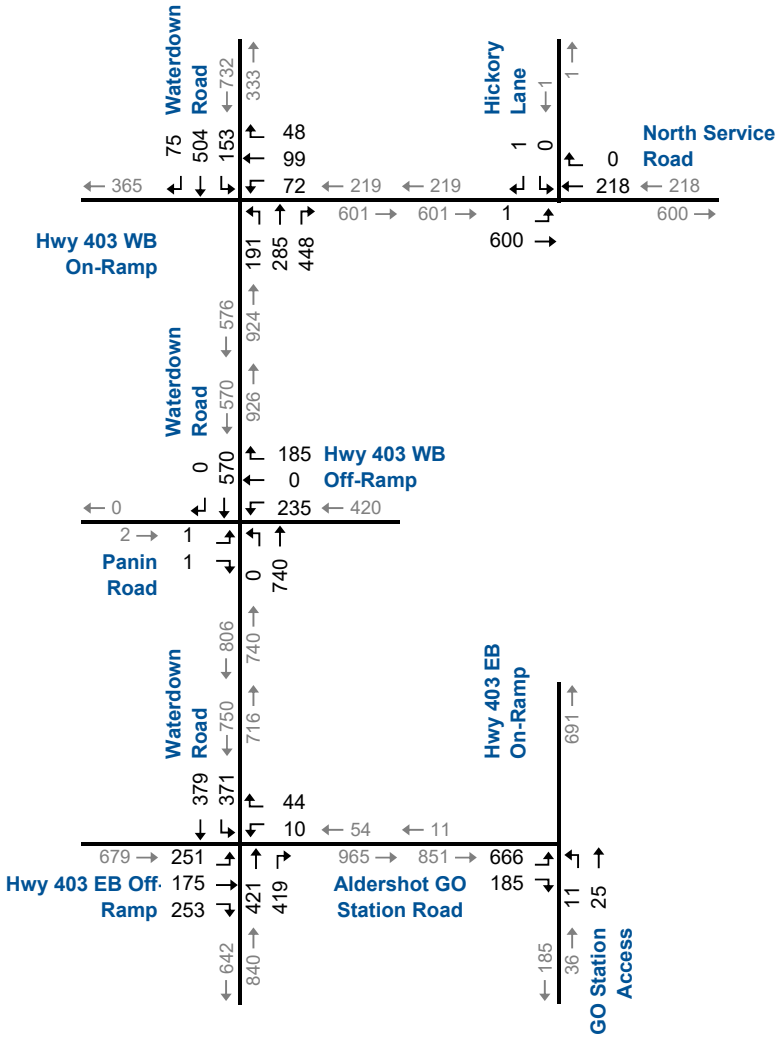
Background 2033 PM Peak Hour

Passenger Car Equivalents (PCE)



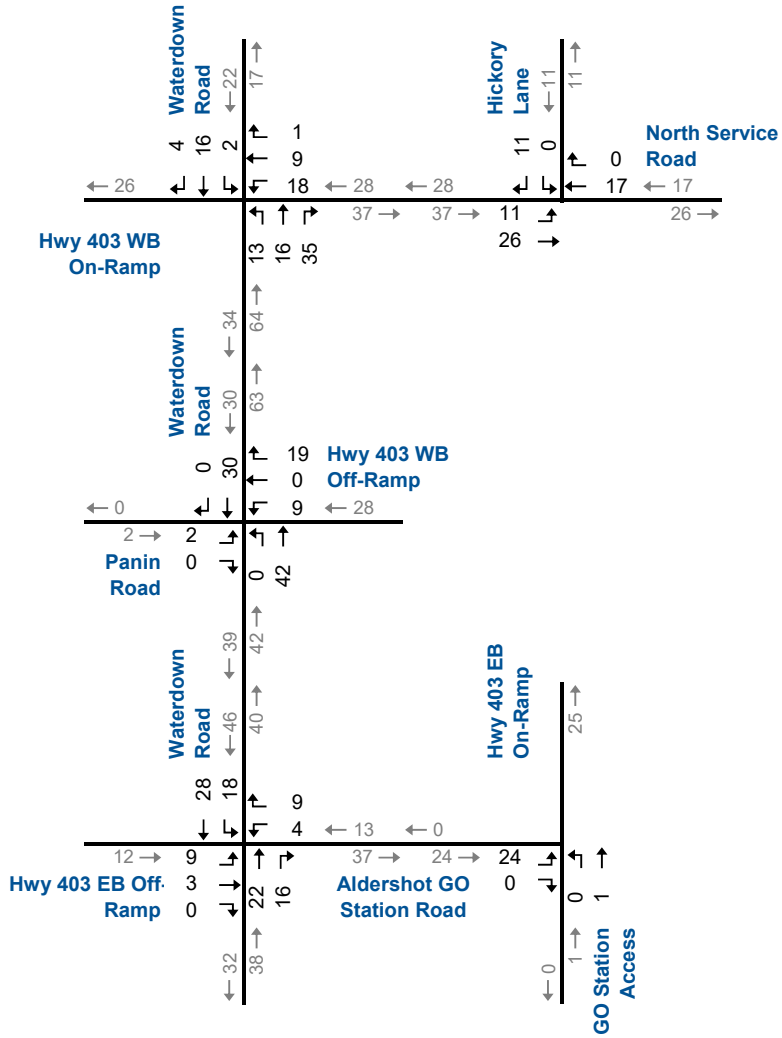
Total 2023 AM Peak Hour

Light Vehicles



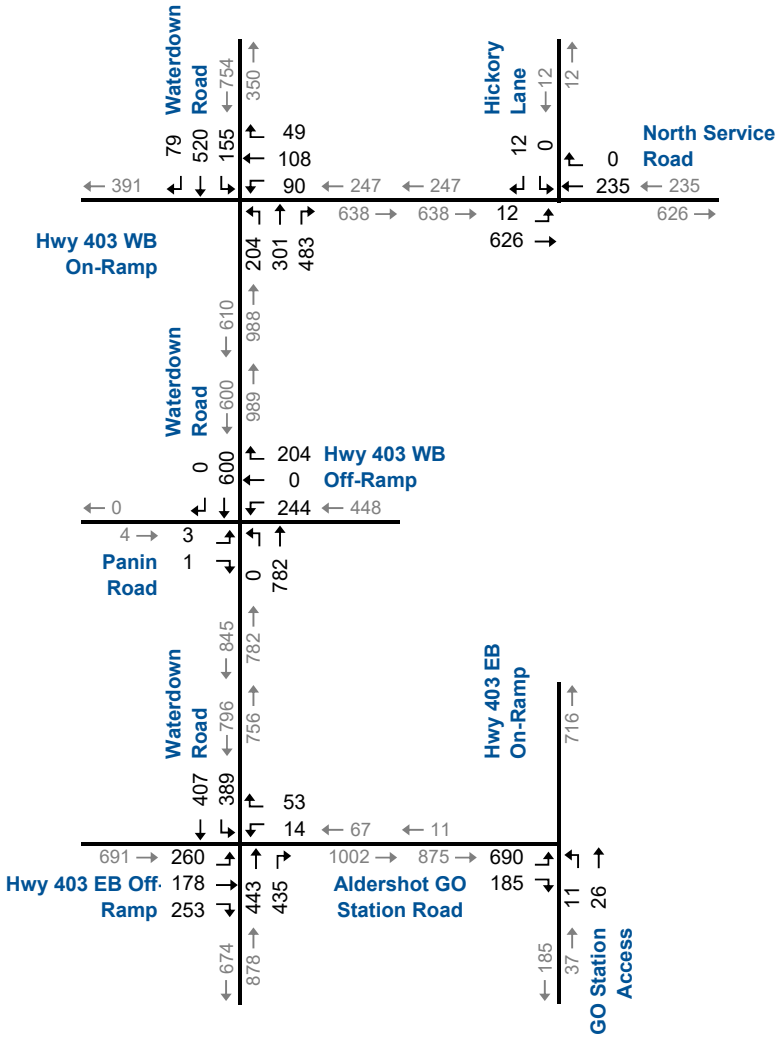
Total 2023 AM Peak Hour

Medium & Articulated Trucks



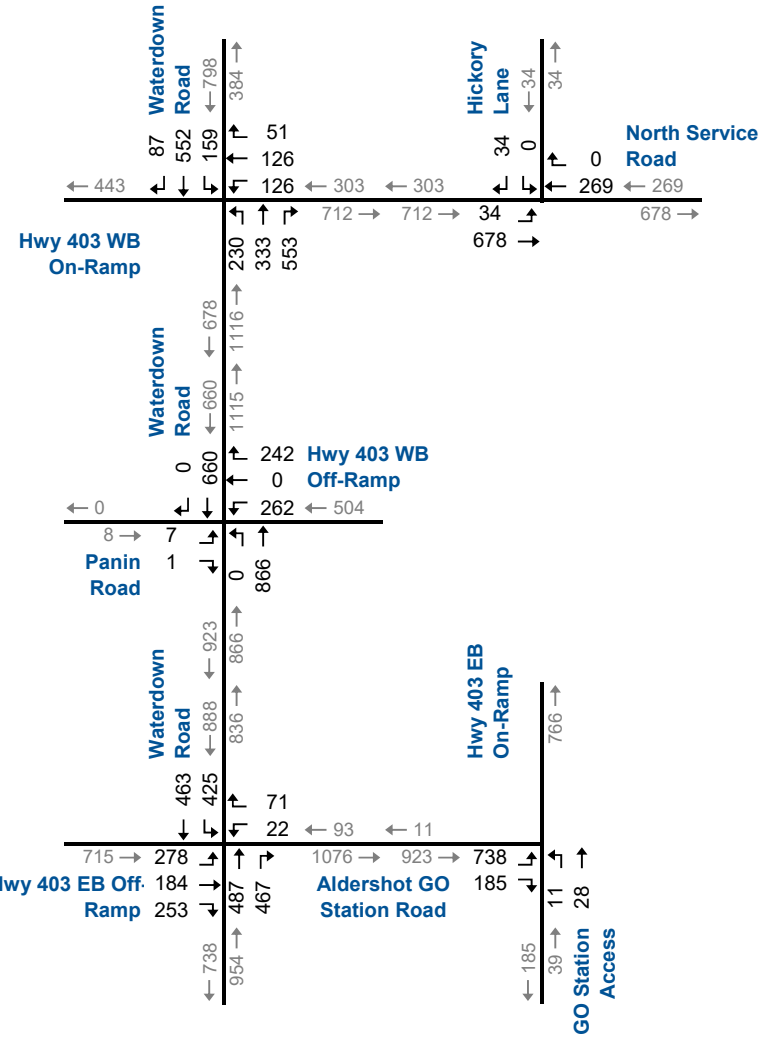
Total 2023 AM Peak Hour

Total Count Volume (Light + Medium + Articulated)



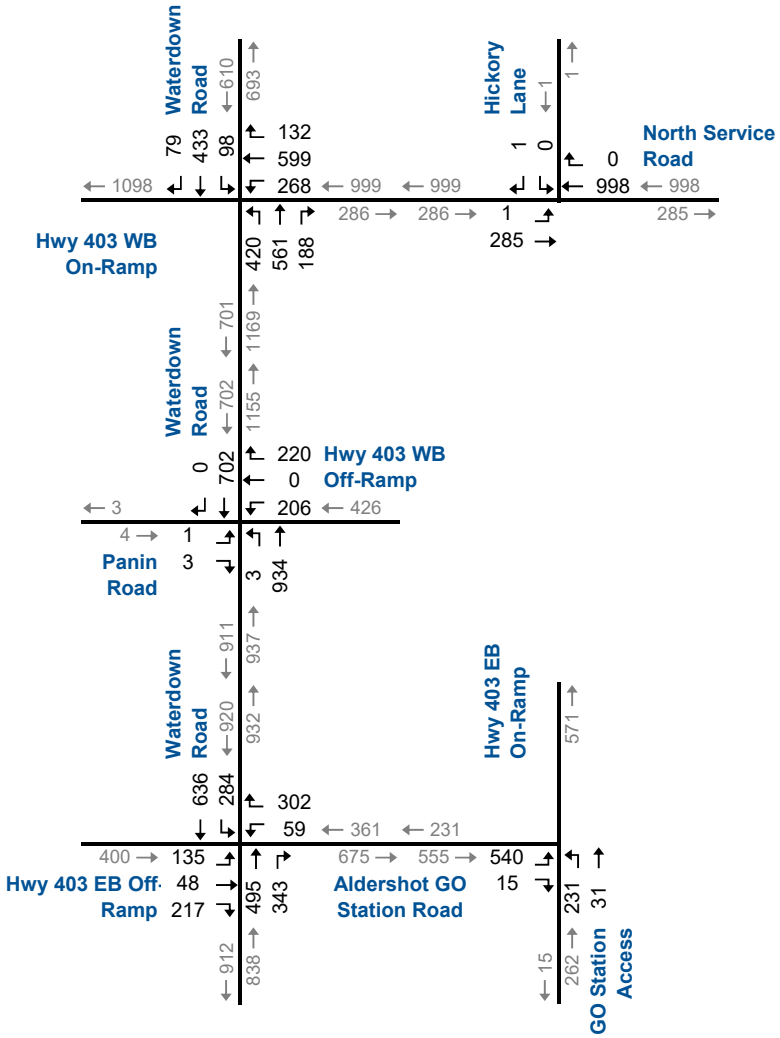
Total 2023 AM Peak Hour

Passenger Car Equivalents (PCE)



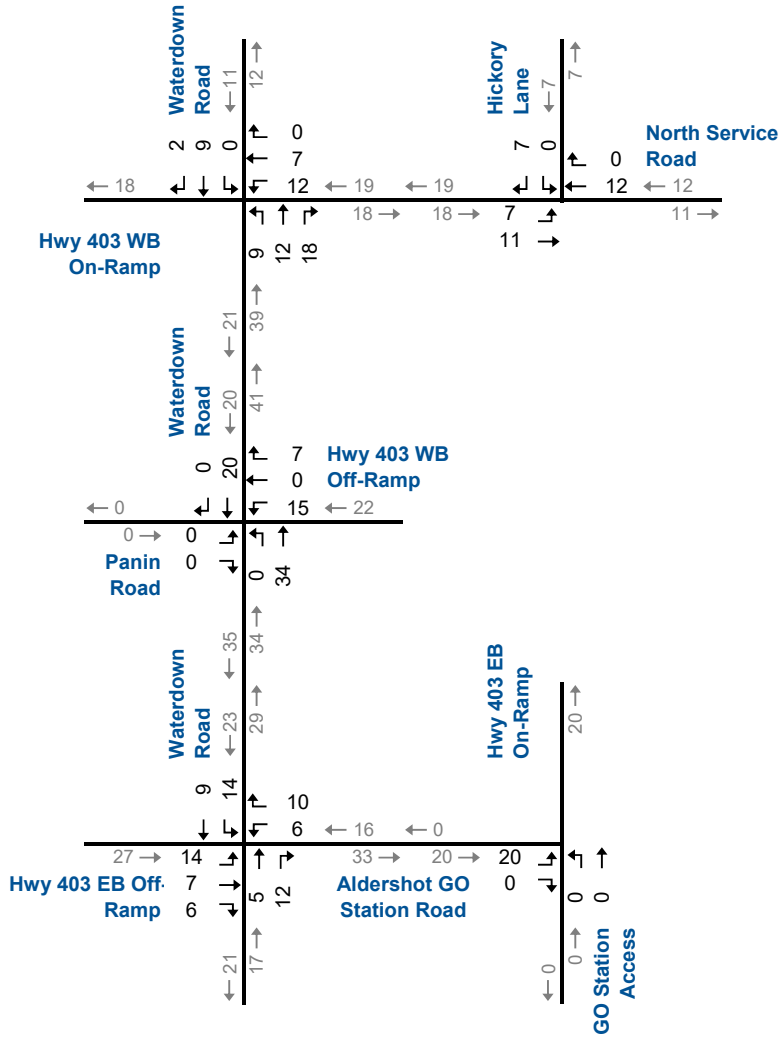
Total 2023 PM Peak Hour

Light Vehicles



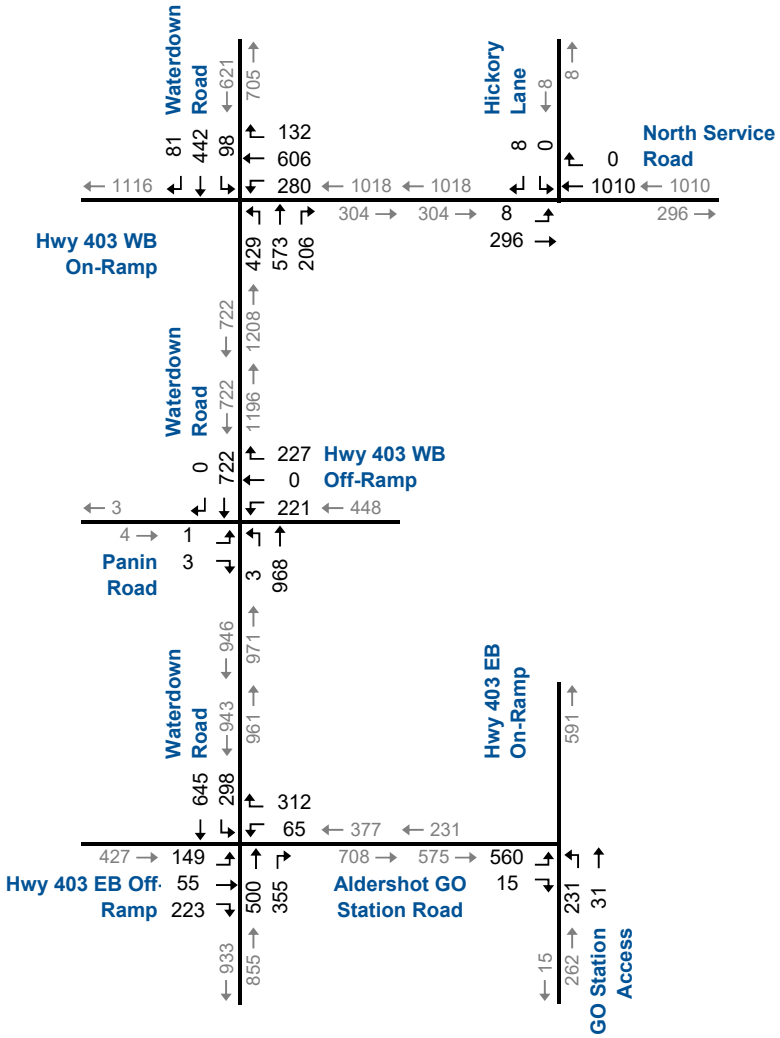
Total 2023 PM Peak Hour

Medium & Articulated Trucks



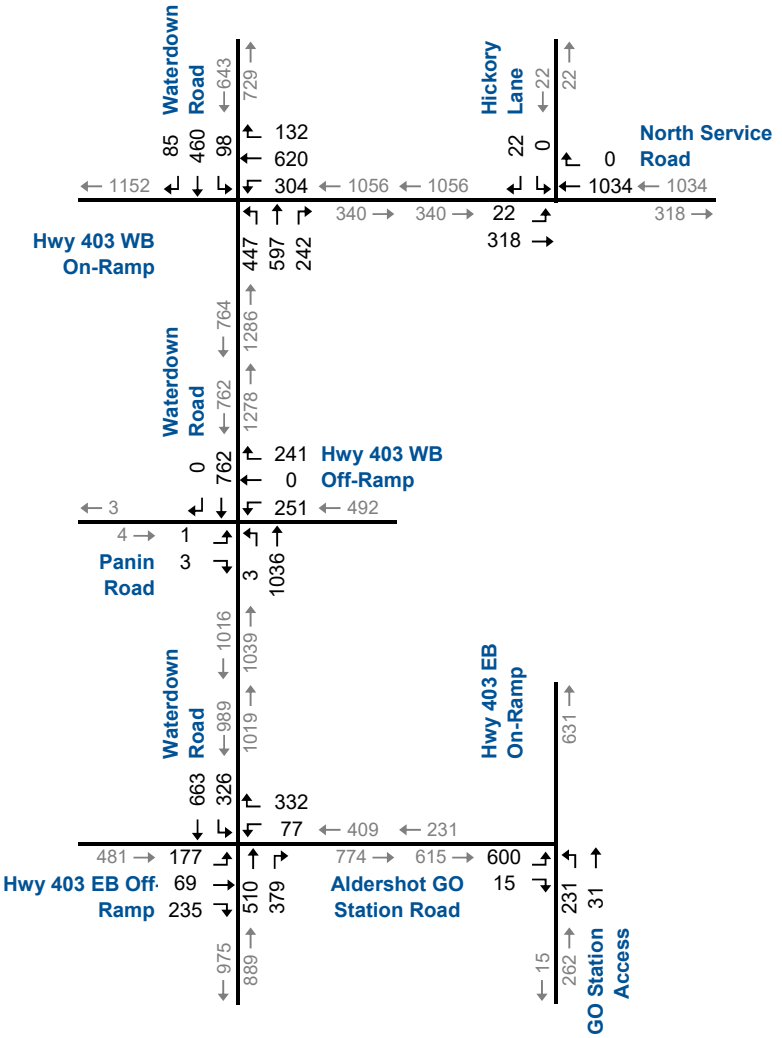
Total 2023 PM Peak Hour

Total Count Volume (Light + Medium + Articulated)



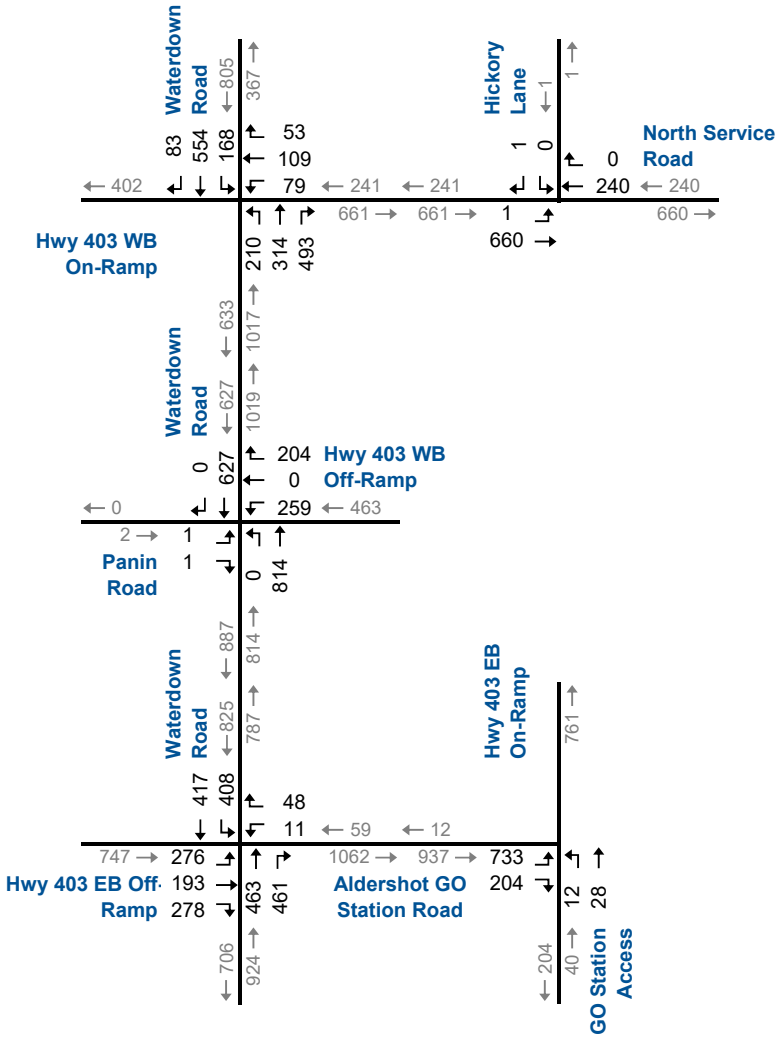
Total 2023 PM Peak Hour

Passenger Car Equivalents (PCE)



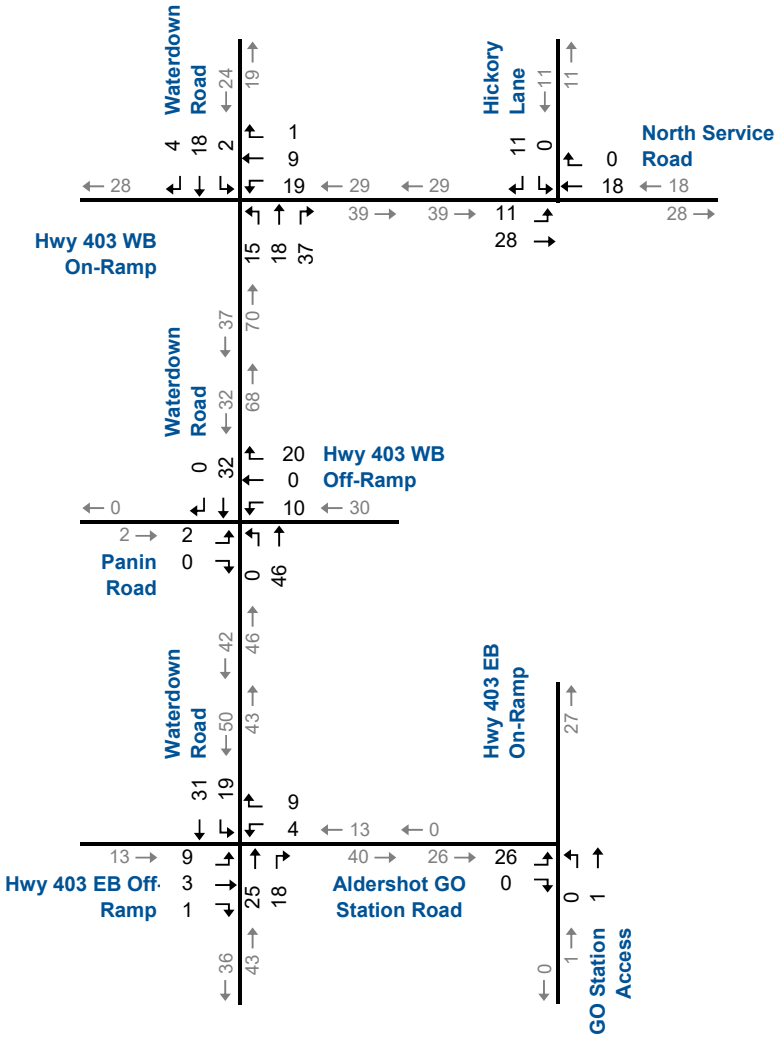
Total 2028 AM Peak Hour

Light Vehicles



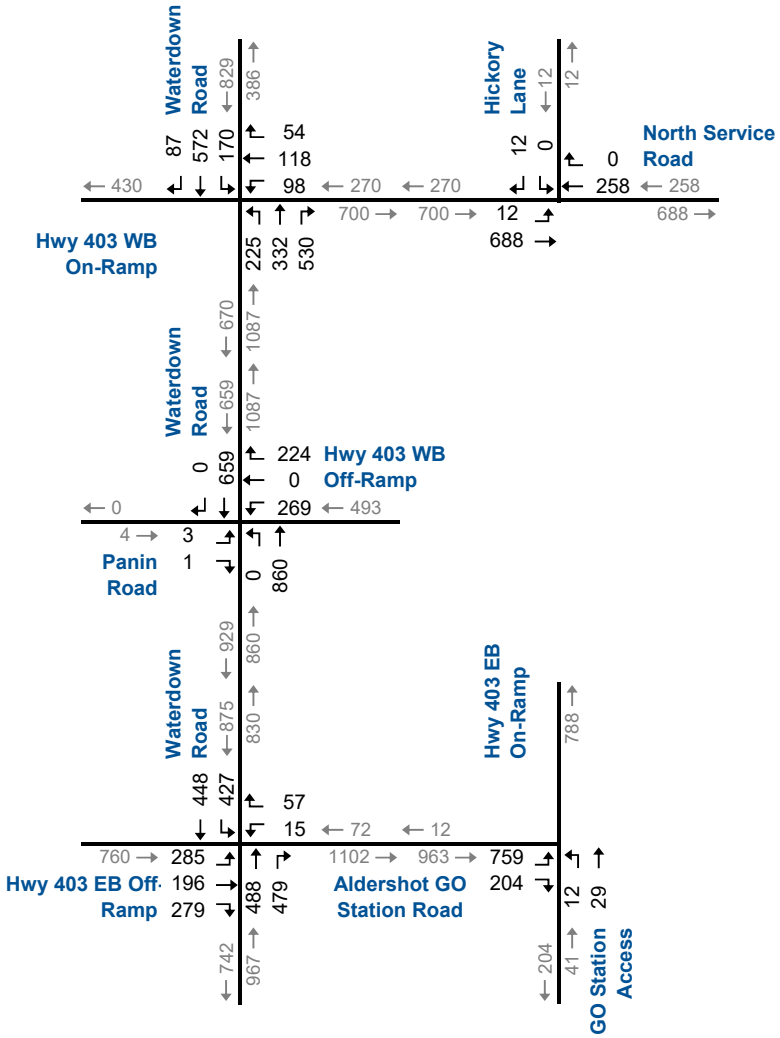
Total 2028 AM Peak Hour

Medium & Articulated Trucks



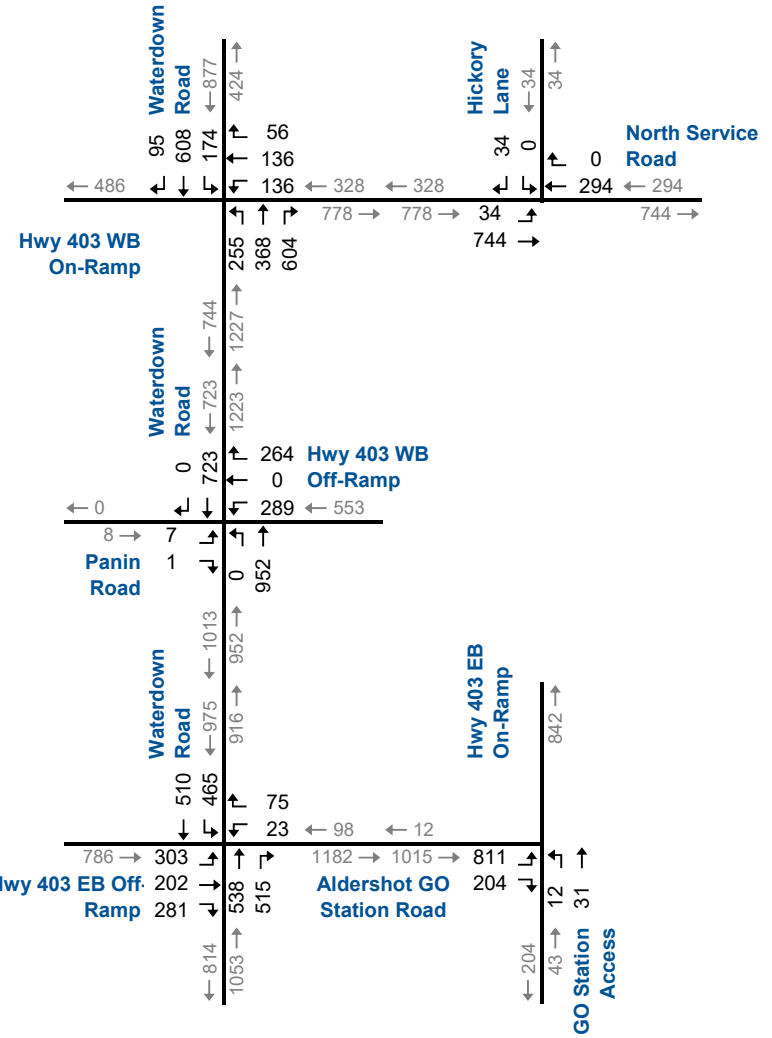
Total 2028 AM Peak Hour

Total Count Volume (Light + Medium + Articulated)



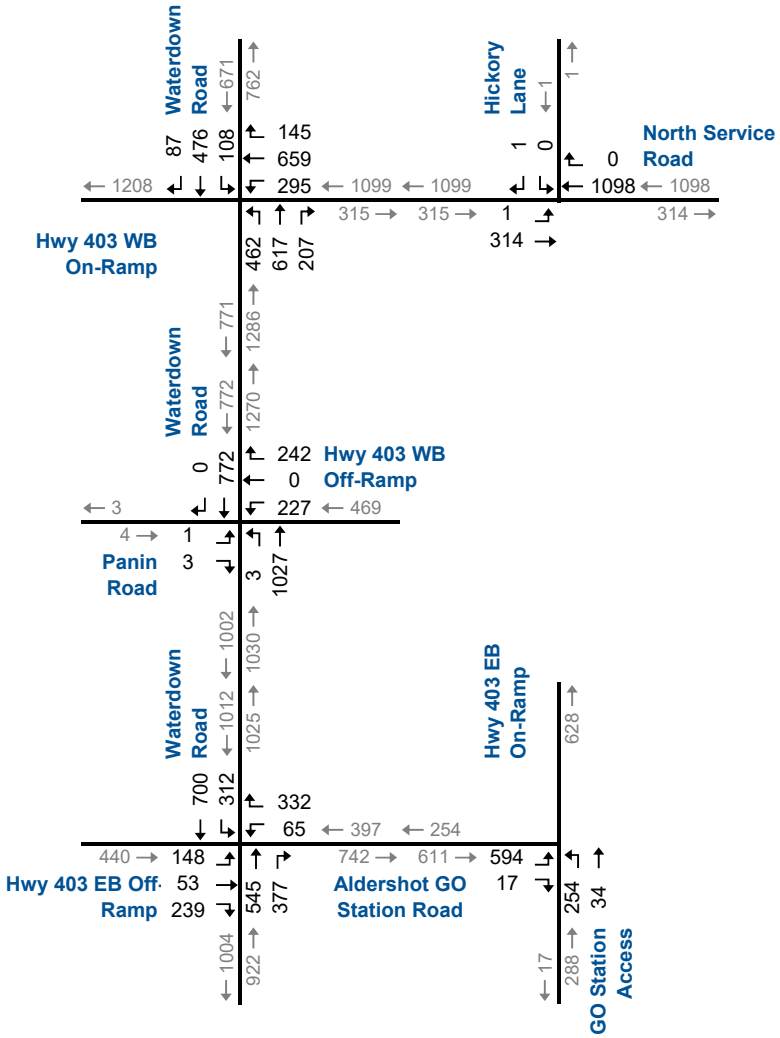
Total 2028 AM Peak Hour

Passenger Car Equivalents (PCE)



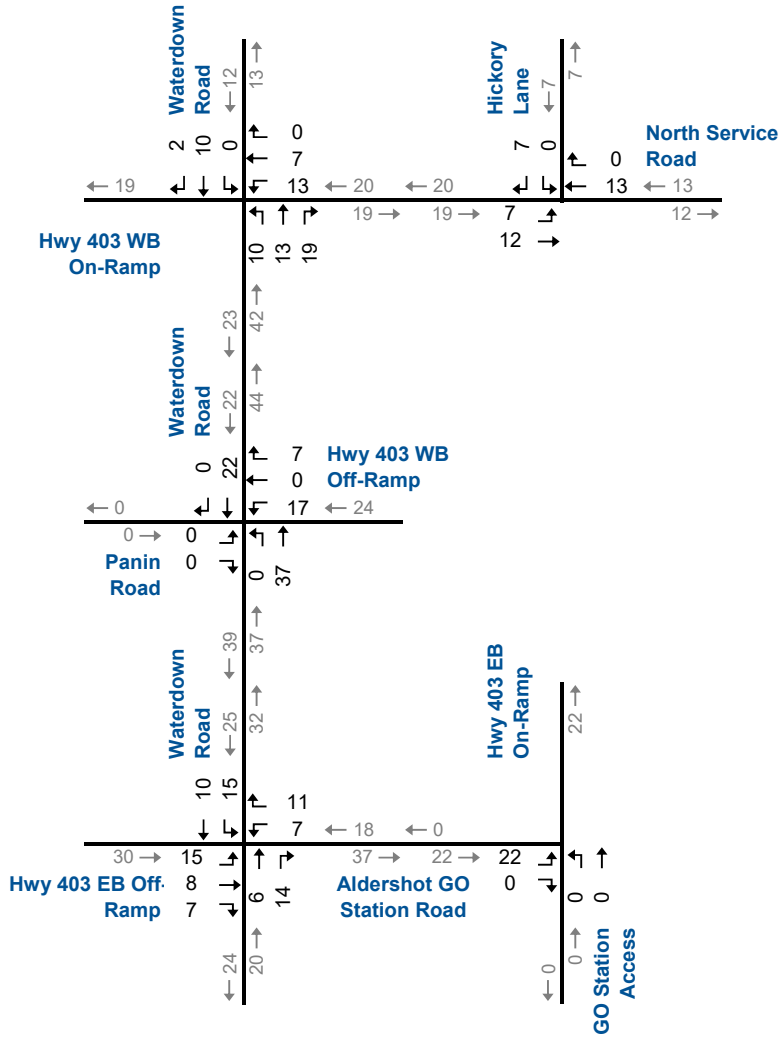
Total 2028 PM Peak Hour

Light Vehicles



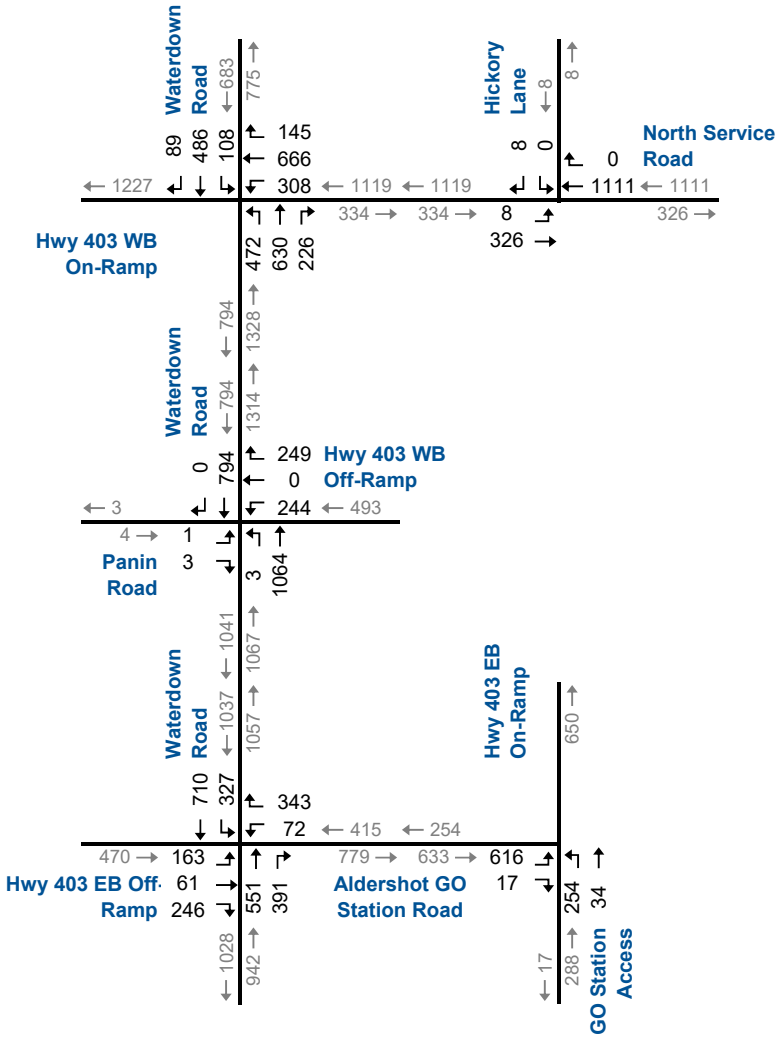
Total 2028 PM Peak Hour

Medium & Articulated Trucks



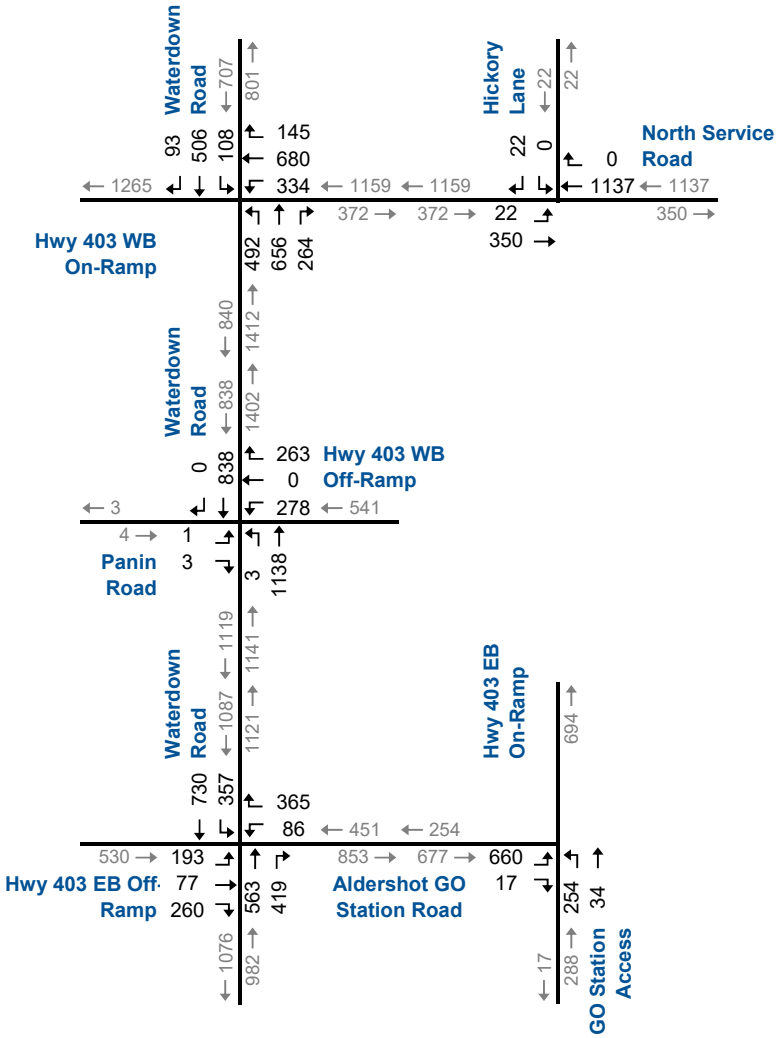
Total 2028 PM Peak Hour

Total Count Volume (Light + Medium + Articulated)



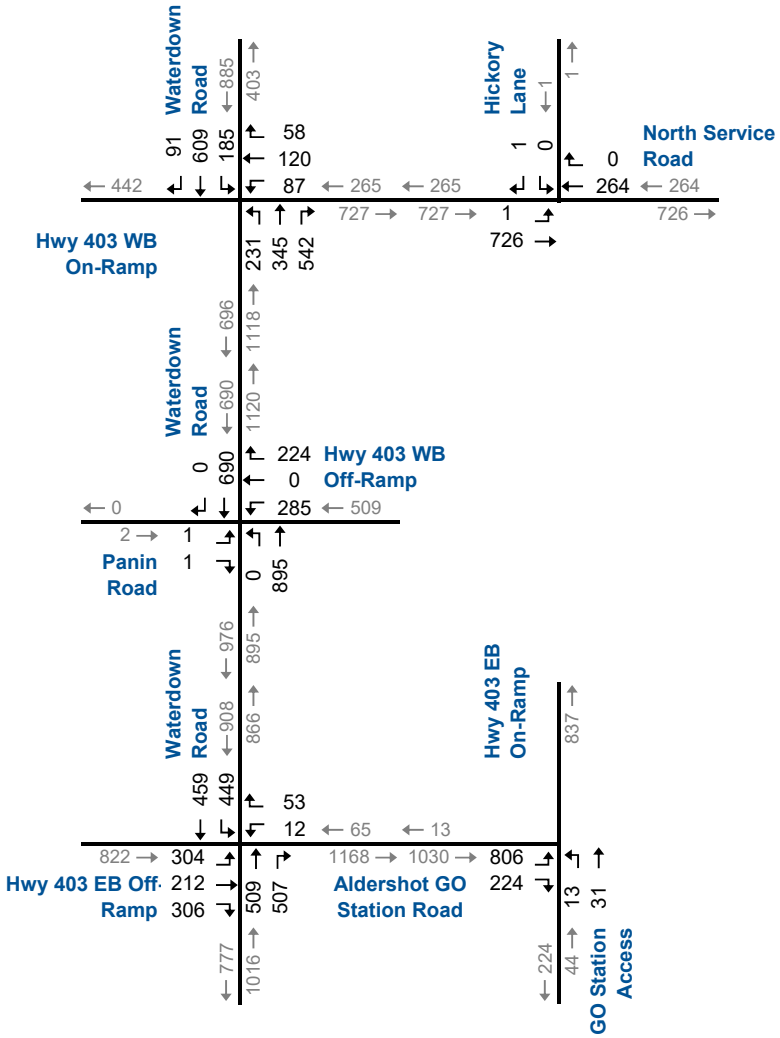
Total 2028 PM Peak Hour

Passenger Car Equivalents (PCE)



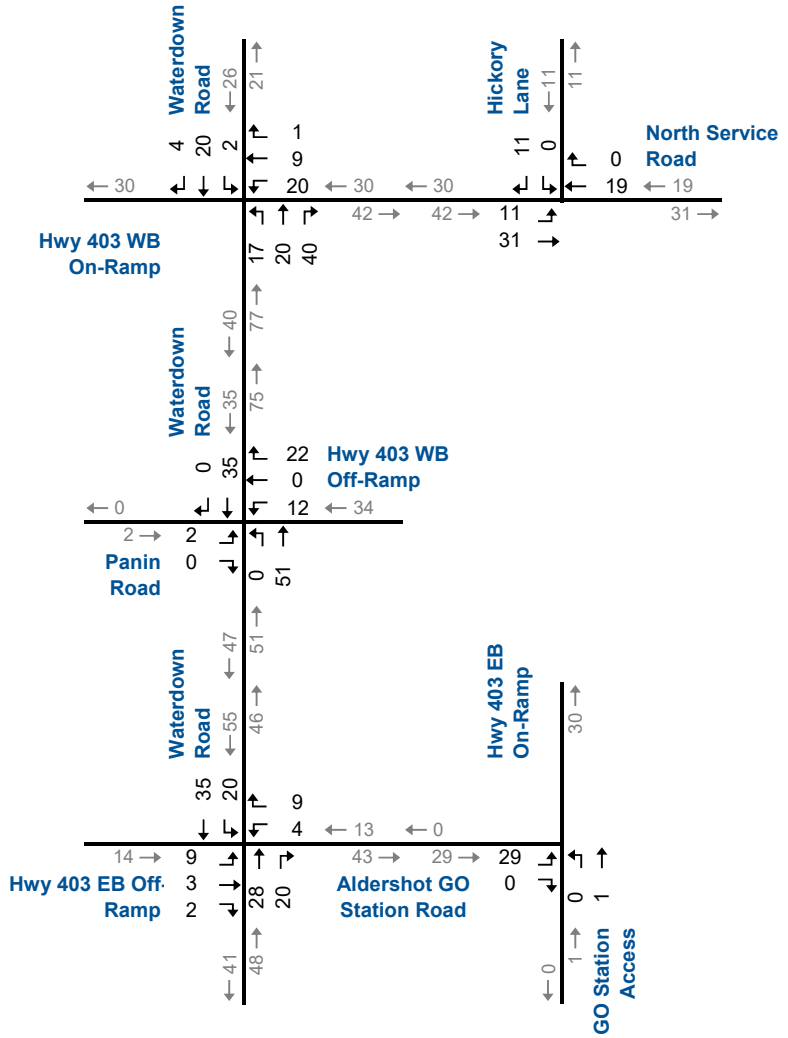
Total 2033 AM Peak Hour

Light Vehicles



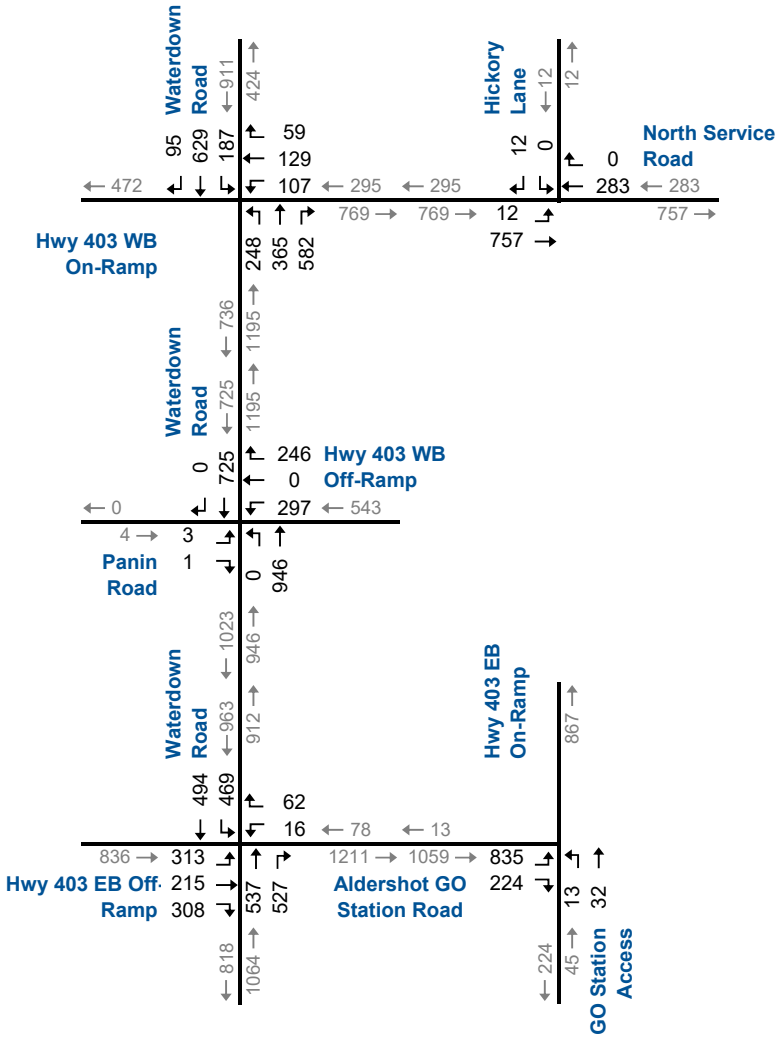
Total 2033 AM Peak Hour

Medium & Articulated Trucks



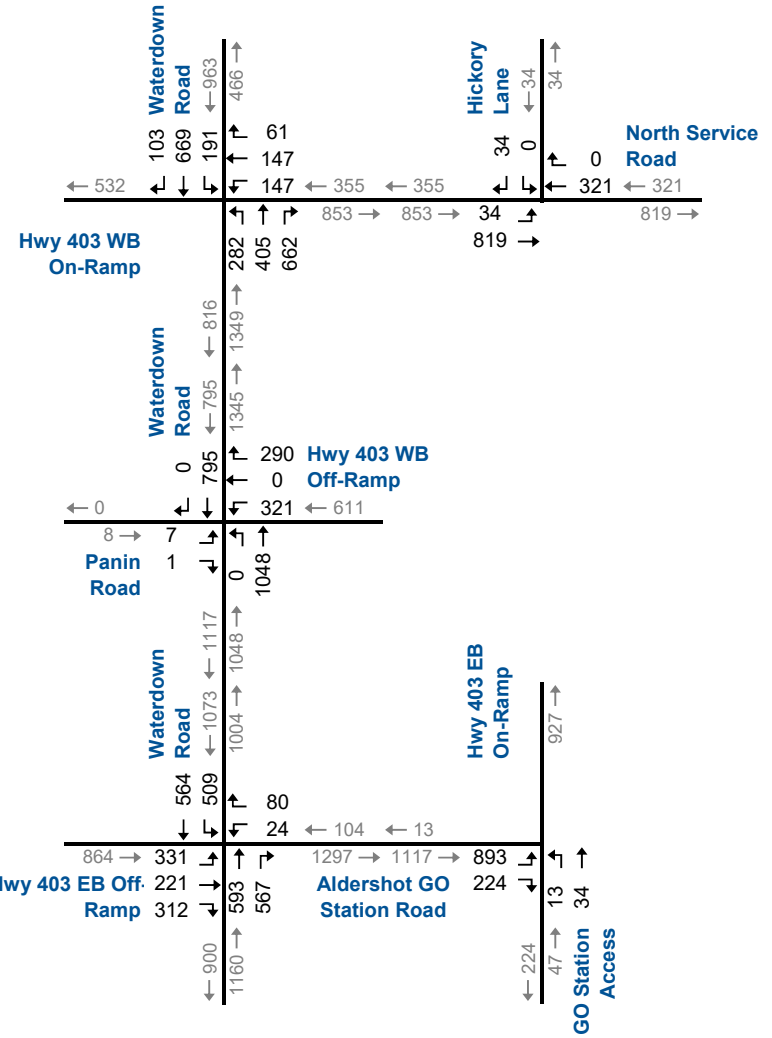
Total 2033 AM Peak Hour

Total Count Volume (Light + Medium + Articulated)



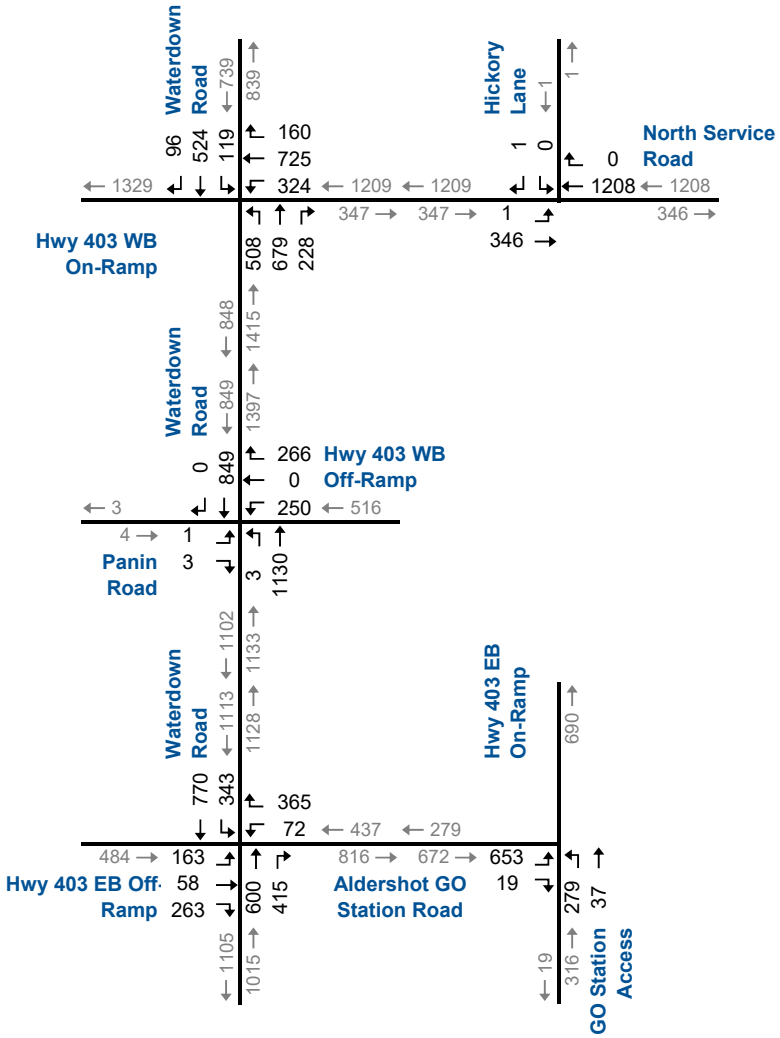
Total 2033 AM Peak Hour

Passenger Car Equivalents (PCE)



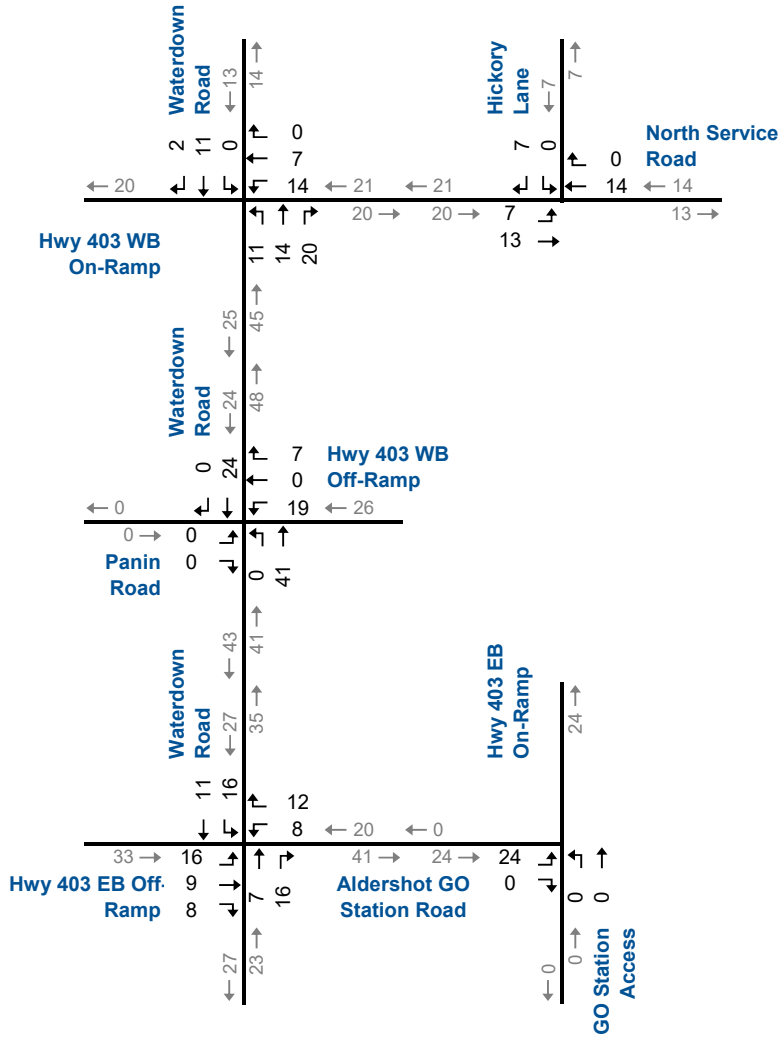
Total 2033 PM Peak Hour

Light Vehicles



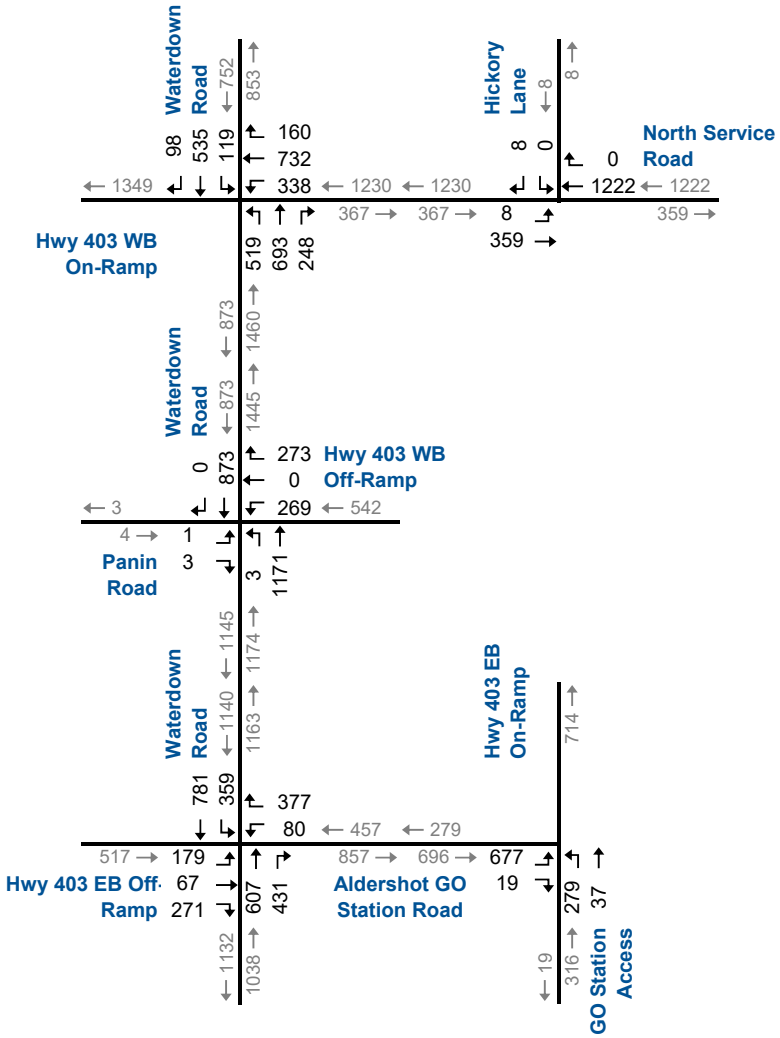
Total 2033 PM Peak Hour

Medium & Articulated Trucks



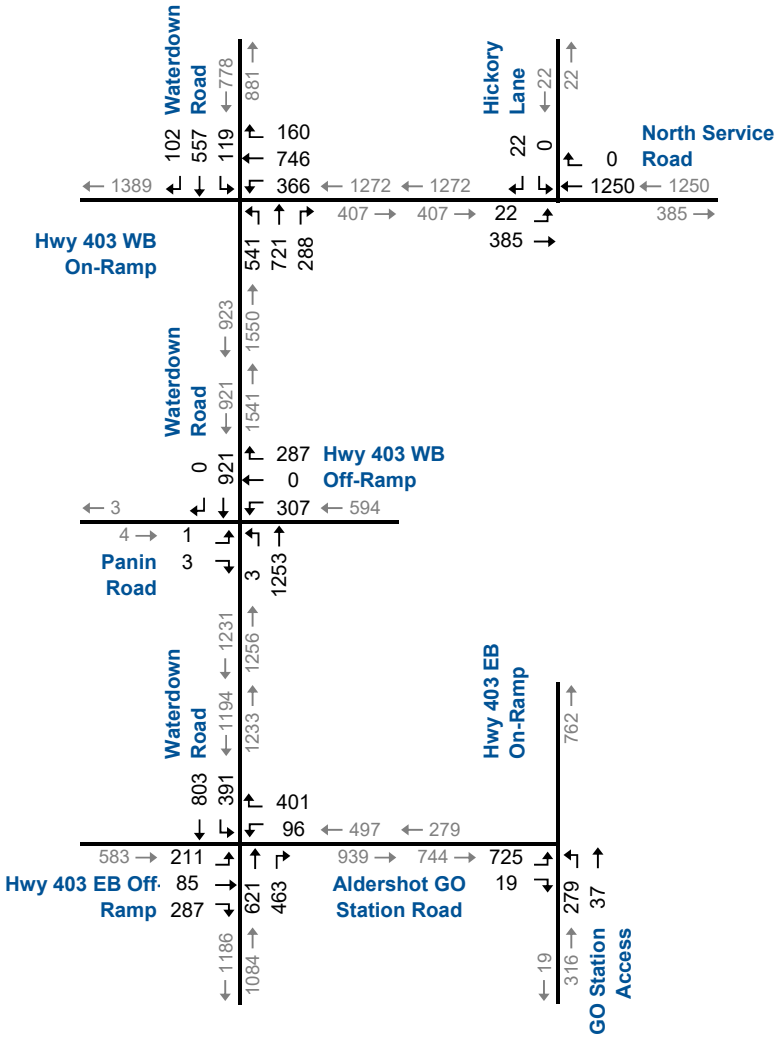
Total 2033 PM Peak Hour

Total Count Volume (Light + Medium + Articulated)



Total 2033 PM Peak Hour

Passenger Car Equivalents (PCE)



Appendix G1

Background Traffic Operations – Opening Date



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	107	111	51	245	333	519	159	552	87
Future Volume (vph)	0	0	0	107	111	51	245	333	519	159	552	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.909			0.980	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3281	0	1745	3538	0
Flt Permitted				0.950			0.368			0.294		
Satd. Flow (perm)	0	0	0	1745	1900	1597	676	3281	0	540	3538	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		492			19	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	109	113	52	250	340	530	162	563	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	109	113	52	250	870	0	162	652	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.5	31.0	
Total Split (s)				28.0	28.0	28.0	33.0	57.0		25.0	49.0	
Total Split (%)				25.5%	25.5%	25.5%	30.0%	51.8%		22.7%	44.5%	
Maximum Green (s)				20.0	20.0	20.0	30.0	49.0		22.0	41.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				16.3	16.3	16.3	83.2	74.4		80.2	72.9	
Actuated g/C Ratio				0.15	0.15	0.15	0.76	0.68		0.73	0.66	
v/c Ratio				0.42	0.40	0.16	0.42	0.37		0.34	0.28	
Control Delay				46.9	45.9	1.0	4.5	2.0		5.6	8.4	
Queue Delay				0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay				46.9	45.9	1.0	4.5	2.2		5.6	8.4	
LOS				D	D	A	A	A		A	A	
Approach Delay					37.8			2.7			7.9	
Approach LOS					D			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 52 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.42			
Intersection Signal Delay: 8.9		Intersection LOS: A	
Intersection Capacity Utilization 51.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd





Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	109	113	52	250	870	162	652
v/c Ratio	0.42	0.40	0.16	0.42	0.37	0.34	0.28
Control Delay	46.9	45.9	1.0	4.5	2.0	5.6	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	46.9	45.9	1.0	4.5	2.2	5.6	8.4
Queue Length 50th (m)	22.7	23.5	0.0	2.3	0.0	7.2	27.7
Queue Length 95th (m)	38.5	39.5	0.0	9.8	0.0	15.2	46.1
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	380	414	433	808	2379	650	2351
Starvation Cap Reductn	0	0	0	0	535	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.27	0.12	0.31	0.47	0.25	0.28

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	107	111	51	245	333	519	159	552	87
Future Volume (vph)	0	0	0	107	111	51	245	333	519	159	552	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.91		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3280		1745	3536	
Flt Permitted				0.95	1.00	1.00	0.37	1.00		0.29	1.00	
Satd. Flow (perm)				1745	1900	1597	675	3280		540	3536	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	109	113	52	250	340	530	162	563	89
RTOR Reduction (vph)	0	0	0	0	0	44	0	159	0	0	6	0
Lane Group Flow (vph)	0	0	0	109	113	8	250	711	0	162	646	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				12.3	12.3	12.3	80.2	70.4		77.2	68.9	
Effective Green, g (s)				16.3	16.3	16.3	78.2	74.4		75.2	72.9	
Actuated g/C Ratio				0.15	0.15	0.15	0.71	0.68		0.68	0.66	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				258	281	236	565	2218		449	2343	
v/s Ratio Prot					0.06		c0.04	0.22		0.02	0.18	
v/s Ratio Perm				c0.06		0.00	c0.28			0.22		
v/c Ratio				0.42	0.40	0.03	0.44	0.32		0.36	0.28	
Uniform Delay, d1				42.6	42.4	40.1	5.6	7.4		6.3	7.7	
Progression Factor				1.00	1.00	1.00	0.67	0.49		1.00	1.00	
Incremental Delay, d2				1.1	0.9	0.1	0.5	0.4		0.5	0.3	
Delay (s)				43.7	43.4	40.2	4.3	3.9		6.8	7.9	
Level of Service				D	D	D	A	A		A	A	
Approach Delay (s)		0.0			42.9			4.0			7.7	
Approach LOS		A			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.42				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	51.4%	ICU Level of Service		A	
Analysis Period (min)	15				

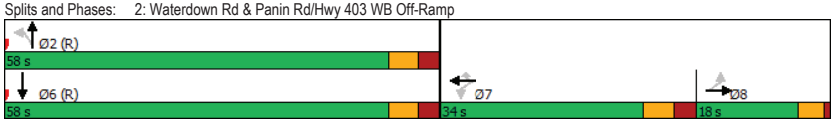
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	277	0	227	0	862	0	0	641	0
Future Volume (vph)	7	0	1	277	0	227	0	862	0	0	641	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.983				0.850						
Flt Protected		0.958		0.950	0.950							
Satd. Flow (prot)	0	1789	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.875	0.875							
Satd. Flow (perm)	0	1868	0	1527	1579	1597	0	3610	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109				234						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	0	1	286	0	234	0	889	0	0	661	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	143	143	234	0	889	0	0	661	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	18.0	18.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	18.0	18.0		34.0	34.0	34.0	58.0	58.0			58.0	
Total Split (%)	16.4%	16.4%		30.9%	30.9%	30.9%	52.7%	52.7%			52.7%	
Maximum Green (s)	13.5	13.5		27.0	27.0	27.0	51.0	51.0			51.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		18.7	18.7	18.7		81.3			81.3	
Actuated g/C Ratio		0.05		0.17	0.17	0.17		0.74			0.74	
v/c Ratio		0.04		0.55	0.53	0.50		0.33			0.25	
Control Delay		0.4		48.9	48.0	8.7		4.6			4.7	
Queue Delay		0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay		0.4		48.9	48.0	8.7		4.6			4.7	
LOS		A		D	D	A		A			A	
Approach Delay		0.4			30.6			4.6			4.7	
Approach LOS		A			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 26 (24%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 11.1		Intersection LOS: B	
Intersection Capacity Utilization 52.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	8	143	143	234	889	661
v/c Ratio	0.04	0.55	0.53	0.50	0.33	0.25
Control Delay	0.4	48.9	48.0	8.7	4.6	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.4	48.9	48.0	8.7	4.6	4.7
Queue Length 50th (m)	0.0	31.5	31.4	0.0	11.5	15.7
Queue Length 95th (m)	0.0	49.6	49.3	19.8	36.6	38.5
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	332	416	430	605	2666	2666
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	0.34	0.33	0.39	0.33	0.25

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	277	0	227	0	862	0	0	641	0
Future Volume (vph)	7	0	1	277	0	227	0	862	0	0	641	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.98		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.96		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1790		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.88	0.88	1.00		1.00			1.00	
Satd. Flow (perm)		1868		1527	1579	1597		3610			3610	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	7	0	1	286	0	234	0	889	0	0	661	0
RTOR Reduction (vph)	0	8	0	0	0	194	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	143	143	40	0	889	0	0	661	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		15.7	15.7	15.7		74.7			74.7	
Effective Green, g (s)		1.6		18.7	18.7	18.7		77.7			77.7	
Actuated g/C Ratio		0.01		0.17	0.17	0.17		0.71			0.71	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		27		259	268	271		2549			2549	
v/s Ratio Prot								c0.25			0.18	
v/s Ratio Perm		c0.00		c0.09	0.09	0.02						
v/c Ratio		0.00		0.55	0.53	0.15		0.35			0.26	
Uniform Delay, d1		53.4		41.8	41.7	38.9		6.3			5.8	
Progression Factor		1.00		1.00	1.00	1.00		0.72			0.80	
Incremental Delay, d2		0.1		2.5	2.0	0.3		0.3			0.2	
Delay (s)		53.5		44.4	43.7	39.1		4.8			4.9	
Level of Service		D		D	D	D		A			A	
Approach Delay (s)		53.5			41.8			4.8			4.9	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.38				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0		
Intersection Capacity Utilization	52.1%	ICU Level of Service	A		
Analysis Period (min)	15				

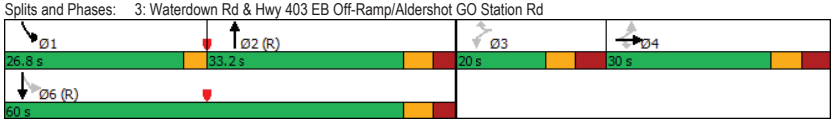
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	259	184	272	22	0	71	0	502	486	406	478	0
Future Volume (vph)	259	184	272	22	0	71	0	502	486	406	478	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.926				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3343	0	1805	3610	0
Flt Permitted	0.950			0.345						0.115		
Satd. Flow (perm)	1745	1900	1597	1229	0	1597	0	3343	0	218	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			289			149		217				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
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 (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	276	196	289	23	0	76	0	534	517	432	509	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	276	196	289	23	0	76	0	1051	0	432	509	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	30.0	30.0	30.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	30.0	30.0	30.0	20.0		20.0		33.2		26.8	60.0	
Total Split (%)	27.3%	27.3%	27.3%	18.2%		18.2%		30.2%		24.4%	54.5%	
Maximum Green (s)	22.0	22.0	22.0	12.0		12.0		26.2		23.8	53.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	24.7	24.7	24.7	13.2		13.2		36.4		63.2	63.2	
Actuated g/C Ratio	0.22	0.22	0.22	0.12		0.12		0.33		0.57	0.57	
v/c Ratio	0.70	0.46	0.50	0.16		0.24		0.84		0.95	0.25	
Control Delay	49.4	40.1	7.2	45.8		3.4		36.5		59.5	11.9	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	49.4	40.1	7.2	45.8		3.4		36.5		59.5	11.9	
LOS	D	D	A	D		A		D		E	B	
Approach Delay		31.0			13.3			36.5			33.7	
Approach LOS		C			B			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 2 (2%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 33.3		Intersection LOS: C	
Intersection Capacity Utilization 81.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	276	196	289	23	76	1051	432	509
v/c Ratio	0.70	0.46	0.50	0.16	0.24	0.84	0.95	0.25
Control Delay	49.4	40.1	7.2	45.8	3.4	36.5	59.5	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.4	40.1	7.2	45.8	3.4	36.5	59.5	11.9
Queue Length 50th (m)	56.0	37.3	0.0	2.5	0.0	~105.1	62.7	24.4
Queue Length 95th (m)	86.8	60.6	21.5	6.6	0.0	#153.1	#142.9	49.8
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	422	460	606	178	359	1250	469	2075
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.43	0.48	0.13	0.21	0.84	0.92	0.25

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	259	184	272	22	0	71	0	502	486	406	478	0
Future Volume (vph)	259	184	272	22	0	71	0	502	486	406	478	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.93		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3344		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.34		1.00		1.00		0.11	1.00	
Satd. Flow (perm)	1745	1900	1597	1229		1597		3344		218	3610	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	276	196	289	23	0	76	0	534	517	432	509	0
RTOR Reduction (vph)	0	0	224	0	0	68	0	148	0	0	0	0
Lane Group Flow (vph)	276	196	65	23	0	8	0	903	0	432	509	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	20.7	20.7	20.7	7.6		7.6		31.8		58.7	58.7	
Effective Green, g (s)	24.7	24.7	24.7	11.6		11.6		34.8		57.7	61.7	
Actuated g/C Ratio	0.22	0.22	0.22	0.11		0.11		0.32		0.52	0.56	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	391	426	358	129		168		1057		444	2024	
v/s Ratio Prot		0.10						0.27		c0.20	0.14	
v/s Ratio Perm	c0.16		0.04	c0.02		0.01				c0.31		
v/c Ratio	0.71	0.46	0.18	0.18		0.05		0.85		0.97	0.25	
Uniform Delay, d1	39.3	36.9	34.5	44.9		44.2		35.2		32.7	12.3	
Progression Factor	1.00	1.00	1.00	1.01		1.00		1.00		0.95	0.88	
Incremental Delay, d2	5.7	0.8	0.2	0.7		0.1		8.8		35.0	0.3	
Delay (s)	45.0	37.7	34.7	46.1		44.4		44.0		66.0	11.2	
Level of Service	D	D	C	D		D		D		E	B	
Approach Delay (s)		39.2			44.8			44.0			36.3	
Approach LOS		D			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	40.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	81.7%	ICU Level of Service	D	
Analysis Period (min)	15			

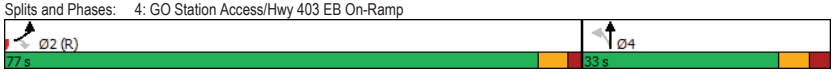
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	738	185	11	28	0	0
Future Volume (vph)	738	185	11	28	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.986		
Satd. Flow (prot)	1745	1597	0	1873	0	0
Flt Permitted	0.950			0.986		
Satd. Flow (perm)	1745	1597	0	1873	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		195				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	777	195	12	29	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	777	195	0	41	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	77.0	77.0	33.0	33.0		
Total Split (%)	70.0%	70.0%	30.0%	30.0%		
Maximum Green (s)	71.0	71.0	26.0	26.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	97.9	97.9		11.7		
Actuated g/C Ratio	0.89	0.89		0.11		
v/c Ratio	0.50	0.14		0.21		
Control Delay	0.8	0.1		47.3		
Queue Delay	0.0	0.0		0.0		
Total Delay	0.8	0.1		47.3		
LOS	A	A		D		
Approach Delay	0.7			47.3		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 102 (93%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 2.5		Intersection LOS: A	
Intersection Capacity Utilization 54.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	777	195	41
v/c Ratio	0.50	0.14	0.21
Control Delay	0.8	0.1	47.3
Queue Delay	0.0	0.0	0.0
Total Delay	0.8	0.1	47.3
Queue Length 50th (m)	2.2	0.0	8.7
Queue Length 95th (m)	m3.0	m0.0	19.3
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1553	1443	493
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.50	0.14	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	738	185	11	28	0	0
Future Volume (vph)	738	185	11	28	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.99		
Satd. Flow (prot)	1745	1597		1873		
Flt Permitted	0.95	1.00		0.99		
Satd. Flow (perm)	1745	1597		1873		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	777	195	12	29	0	0
RTOR Reduction (vph)	0	29	0	0	0	0
Lane Group Flow (vph)	777	166	0	41	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	91.5	91.5		5.5		
Effective Green, g (s)	93.5	93.5		8.5		
Actuated g/C Ratio	0.85	0.85		0.08		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1483	1357		144		
v/s Ratio Prot	c0.45					
v/s Ratio Perm		0.10		0.02		
v/c Ratio	0.52	0.12		0.28		
Uniform Delay, d1	2.2	1.4		47.9		
Progression Factor	0.05	0.00		1.00		
Incremental Delay, d2	0.8	0.1		1.1		
Delay (s)	0.9	0.1		49.0		
Level of Service	A	A		D		
Approach Delay (s)	0.7			49.0	0.0	
Approach LOS	A			D	A	

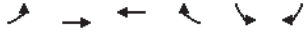
Intersection Summary				
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	54.2%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	678	269	0	0	0
Future Volume (vph)	0	678	269	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	1863	0
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	1863	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		286.2	
Travel Time (s)		56.6	12.1		20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	737	292	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	737	292	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	678	269	0	0	0
Future Volume (Veh/h)	0	678	269	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	737	292	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	292				1029	292
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	292				1029	292
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1270				259	747

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	737	292	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1270	1700	1700
Volume to Capacity	0.00	0.17	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		39.0%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	TR	L	T	TR
Maximum Queue (m)	49.1	45.7	15.5	54.8	39.6	51.6	43.9	80.2	63.3
Average Queue (m)	23.0	21.5	5.8	21.6	14.0	18.6	18.8	34.6	17.1
95th Queue (m)	42.2	39.3	12.9	41.6	31.2	38.2	35.6	61.9	45.1
Link Distance (m)		281.2			124.2	124.2		83.3	
Upstream Blk Time (%)								0	0
Queuing Penalty (veh)								0	0
Storage Bay Dist (m)	150.0		130.0	90.0			70.0		70.0
Storage Blk Time (%)				0				0	
Queuing Penalty (veh)				0				2	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	14.0	53.3	53.2	41.7	54.9	46.1	50.1	30.7
Average Queue (m)	2.4	27.2	26.6	20.7	16.2	15.4	23.2	6.8
95th Queue (m)	9.6	46.6	44.7	36.5	39.3	37.1	43.2	22.7
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	82.8	62.4	44.3	20.4	9.6	24.5	331.5	347.0	37.4	129.1	109.9
Average Queue (m)	51.5	31.1	20.3	6.7	0.6	9.3	191.8	220.8	35.5	60.5	35.5
95th Queue (m)	79.5	52.1	35.6	16.2	5.1	18.6	382.8	402.1	41.6	115.8	85.0
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)							6	9			
Queuing Penalty (veh)							0	0			
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)									38	1	
Queuing Penalty (veh)									92	3	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	59.8	22.1	25.1
Average Queue (m)	21.9	5.3	10.7
95th Queue (m)	52.4	16.1	22.7
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

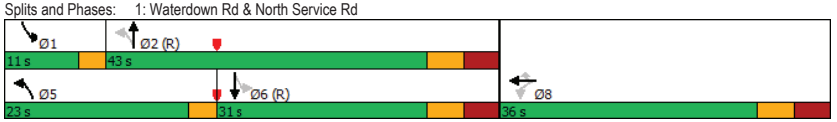
Network wide Queuing Penalty: 96

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	291	611	132	456	597	220	98	460	85
Future Volume (vph)	0	0	0	291	611	132	456	597	220	98	460	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.960			0.977	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3466	0	1745	3527	0
Flt Permitted				0.950			0.207			0.317		
Satd. Flow (perm)	0	0	0	1745	1900	1597	380	3466	0	582	3527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						145		74			24	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	320	671	145	501	656	242	108	505	93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	320	671	145	501	898	0	108	598	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.0	31.0	
Total Split (s)				36.0	36.0	36.0	23.0	43.0		11.0	31.0	
Total Split (%)				40.0%	40.0%	40.0%	25.6%	47.8%		12.2%	34.4%	
Maximum Green (s)				28.0	28.0	28.0	20.0	35.0		8.0	23.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				32.0	32.0	32.0	50.0	41.4		33.6	27.0	
Actuated g/C Ratio				0.36	0.36	0.36	0.56	0.46		0.37	0.30	
v/c Ratio				0.52	0.99	0.22	1.00	0.55		0.36	0.56	
Control Delay				26.5	63.9	4.5	62.7	6.8		14.8	27.7	
Queue Delay				0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay				26.5	63.9	4.5	62.7	6.9		14.8	27.7	
LOS				C	E	A	E	A		B	C	
Approach Delay					45.8			26.9			25.7	
Approach LOS					D			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 42 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.00			
Intersection Signal Delay: 33.3		Intersection LOS: C	
Intersection Capacity Utilization 82.8%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd





Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	320	671	145	501	898	108	598
v/c Ratio	0.52	0.99	0.22	1.00	0.55	0.36	0.56
Control Delay	26.5	63.9	4.5	62.7	6.8	14.8	27.7
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	26.5	63.9	4.5	62.7	6.9	14.8	27.7
Queue Length 50th (m)	45.3	119.8	0.0	~37.8	14.6	8.7	45.8
Queue Length 95th (m)	71.1	#194.4	12.1	#130.6	20.6	16.5	63.1
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	620	675	661	499	1632	310	1074
Starvation Cap Reductn	0	0	0	0	99	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.99	0.22	1.00	0.59	0.35	0.56

Intersection Summary

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	291	611	132	456	597	220	98	460	85
Future Volume (vph)	0	0	0	291	611	132	456	597	220	98	460	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3464		1745	3526	
Flt Permitted				0.95	1.00	1.00	0.21	1.00		0.32	1.00	
Satd. Flow (perm)				1745	1900	1597	381	3464		582	3526	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	320	671	145	501	656	242	108	505	93
RTOR Reduction (vph)	0	0	0	0	0	93	0	40	0	0	17	0
Lane Group Flow (vph)	0	0	0	320	671	52	501	858	0	108	581	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				28.0	28.0	28.0	46.0	36.8		29.2	23.0	
Effective Green, g (s)				32.0	32.0	32.0	45.0	40.8		27.2	27.0	
Actuated g/C Ratio				0.36	0.36	0.36	0.50	0.45		0.30	0.30	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				620	675	567	478	1570		243	1057	
v/s Ratio Prot					c0.35		c0.22	0.25		0.03	0.16	
v/s Ratio Perm				0.18		0.03	c0.30			0.11		
v/c Ratio				0.52	0.99	0.09	1.05	0.55		0.44	0.55	
Uniform Delay, d1				22.9	28.9	19.3	21.5	17.9		23.4	26.4	
Progression Factor				1.00	1.00	1.00	1.27	0.34		1.00	1.00	
Incremental Delay, d2				0.7	33.0	0.1	50.7	1.1		1.3	2.1	
Delay (s)				23.6	61.9	19.4	78.1	7.1		24.7	28.5	
Level of Service				C	E	B	E	A		C	C	
Approach Delay (s)		0.0			45.7			32.6			27.9	
Approach LOS		A			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	36.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	82.8%	ICU Level of Service	E	
Analysis Period (min)	15			

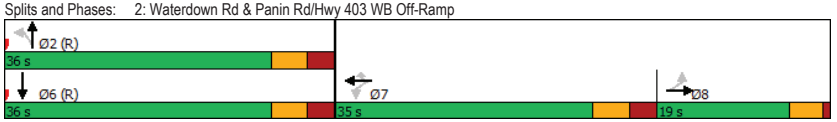
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	260	0	232	3	1032	0	0	749	0
Future Volume (vph)	1	0	3	260	0	232	3	1032	0	0	749	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.899				0.850						
Flt Protected		0.988		0.950	0.950							
Satd. Flow (prot)	0	1688	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.253	0.253			0.953				
Satd. Flow (perm)	0	1708	0	441	457	1597	0	3440	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		133				258						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	0	3	289	0	258	3	1147	0	0	832	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	4	0	144	145	258	0	1150	0	0	832	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	19.0	19.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	19.0	19.0		35.0	35.0	35.0	36.0	36.0			36.0	
Total Split (%)	21.1%	21.1%		38.9%	38.9%	38.9%	40.0%	40.0%			40.0%	
Maximum Green (s)	14.5	14.5		28.0	28.0	28.0	29.0	29.0			29.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		31.0	31.0	31.0		49.0			49.0	
Actuated g/C Ratio		0.07		0.34	0.34	0.34		0.54			0.54	
v/c Ratio		0.02		0.95	0.92	0.36		0.61			0.42	
Control Delay		0.2		95.2	86.8	4.4		10.7			13.8	
Queue Delay		0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay		0.2		95.2	86.8	4.4		10.7			13.8	
LOS		A		F	F	A		B			B	
Approach Delay		0.3			50.2			10.7			13.8	
Approach LOS		A			D			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 34 (38%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 57.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	4	144	145	258	1150	832
v/c Ratio	0.02	0.95	0.92	0.36	0.61	0.42
Control Delay	0.2	95.2	86.8	4.4	10.7	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.2	95.2	86.8	4.4	10.7	13.8
Queue Length 50th (m)	0.0	26.5	26.3	0.0	67.6	40.2
Queue Length 95th (m)	0.0	#66.8	#66.2	16.0	m100.3	64.0
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	395	151	157	719	1873	1965
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	0.95	0.92	0.36	0.61	0.42

Intersection Summary

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	260	0	232	3	1032	0	0	749	0
Future Volume (vph)	1	0	3	260	0	232	3	1032	0	0	749	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.90		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.99		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1687		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.25	0.25	1.00		0.95			1.00	
Satd. Flow (perm)		1708		441	457	1597		3441			3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1	0	3	289	0	258	3	1147	0	0	832	0
RTOR Reduction (vph)	0	4	0	0	0	169	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	144	145	89	0	1150	0	0	832	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		28.0	28.0	28.0		42.4			42.4	
Effective Green, g (s)		1.6		31.0	31.0	31.0		45.4			45.4	
Actuated g/C Ratio		0.02		0.34	0.34	0.34		0.50			0.50	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		30		151	157	550		1735			1821	
v/s Ratio Prot											0.23	
v/s Ratio Perm		c0.00		c0.33	0.32	0.06		c0.33				
v/c Ratio		0.00		0.95	0.92	0.16		0.66			0.46	
Uniform Delay, d1		43.4		28.8	28.4	20.5		16.6			14.4	
Progression Factor		1.00		1.00	1.00	1.00		0.65			1.02	
Incremental Delay, d2		0.0		59.0	49.5	0.1		1.3			0.7	
Delay (s)		43.4		87.8	77.9	20.6		12.0			15.4	
Level of Service		D		F	E	C		B			B	
Approach Delay (s)		43.4			53.5			12.0			15.4	
Approach LOS		D			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	57.1%	ICU Level of Service	B	
Analysis Period (min)	15			

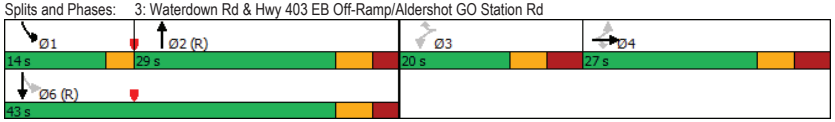
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	69	248	77	0	332	0	519	392	313	672	0
Future Volume (vph)	164	69	248	77	0	332	0	519	392	313	672	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.936				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3379	0	1805	3610	0
Flt Permitted	0.950			0.267						0.160		
Satd. Flow (perm)	1745	1900	1597	951	0	1597	0	3379	0	304	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			232			377		209				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	186	78	282	88	0	377	0	590	445	356	764	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	186	78	282	88	0	377	0	1035	0	356	764	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		14.0	43.0	
Total Split (%)	30.0%	30.0%	30.0%	22.2%		22.2%		32.2%		15.6%	47.8%	
Maximum Green (s)	19.0	19.0	19.0	12.0		12.0		22.0		11.0	36.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	18.7	18.7	18.7	15.0		15.0		25.0		44.3	44.3	
Actuated g/C Ratio	0.21	0.21	0.21	0.17		0.17		0.28		0.49	0.49	
v/c Ratio	0.52	0.20	0.55	0.55		0.65		0.95		0.88	0.43	
Control Delay	36.1	29.3	11.1	33.6		13.2		44.1		44.1	15.7	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	36.1	29.3	11.1	33.6		13.2		44.1		44.1	15.7	
LOS	D	C	B	C		B		D		D	B	
Approach Delay		22.2			17.1			44.1			24.7	
Approach LOS		C			B			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 78 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 29.5		Intersection LOS: C	
Intersection Capacity Utilization 70.0%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	186	78	282	88	377	1035	356	764
v/c Ratio	0.52	0.20	0.55	0.55	0.65	0.95	0.88	0.43
Control Delay	36.1	29.3	11.1	33.6	13.2	44.1	44.1	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.1	29.3	11.1	33.6	13.2	44.1	44.1	15.7
Queue Length 50th (m)	30.2	11.8	7.5	8.1	39.1	80.1	37.4	37.3
Queue Length 95th (m)	46.9	22.1	26.7	m15.3	62.2	#117.7	m#96.4	m65.1
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	445	485	580	169	593	1089	404	1776
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.16	0.49	0.52	0.64	0.95	0.88	0.43

Intersection Summary

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	69	248	77	0	332	0	519	392	313	672	0
Future Volume (vph)	164	69	248	77	0	332	0	519	392	313	672	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3377		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.27		1.00		1.00		0.16	1.00	
Satd. Flow (perm)	1745	1900	1597	950		1597		3377		304	3610	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	186	78	282	88	0	377	0	590	445	356	764	0
RTOR Reduction (vph)	0	0	184	0	0	314	0	151	0	0	0	0
Lane Group Flow (vph)	186	78	98	88	0	63	0	884	0	356	764	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	14.7	14.7	14.7	11.0		11.0		22.0		41.3	41.3	
Effective Green, g (s)	18.7	18.7	18.7	15.0		15.0		25.0		40.3	44.3	
Actuated g/C Ratio	0.21	0.21	0.21	0.17		0.17		0.28		0.45	0.49	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	362	394	331	158		266		938		391	1776	
v/s Ratio Prot		0.04						c0.26		c0.15	0.21	
v/s Ratio Perm	c0.11		0.06	c0.09		0.04				0.25		
v/c Ratio	0.51	0.20	0.30	0.56		0.24		0.94		0.91	0.43	
Uniform Delay, d1	31.6	29.5	30.1	34.4		32.5		31.8		22.6	14.7	
Progression Factor	1.00	1.00	1.00	0.60		1.99		1.00		1.04	0.95	
Incremental Delay, d2	1.2	0.2	0.5	4.0		0.4		18.4		21.8	0.6	
Delay (s)	32.9	29.7	30.6	24.6		65.2		50.2		45.4	14.6	
Level of Service	C	C	C	C		E		D		D	B	
Approach Delay (s)		31.2			57.6			50.2			24.4	
Approach LOS		C			E			D			C	

Intersection Summary				
HCM 2000 Control Delay	38.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	70.0%	ICU Level of Service	C	
Analysis Period (min)	15			

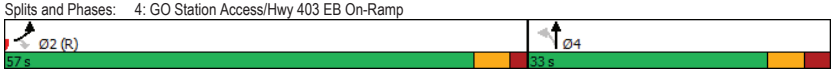
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	600	15	231	31	0	0
Future Volume (vph)	600	15	231	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.958		
Satd. Flow (prot)	1745	1597	0	1820	0	0
Flt Permitted	0.950			0.958		
Satd. Flow (perm)	1745	1597	0	1820	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		19				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	769	19	296	40	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	769	19	0	336	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	57.0	57.0	33.0	33.0		
Total Split (%)	63.3%	63.3%	36.7%	36.7%		
Maximum Green (s)	51.0	51.0	26.0	26.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	57.9	57.9		24.1		
Actuated g/C Ratio	0.64	0.64		0.27		
v/c Ratio	0.69	0.02		0.69		
Control Delay	4.7	0.5		36.8		
Queue Delay	0.0	0.0		0.0		
Total Delay	4.7	0.5		36.8		
LOS	A	A		D		
Approach Delay	4.6			36.8		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 14.2		Intersection LOS: B	
Intersection Capacity Utilization 54.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	769	19	336
v/c Ratio	0.69	0.02	0.69
Control Delay	4.7	0.5	36.8
Queue Delay	0.0	0.0	0.0
Total Delay	4.7	0.5	36.8
Queue Length 50th (m)	18.6	0.2	54.3
Queue Length 95th (m)	m20.3	m0.1	64.9
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1121	1033	586
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.69	0.02	0.57

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	600	15	231	31	0	0
Future Volume (vph)	600	15	231	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.96		
Satd. Flow (prot)	1745	1597		1820		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1745	1597		1820		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	769	19	296	40	0	0
RTOR Reduction (vph)	0	7	0	0	0	0
Lane Group Flow (vph)	769	12	0	336	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	55.9	55.9		21.1		
Effective Green, g (s)	57.9	57.9		24.1		
Actuated g/C Ratio	0.64	0.64		0.27		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1122	1027		487		
v/s Ratio Prot	c0.44					
v/s Ratio Perm		0.01		0.18		
v/c Ratio	0.69	0.01		0.69		
Uniform Delay, d1	10.2	5.8		29.6		
Progression Factor	0.25	0.16		1.00		
Incremental Delay, d2	1.7	0.0		4.1		
Delay (s)	4.3	0.9		33.7		
Level of Service	A	A		C		
Approach Delay (s)	4.2			33.7	0.0	
Approach LOS	A			C	A	

Intersection Summary				
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	54.3%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	318	1034	0	0	0
Future Volume (vph)	0	318	1034	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	1863	0
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	1863	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		228.3	
Travel Time (s)		56.6	12.1		16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	346	1124	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	346	1124	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	318	1034	0	0	0
Future Volume (Veh/h)	0	318	1034	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	346	1124	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1124				1470	1124
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1124				1470	1124
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	621				140	250

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	346	1124	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	621	1700	1700
Volume to Capacity	0.00	0.66	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		57.8%	ICU Level of Service B
Analysis Period (min)		15	

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	B16	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	T	L	T	TR	L	T	TR	T
Maximum Queue (m)	157.5	312.8	137.5	779.3	97.4	132.9	123.4	66.9	96.7	76.2	6.1
Average Queue (m)	123.8	269.3	100.5	446.9	63.2	68.6	49.6	16.7	54.0	39.2	0.2
95th Queue (m)	212.1	391.1	195.8	1037.4	105.8	124.8	104.7	37.9	81.9	66.4	3.4
Link Distance (m)		281.2		929.4		124.2	124.2		83.3		88.5
Upstream Blk Time (%)		46		1		2	0		1	0	
Queuing Penalty (veh)		473		9		15	2		0	0	
Storage Bay Dist (m)	150.0		130.0		90.0			70.0		70.0	
Storage Blk Time (%)	0	53	0		8	2			2	0	
Queuing Penalty (veh)	0	222	1		24	8			8	0	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	8.6	38.8	52.8	55.0	126.8	104.4	51.5	49.6
Average Queue (m)	0.9	16.8	27.4	24.1	41.8	22.9	28.1	21.9
95th Queue (m)	5.2	32.8	46.0	45.6	101.8	79.4	48.7	45.6
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)					0	0		
Queuing Penalty (veh)					1	1		
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	54.3	33.3	50.7	21.9	18.3	49.7	106.1	126.4	37.4	85.6	66.7
Average Queue (m)	30.3	14.7	21.6	9.8	4.5	25.7	62.0	68.3	31.3	35.7	32.3
95th Queue (m)	48.8	28.1	37.7	19.7	13.6	42.7	100.0	111.7	43.2	68.8	55.3
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)						0			21	6	
Queuing Penalty (veh)						0			71	18	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	67.4	8.6	48.3
Average Queue (m)	27.9	0.7	39.7
95th Queue (m)	55.5	4.4	54.0
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			9
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	WB	B5
Directions Served	TR	T
Maximum Queue (m)	167.6	49.7
Average Queue (m)	32.9	10.0
95th Queue (m)	151.0	59.3
Link Distance (m)	182.3	95.3
Upstream Blk Time (%)	10	7
Queuing Penalty (veh)	0	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 854

Appendix G2

Background Traffic Operations – 5-Year Horizon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	117	121	56	270	368	570	174	608	95
Future Volume (vph)	0	0	0	117	121	56	270	368	570	174	608	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.909			0.980	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3281	0	1745	3538	0
Flt Permitted				0.950			0.339			0.265		
Satd. Flow (perm)	0	0	0	1745	1900	1597	623	3281	0	487	3538	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						100		473			18	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	119	123	57	276	376	582	178	620	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	119	123	57	276	958	0	178	717	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.5	31.0	
Total Split (s)				28.0	28.0	28.0	39.0	65.0		27.0	53.0	
Total Split (%)				23.3%	23.3%	23.3%	32.5%	54.2%		22.5%	44.2%	
Maximum Green (s)				20.0	20.0	20.0	36.0	57.0		24.0	45.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				17.5	17.5	17.5	92.4	82.9		88.6	81.0	
Actuated g/C Ratio				0.15	0.15	0.15	0.77	0.69		0.74	0.68	
v/c Ratio				0.47	0.45	0.18	0.49	0.40		0.41	0.30	
Control Delay				52.4	51.1	2.6	5.1	2.3		6.5	8.8	
Queue Delay				0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay				52.4	51.1	2.6	5.1	2.4		6.5	8.8	
LOS				D	D	A	A	A		A	A	
Approach Delay					42.4			3.0			8.4	
Approach LOS					D			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 58 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.49			
Intersection Signal Delay: 9.8		Intersection LOS: A	
Intersection Capacity Utilization 54.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd





Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	119	123	57	276	958	178	717
v/c Ratio	0.47	0.45	0.18	0.49	0.40	0.41	0.30
Control Delay	52.4	51.1	2.6	5.1	2.3	6.5	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	52.4	51.1	2.6	5.1	2.4	6.5	8.8
Queue Length 50th (m)	27.4	28.2	0.0	2.7	0.0	8.6	33.3
Queue Length 95th (m)	44.6	45.7	2.7	10.5	9.1	17.3	54.5
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	349	380	399	817	2412	624	2393
Starvation Cap Reductn	0	0	0	0	517	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.32	0.14	0.34	0.51	0.29	0.30

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	117	121	56	270	368	570	174	608	95
Future Volume (vph)	0	0	0	117	121	56	270	368	570	174	608	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.91		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3281		1745	3537	
Flt Permitted				0.95	1.00	1.00	0.34	1.00		0.27	1.00	
Satd. Flow (perm)				1745	1900	1597	623	3281		487	3537	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	119	123	57	276	376	582	178	620	97
RTOR Reduction (vph)	0	0	0	0	0	49	0	146	0	0	6	0
Lane Group Flow (vph)	0	0	0	119	123	8	276	812	0	178	711	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				13.5	13.5	13.5	89.4	78.9		85.6	77.0	
Effective Green, g (s)				17.5	17.5	17.5	87.4	82.9		83.6	81.0	
Actuated g/C Ratio				0.15	0.15	0.15	0.73	0.69		0.70	0.68	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				254	277	232	542	2266		418	2387	
v/s Ratio Prot					0.06		c0.04	0.25		0.03	0.20	
v/s Ratio Perm				c0.07		0.01	c0.33			0.27		
v/c Ratio				0.47	0.44	0.04	0.51	0.36		0.43	0.30	
Uniform Delay, d1				47.0	46.8	44.0	5.7	7.6		6.6	7.9	
Progression Factor				1.00	1.00	1.00	0.63	0.45		1.00	1.00	
Incremental Delay, d2				1.4	1.1	0.1	0.7	0.4		0.7	0.3	
Delay (s)				48.4	47.9	44.1	4.3	3.8		7.3	8.3	
Level of Service				D	D	D	A	A		A	A	
Approach Delay (s)		0.0			47.4			3.9			8.1	
Approach LOS		A			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	54.8%	ICU Level of Service	A	
Analysis Period (min)	15			

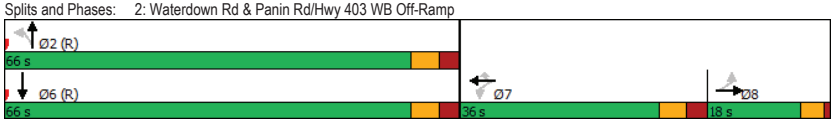
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	304	0	249	0	948	0	0	704	0
Future Volume (vph)	7	0	1	304	0	249	0	948	0	0	704	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.983				0.850						
Flt Protected		0.958		0.950	0.950							
Satd. Flow (prot)	0	1789	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.875	0.875							
Satd. Flow (perm)	0	1868	0	1527	1579	1597	0	3610	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		100				257						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	0	1	313	0	257	0	977	0	0	726	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	156	157	257	0	977	0	0	726	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	18.0	18.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	18.0	18.0		36.0	36.0	36.0	66.0	66.0			66.0	
Total Split (%)	15.0%	15.0%		30.0%	30.0%	30.0%	55.0%	55.0%			55.0%	
Maximum Green (s)	13.5	13.5		29.0	29.0	29.0	59.0	59.0			59.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		20.9	20.9	20.9		89.1			89.1	
Actuated g/C Ratio		0.05		0.17	0.17	0.17		0.74			0.74	
v/c Ratio		0.04		0.59	0.57	0.52		0.36			0.27	
Control Delay		0.4		53.8	52.8	8.8		4.1			5.1	
Queue Delay		0.0		0.0	0.0	0.0		0.0			0.1	
Total Delay		0.4		53.8	52.8	8.8		4.1			5.2	
LOS		A		D	D	A		A			A	
Approach Delay		0.4			33.2			4.1			5.2	
Approach LOS		A			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 26 (22%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 11.7		Intersection LOS: B	
Intersection Capacity Utilization 55.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp





Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	8	156	157	257	977	726
v/c Ratio	0.04	0.59	0.57	0.52	0.36	0.27
Control Delay	0.4	53.8	52.8	8.8	4.1	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	0.4	53.8	52.8	8.8	4.1	5.2
Queue Length 50th (m)	0.0	38.0	38.1	0.0	11.6	19.5
Queue Length 95th (m)	0.0	57.7	57.6	21.3	m39.7	44.6
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	306	407	421	614	2681	2681
Starvation Cap Reductn	0	0	0	0	0	922
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.38	0.37	0.42	0.36	0.41

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	304	0	249	0	948	0	0	704	0
Future Volume (vph)	7	0	1	304	0	249	0	948	0	0	704	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.98		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.96		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1790		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.88	0.88	1.00		1.00			1.00	
Satd. Flow (perm)		1868		1527	1579	1597		3610			3610	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	7	0	1	313	0	257	0	977	0	0	726	0
RTOR Reduction (vph)	0	8	0	0	0	212	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	156	157	45	0	977	0	0	726	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		17.9	17.9	17.9		82.5			82.5	
Effective Green, g (s)		1.6		20.9	20.9	20.9		85.5			85.5	
Actuated g/C Ratio		0.01		0.17	0.17	0.17		0.71			0.71	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		265	275	278		2572			2572	
v/s Ratio Prot								c0.27			0.20	
v/s Ratio Perm		c0.00		c0.10	0.10	0.03						
v/c Ratio		0.00		0.59	0.57	0.16		0.38			0.28	
Uniform Delay, d1		58.4		45.6	45.4	42.1		6.8			6.2	
Progression Factor		1.00		1.00	1.00	1.00		0.60			0.80	
Incremental Delay, d2		0.1		3.3	2.8	0.3		0.2			0.3	
Delay (s)		58.5		48.9	48.3	42.4		4.3			5.2	
Level of Service		E		D	D	D		A			A	
Approach Delay (s)		58.5			45.8			4.3			5.2	
Approach LOS		E			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.41			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	55.8%	ICU Level of Service	B	
Analysis Period (min)	15			

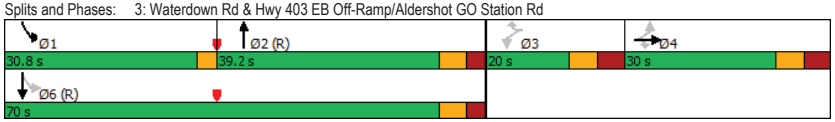
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	284	202	300	23	0	75	0	553	534	446	525	0
Future Volume (vph)	284	202	300	23	0	75	0	553	534	446	525	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.926				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3343	0	1805	3610	0
Flt Permitted	0.950			0.339						0.105		
Satd. Flow (perm)	1745	1900	1597	1208	0	1597	0	3343	0	200	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			319			136		206				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
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 (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	302	215	319	24	0	80	0	588	568	474	559	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	215	319	24	0	80	0	1156	0	474	559	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	30.0	30.0	30.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	30.0	30.0	30.0	20.0		20.0		39.2		30.8	70.0	
Total Split (%)	25.0%	25.0%	25.0%	16.7%		16.7%		32.7%		25.7%	58.3%	
Maximum Green (s)	22.0	22.0	22.0	12.0		12.0		32.2		27.8	63.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	26.7	26.7	26.7	13.4		13.4		39.7		71.1	71.1	
Actuated g/C Ratio	0.22	0.22	0.22	0.11		0.11		0.33		0.59	0.59	
v/c Ratio	0.78	0.51	0.53	0.18		0.27		0.93		0.98	0.26	
Control Delay	58.8	45.6	7.7	52.0		4.9		46.7		68.4	11.6	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	58.8	45.6	7.7	52.0		4.9		46.7		68.4	11.6	
LOS	E	D	A	D		A		D		E	B	
Approach Delay		35.9			15.8			46.7			37.6	
Approach LOS		D			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 39.8		Intersection LOS: D	
Intersection Capacity Utilization 87.8%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	302	215	319	24	80	1156	474	559
v/c Ratio	0.78	0.51	0.53	0.18	0.27	0.93	0.98	0.26
Control Delay	58.8	45.6	7.7	52.0	4.9	46.7	68.4	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.8	45.6	7.7	52.0	4.9	46.7	68.4	11.6
Queue Length 50th (m)	68.7	45.6	0.0	2.9	0.0	~140.6	~80.5	29.7
Queue Length 95th (m)	#115.5	73.0	24.5	7.3	4.5	#184.8	#169.4	49.7
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	398	433	610	161	330	1244	485	2140
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.50	0.52	0.15	0.24	0.93	0.98	0.26

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	284	202	300	23	0	75	0	553	534	446	525	0
Future Volume (vph)	284	202	300	23	0	75	0	553	534	446	525	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.93		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3344		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.34		1.00		1.00		0.10	1.00	
Satd. Flow (perm)	1745	1900	1597	1208		1597		3344		199	3610	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	302	215	319	24	0	80	0	588	568	474	559	0
RTOR Reduction (vph)	0	0	248	0	0	72	0	141	0	0	0	0
Lane Group Flow (vph)	302	215	71	24	0	8	0	1015	0	474	559	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	22.7	22.7	22.7	7.8		7.8		35.1		66.5	66.5	
Effective Green, g (s)	26.7	26.7	26.7	11.8		11.8		38.1		65.5	69.5	
Actuated g/C Ratio	0.22	0.22	0.22	0.10		0.10		0.32		0.55	0.58	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	388	422	355	118		157		1061		475	2090	
v/s Ratio Prot		0.11						0.30		c0.23	0.15	
v/s Ratio Perm	c0.17		0.04	c0.02		0.00				c0.32		
v/c Ratio	0.78	0.51	0.20	0.20		0.05		0.96		1.00	0.27	
Uniform Delay, d1	43.9	40.9	38.0	49.8		49.0		40.1		36.9	12.6	
Progression Factor	1.00	1.00	1.00	1.02		3.47		1.00		0.98	0.87	
Incremental Delay, d2	9.5	1.0	0.3	0.9		0.1		19.0		39.8	0.3	
Delay (s)	53.4	41.9	38.2	51.8		170.0		59.2		75.9	11.2	
Level of Service	D	D	D	D		F		E		E	B	
Approach Delay (s)		44.6			142.8			59.2			40.9	
Approach LOS		D			F			E			D	

Intersection Summary				
HCM 2000 Control Delay	52.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	87.8%	ICU Level of Service	E	
Analysis Period (min)	15			

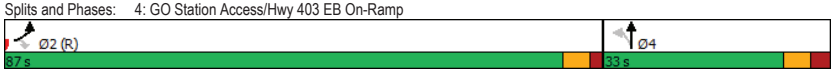
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	811	204	12	31	0	0
Future Volume (vph)	811	204	12	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.986		
Satd. Flow (prot)	1745	1597	0	1873	0	0
Flt Permitted	0.950			0.986		
Satd. Flow (perm)	1745	1597	0	1873	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		215				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	854	215	13	33	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	854	215	0	46	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	87.0	87.0	33.0	33.0		
Total Split (%)	72.5%	72.5%	27.5%	27.5%		
Maximum Green (s)	81.0	81.0	26.0	26.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	103.7	103.7		12.1		
Actuated g/C Ratio	0.86	0.86		0.10		
v/c Ratio	0.57	0.15		0.24		
Control Delay	0.9	0.1		52.7		
Queue Delay	0.0	0.0		0.0		
Total Delay	0.9	0.1		52.7		
LOS	A	A		D		
Approach Delay	0.7			52.7		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 106 (88%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 2.9		Intersection LOS: A	
Intersection Capacity Utilization 58.3%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	854	215	46
v/c Ratio	0.57	0.15	0.24
Control Delay	0.9	0.1	52.7
Queue Delay	0.0	0.0	0.0
Total Delay	0.9	0.1	52.7
Queue Length 50th (m)	2.2	0.0	10.8
Queue Length 95th (m)	m2.9	m0.0	22.4
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1508	1409	452
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.57	0.15	0.10

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	811	204	12	31	0	0
Future Volume (vph)	811	204	12	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.99		
Satd. Flow (prot)	1745	1597		1874		
Flt Permitted	0.95	1.00		0.99		
Satd. Flow (perm)	1745	1597		1874		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	854	215	13	33	0	0
RTOR Reduction (vph)	0	33	0	0	0	0
Lane Group Flow (vph)	854	182	0	46	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	99.5	99.5		7.5		
Effective Green, g (s)	101.5	101.5		10.5		
Actuated g/C Ratio	0.85	0.85		0.09		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1475	1350		163		
v/s Ratio Prot	c0.49					
v/s Ratio Perm		0.11		0.02		
v/c Ratio	0.58	0.13		0.28		
Uniform Delay, d1	2.8	1.6		51.2		
Progression Factor	0.05	0.00		1.00		
Incremental Delay, d2	0.8	0.1		1.0		
Delay (s)	0.9	0.1		52.2		
Level of Service	A	A		D		
Approach Delay (s)	0.7			52.2	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	2.9	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	58.3%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	744	294	0	0	0
Future Volume (vph)	0	744	294	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	1863	0
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	1863	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		286.2	
Travel Time (s)		56.6	12.1		20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	809	320	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	809	320	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	744	294	0	0	0
Future Volume (Veh/h)	0	744	294	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	809	320	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	320				1129	320
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	320				1129	320
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1240				226	721

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	809	320	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1240	1700	1700
Volume to Capacity	0.00	0.19	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		42.5%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	L	T	TR	L	T	TR	T
Maximum Queue (m)	59.2	55.4	16.0	51.8	45.9	62.9	63.4	85.0	67.0	2.4
Average Queue (m)	24.8	24.8	6.9	21.4	15.2	19.6	21.8	38.6	19.0	0.1
95th Queue (m)	48.8	46.0	13.3	39.9	35.2	42.3	42.0	67.0	48.0	1.7
Link Distance (m)		281.2			124.2	124.2		83.3		88.5
Upstream Blk Time (%)								0	0	
Queuing Penalty (veh)								0	0	
Storage Bay Dist (m)	150.0		130.0	90.0			70.0		70.0	
Storage Blk Time (%)								0	0	
Queuing Penalty (veh)								3	0	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	11.4	61.3	59.5	61.6	63.3	48.8	50.8	35.8
Average Queue (m)	2.6	30.2	31.0	21.1	19.6	17.7	24.4	7.7
95th Queue (m)	9.5	52.8	52.7	42.0	43.3	38.5	43.2	24.2
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	105.4	86.0	47.6	20.1	10.6	21.4	401.1	401.3	37.4	145.0	130.9
Average Queue (m)	62.5	39.8	25.4	7.2	0.6	10.2	331.5	350.5	35.2	64.8	45.0
95th Queue (m)	96.7	70.9	42.1	16.5	5.4	17.5	478.1	465.6	42.5	129.0	102.3
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)							35	49		0	
Queuing Penalty (veh)							0	0		0	
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)	1								43	1	
Queuing Penalty (veh)	1								114	3	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	72.3	19.3	29.6
Average Queue (m)	21.7	5.7	12.0
95th Queue (m)	55.2	15.6	24.9
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

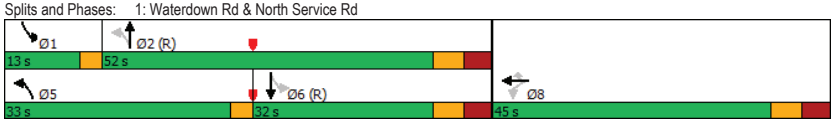
Network wide Queuing Penalty: 121

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	321	671	145	501	656	242	108	506	93
Future Volume (vph)	0	0	0	321	671	145	501	656	242	108	506	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.960			0.977	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3466	0	1745	3527	0
Flt Permitted				0.950			0.148			0.290		
Satd. Flow (perm)	0	0	0	1745	1900	1597	272	3466	0	533	3527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						159		61			18	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	353	737	159	551	721	266	119	556	102
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	353	737	159	551	987	0	119	658	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.0	31.0	
Total Split (s)				45.0	45.0	45.0	33.0	52.0		13.0	32.0	
Total Split (%)				40.9%	40.9%	40.9%	30.0%	47.3%		11.8%	29.1%	
Maximum Green (s)				37.0	37.0	37.0	30.0	44.0		10.0	24.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				41.0	41.0	41.0	61.0	49.2		35.8	28.0	
Actuated g/C Ratio				0.37	0.37	0.37	0.55	0.45		0.33	0.25	
v/c Ratio				0.54	1.04	0.23	1.02	0.62		0.46	0.72	
Control Delay				31.0	79.6	4.5	71.4	9.2		21.5	41.7	
Queue Delay				0.0	0.0	0.0	0.0	0.3		0.0	0.0	
Total Delay				31.0	79.6	4.5	71.4	9.5		21.5	41.7	
LOS				C	E	A	E	A		C	D	
Approach Delay					56.3			31.7			38.6	
Approach LOS					E			C			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 55 (50%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.04			
Intersection Signal Delay: 41.8		Intersection LOS: D	
Intersection Capacity Utilization 90.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd





Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	353	737	159	551	987	119	658
v/c Ratio	0.54	1.04	0.23	1.02	0.62	0.46	0.72
Control Delay	31.0	79.6	4.5	71.4	9.2	21.5	41.7
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	31.0	79.6	4.5	71.4	9.5	21.5	41.7
Queue Length 50th (m)	62.0	~180.5	0.0	~63.7	16.6	12.2	69.7
Queue Length 95th (m)	92.0	#254.0	13.5	#176.5	33.5	21.6	91.0
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	650	708	694	539	1583	278	911
Starvation Cap Reductn	0	0	0	0	178	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	1.04	0.23	1.02	0.70	0.43	0.72

Intersection Summary

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	321	671	145	501	656	242	108	506	93
Future Volume (vph)	0	0	0	321	671	145	501	656	242	108	506	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3464		1745	3526	
Flt Permitted				0.95	1.00	1.00	0.15	1.00		0.29	1.00	
Satd. Flow (perm)				1745	1900	1597	272	3464		533	3526	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	353	737	159	551	721	266	119	556	102
RTOR Reduction (vph)	0	0	0	0	0	100	0	34	0	0	13	0
Lane Group Flow (vph)	0	0	0	353	737	59	551	953	0	119	645	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				37.0	37.0	37.0	57.0	45.2		32.8	24.0	
Effective Green, g (s)				41.0	41.0	41.0	56.0	49.2		30.8	28.0	
Actuated g/C Ratio				0.37	0.37	0.37	0.51	0.45		0.28	0.25	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				650	708	595	526	1549		235	897	
v/s Ratio Prot					c0.39		c0.28	0.28		0.04	0.18	
v/s Ratio Perm				0.20		0.04	c0.26			0.11		
v/c Ratio				0.54	1.04	0.10	1.05	0.62		0.51	0.72	
Uniform Delay, d1				27.1	34.5	22.5	31.3	23.2		30.6	37.4	
Progression Factor				1.00	1.00	1.00	1.07	0.35		1.00	1.00	
Incremental Delay, d2				0.9	44.9	0.1	48.0	1.5		1.7	4.9	
Delay (s)				28.1	79.4	22.5	81.3	9.5		32.3	42.3	
Level of Service				C	E	C	F	A		C	D	
Approach Delay (s)		0.0			57.7			35.2			40.8	
Approach LOS		A			E			D			D	

Intersection Summary				
HCM 2000 Control Delay	44.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	90.0%	ICU Level of Service	E	
Analysis Period (min)	15			

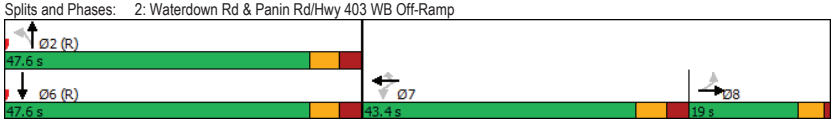
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	287	0	254	3	1134	0	0	825	0
Future Volume (vph)	1	0	3	287	0	254	3	1134	0	0	825	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.899				0.850						
Flt Protected		0.988		0.950	0.950							
Satd. Flow (prot)	0	1688	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.251	0.251			0.953				
Satd. Flow (perm)	0	1708	0	438	453	1597	0	3440	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109				282						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	0	3	319	0	282	3	1260	0	0	917	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	4	0	159	160	282	0	1263	0	0	917	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	19.0	19.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	19.0	19.0		43.4	43.4	43.4	47.6	47.6			47.6	
Total Split (%)	17.3%	17.3%		39.5%	39.5%	39.5%	43.3%	43.3%			43.3%	
Maximum Green (s)	14.5	14.5		36.4	36.4	36.4	40.6	40.6			40.6	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		39.4	39.4	39.4		60.6			60.6	
Actuated g/C Ratio		0.05		0.36	0.36	0.36		0.55			0.55	
v/c Ratio		0.02		1.02	0.99	0.37		0.67			0.46	
Control Delay		0.2		114.7	105.3	4.4		14.3			18.1	
Queue Delay		0.0		0.0	0.0	0.1		0.1			0.3	
Total Delay		0.2		114.7	105.3	4.5		14.4			18.4	
LOS		A		F	F	A		B			B	
Approach Delay		0.3			60.5			14.4			18.4	
Approach LOS		A			E			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 40 (36%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.02			
Intersection Signal Delay: 25.6		Intersection LOS: C	
Intersection Capacity Utilization 61.3%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	4	159	160	282	1263	917
v/c Ratio	0.02	1.02	0.99	0.37	0.67	0.46
Control Delay	0.2	114.7	105.3	4.4	14.3	18.1
Queue Delay	0.0	0.0	0.0	0.1	0.1	0.3
Total Delay	0.2	114.7	105.3	4.5	14.4	18.4
Queue Length 50th (m)	0.0	~38.5	37.3	0.0	102.0	53.8
Queue Length 95th (m)	0.0	#85.1	#84.3	17.6	m141.5	81.1
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	327	156	162	753	1894	1988
Starvation Cap Reductn	0	0	0	0	0	480
Spillback Cap Reductn	0	0	0	51	58	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.02	0.99	0.40	0.69	0.61

Intersection Summary

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

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	287	0	254	3	1134	0	0	825	0
Future Volume (vph)	1	0	3	287	0	254	3	1134	0	0	825	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.90		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.99		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1687		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.25	0.25	1.00		0.95			1.00	
Satd. Flow (perm)		1708		438	453	1597		3441			3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1	0	3	319	0	282	3	1260	0	0	917	0
RTOR Reduction (vph)	0	4	0	0	0	181	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	159	160	101	0	1263	0	0	917	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		36.4	36.4	36.4		54.0			54.0	
Effective Green, g (s)		1.6		39.4	39.4	39.4		57.0			57.0	
Actuated g/C Ratio		0.01		0.36	0.36	0.36		0.52			0.52	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		156	162	572		1783			1870	
v/s Ratio Prot											0.25	
v/s Ratio Perm		c0.00		c0.36	0.35	0.06		c0.37				
v/c Ratio		0.00		1.02	0.99	0.18		0.71			0.49	
Uniform Delay, d1		53.4		35.3	35.1	24.2		20.2			17.1	
Progression Factor		1.00		1.00	1.00	1.00		0.71			1.12	
Incremental Delay, d2		0.0		77.2	66.4	0.1		1.4			0.7	
Delay (s)		53.5		112.5	101.5	24.3		15.9			19.9	
Level of Service		D		F	F	C		B			B	
Approach Delay (s)		53.5			68.2			15.9			19.9	
Approach LOS		D			E			B			B	

Intersection Summary

HCM 2000 Control Delay	28.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

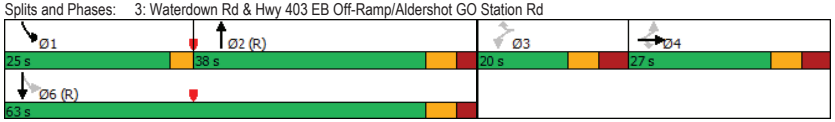
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	77	273	86	0	365	0	572	432	344	739	0
Future Volume (vph)	180	77	273	86	0	365	0	572	432	344	739	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.935				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3375	0	1805	3610	0
Flt Permitted	0.950			0.256						0.107		
Satd. Flow (perm)	1745	1900	1597	912	0	1597	0	3375	0	203	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			197			415		179				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	205	88	310	98	0	415	0	650	491	391	840	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	205	88	310	98	0	415	0	1141	0	391	840	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	27.0	27.0	27.0	20.0		20.0		38.0		25.0	63.0	
Total Split (%)	24.5%	24.5%	24.5%	18.2%		18.2%		34.5%		22.7%	57.3%	
Maximum Green (s)	19.0	19.0	19.0	12.0		12.0		31.0		22.0	56.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	20.6	20.6	20.6	15.6		15.6		37.3		61.8	61.8	
Actuated g/C Ratio	0.19	0.19	0.19	0.14		0.14		0.34		0.56	0.56	
v/c Ratio	0.63	0.25	0.68	0.76		0.71		0.90		0.95	0.41	
Control Delay	49.9	39.1	22.7	72.2		24.1		41.2		54.5	15.8	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	49.9	39.1	22.7	72.2		24.1		41.2		54.5	15.8	
LOS	D	D	C	E		C		D		D	B	
Approach Delay		34.3			33.3			41.2			28.1	
Approach LOS		C			C			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 101 (92%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 34.2		Intersection LOS: C	
Intersection Capacity Utilization 75.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	205	88	310	98	415	1141	391	840
v/c Ratio	0.63	0.25	0.68	0.76	0.71	0.90	0.95	0.41
Control Delay	49.9	39.1	22.7	72.2	24.1	41.2	54.5	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.9	39.1	22.7	72.2	24.1	41.2	54.5	15.8
Queue Length 50th (m)	42.4	16.8	22.4	11.9	49.5	117.2	43.1	41.8
Queue Length 95th (m)	65.0	30.4	50.6	m#20.9	73.8	#158.4	m#107.1	m72.4
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	364	397	489	132	586	1263	426	2027
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.22	0.63	0.74	0.71	0.90	0.92	0.41

Intersection Summary

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	77	273	86	0	365	0	572	432	344	739	0
Future Volume (vph)	180	77	273	86	0	365	0	572	432	344	739	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3377		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.26		1.00		1.00		0.11	1.00	
Satd. Flow (perm)	1745	1900	1597	914		1597		3377		203	3610	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	205	88	310	98	0	415	0	650	491	391	840	0
RTOR Reduction (vph)	0	0	160	0	0	356	0	118	0	0	0	0
Lane Group Flow (vph)	205	88	150	98	0	59	0	1023	0	391	840	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	16.6	16.6	16.6	11.6		11.6		34.4		58.8	58.8	
Effective Green, g (s)	20.6	20.6	20.6	15.6		15.6		37.4		57.8	61.8	
Actuated g/C Ratio	0.19	0.19	0.19	0.14		0.14		0.34		0.53	0.56	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	326	355	299	129		226		1148		403	2028	
v/s Ratio Prot		0.05						0.30		c0.18	0.23	
v/s Ratio Perm	c0.12		0.09	c0.11		0.04				c0.33		
v/c Ratio	0.63	0.25	0.50	0.76		0.26		0.89		0.97	0.41	
Uniform Delay, d1	41.2	38.1	40.1	45.4		42.1		34.4		33.1	13.8	
Progression Factor	1.00	1.00	1.00	0.86		3.83		1.00		0.82	1.06	
Incremental Delay, d2	3.8	0.4	1.3	20.6		0.6		10.5		32.5	0.5	
Delay (s)	44.9	38.5	41.4	59.6		161.8		44.9		59.7	15.1	
Level of Service	D	D	D	E		F		D		E	B	
Approach Delay (s)		42.2			142.3			44.9			29.3	
Approach LOS		D			F			D			C	

Intersection Summary				
HCM 2000 Control Delay	53.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	75.4%	ICU Level of Service	D	
Analysis Period (min)	15			

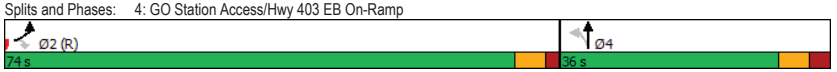
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	660	17	254	34	0	0
Future Volume (vph)	660	17	254	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.958		
Satd. Flow (prot)	1745	1597	0	1820	0	0
Flt Permitted	0.950			0.958		
Satd. Flow (perm)	1745	1597	0	1820	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		22				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	846	22	326	44	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	846	22	0	370	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	74.0	74.0	36.0	36.0		
Total Split (%)	67.3%	67.3%	32.7%	32.7%		
Maximum Green (s)	68.0	68.0	29.0	29.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	73.3	73.3		28.7		
Actuated g/C Ratio	0.67	0.67		0.26		
v/c Ratio	0.73	0.02		0.78		
Control Delay	4.3	0.5		49.6		
Queue Delay	0.0	0.0		0.0		
Total Delay	4.3	0.5		49.6		
LOS	A	A		D		
Approach Delay	4.3			49.6		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 101 (92%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 17.8		Intersection LOS: B	
Intersection Capacity Utilization 59.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	846	22	370
v/c Ratio	0.73	0.02	0.78
Control Delay	4.3	0.5	49.6
Queue Delay	0.0	0.0	0.0
Total Delay	4.3	0.5	49.6
Queue Length 50th (m)	24.0	0.2	76.1
Queue Length 95th (m)	24.9	m0.2	90.2
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1163	1071	529
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.73	0.02	0.70

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	660	17	254	34	0	0
Future Volume (vph)	660	17	254	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.96		
Satd. Flow (prot)	1745	1597		1820		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1745	1597		1820		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	846	22	326	44	0	0
RTOR Reduction (vph)	0	7	0	0	0	0
Lane Group Flow (vph)	846	15	0	370	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	71.3	71.3		25.7		
Effective Green, g (s)	73.3	73.3		28.7		
Actuated g/C Ratio	0.67	0.67		0.26		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1162	1064		474		
v/s Ratio Prot	c0.48					
v/s Ratio Perm		0.01		0.20		
v/c Ratio	0.73	0.01		0.78		
Uniform Delay, d1	11.9	6.2		37.7		
Progression Factor	0.17	0.17		1.00		
Incremental Delay, d2	2.1	0.0		8.1		
Delay (s)	4.1	1.1		45.9		
Level of Service	A	A		D		
Approach Delay (s)	4.0			45.9	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	59.1%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	350	1137	0	0	0
Future Volume (vph)	0	350	1137	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	1863	0
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	1863	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		228.3	
Travel Time (s)		56.6	12.1		16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	380	1236	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	380	1236	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	350	1137	0	0	0
Future Volume (Veh/h)	0	350	1137	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	380	1236	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1236				1616	1236
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1236				1616	1236
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	564				114	215

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	380	1236	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	564	1700	1700
Volume to Capacity	0.00	0.73	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	B16	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	T	L	T	TR	L	T	TR	T
Maximum Queue (m)	157.5	312.1	137.5	887.9	97.5	134.2	133.7	77.3	104.7	77.5	58.8
Average Queue (m)	136.2	303.6	102.8	675.7	87.5	103.9	77.4	32.9	73.6	56.4	5.6
95th Queue (m)	206.1	308.1	195.6	1131.1	115.1	154.6	142.8	75.7	107.3	84.8	34.5
Link Distance (m)		281.2		929.4		124.2	124.2		83.3		88.5
Upstream Blk Time (%)		50		1		7	2	0	6	0	0
Queuing Penalty (veh)		571		11		48	12	0	0	0	0
Storage Bay Dist (m)	150.0		130.0		90.0			70.0		70.0	
Storage Blk Time (%)	0	54	0		17	7		0	11	1	
Queuing Penalty (veh)	2	252	2		57	33		0	50	4	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	8.6	53.0	55.1	79.3	138.7	128.0	66.3	61.6
Average Queue (m)	1.0	24.1	32.8	34.5	65.3	40.4	35.1	31.3
95th Queue (m)	5.5	45.1	51.7	64.9	133.6	104.9	59.4	56.0
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)					0	0		
Queuing Penalty (veh)					2	1		
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	67.9	35.9	52.7	25.8	105.8	67.5	141.5	152.3	37.4	94.8	81.1
Average Queue (m)	37.9	16.9	26.3	13.8	23.7	48.2	78.1	88.3	33.1	46.4	32.8
95th Queue (m)	60.7	31.8	45.3	23.3	78.5	75.2	130.5	146.8	44.5	89.3	64.9
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)					0	8			34	7	
Queuing Penalty (veh)					0	3			125	25	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	78.5	7.0	48.3
Average Queue (m)	36.2	0.6	44.5
95th Queue (m)	66.6	4.2	56.6
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			19
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	WB	B5
Directions Served	TR	T
Maximum Queue (m)	159.5	65.6
Average Queue (m)	68.3	25.6
95th Queue (m)	216.8	98.0
Link Distance (m)	182.3	95.3
Upstream Blk Time (%)	23	19
Queuing Penalty (veh)	0	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 20: Bend

Movement	NW
Directions Served	T
Maximum Queue (m)	59.8
Average Queue (m)	2.7
95th Queue (m)	29.6
Link Distance (m)	83.3
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1198

Appendix G3

Background Traffic Operations – 10-Year Horizon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	128	132	61	297	405	628	191	669	103
Future Volume (vph)	0	0	0	128	132	61	297	405	628	191	669	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.909			0.980	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3281	0	1745	3538	0
Flt Permitted				0.950			0.303			0.231		
Satd. Flow (perm)	0	0	0	1745	1900	1597	557	3281	0	424	3538	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						100		477			17	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	131	135	62	303	413	641	195	683	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	131	135	62	303	1054	0	195	788	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.5	31.0	
Total Split (s)				28.0	28.0	28.0	39.0	65.0		27.0	53.0	
Total Split (%)				23.3%	23.3%	23.3%	32.5%	54.2%		22.5%	44.2%	
Maximum Green (s)				20.0	20.0	20.0	36.0	57.0		24.0	45.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				18.3	18.3	18.3	92.0	80.9		87.3	78.5	
Actuated g/C Ratio				0.15	0.15	0.15	0.77	0.67		0.73	0.65	
v/c Ratio				0.49	0.47	0.19	0.56	0.45		0.48	0.34	
Control Delay				52.3	51.0	3.4	7.0	2.7		8.3	10.6	
Queue Delay				0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay				52.3	51.0	3.4	7.0	2.8		8.3	10.6	
LOS				D	D	A	A	A		A	B	
Approach Delay					42.5			3.7			10.1	
Approach LOS					D			A			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 56 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 10.9		Intersection LOS: B	
Intersection Capacity Utilization 59.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd





Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	131	135	62	303	1054	195	788
v/c Ratio	0.49	0.47	0.19	0.56	0.45	0.48	0.34
Control Delay	52.3	51.0	3.4	7.0	2.7	8.3	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	52.3	51.0	3.4	7.0	2.8	8.3	10.6
Queue Length 50th (m)	30.1	30.9	0.0	3.0	0.0	10.0	39.6
Queue Length 95th (m)	48.2	49.0	4.1	21.0	21.0	19.7	70.6
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	349	380	399	781	2367	584	2319
Starvation Cap Reductn	0	0	0	7	411	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.36	0.16	0.39	0.54	0.33	0.34

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	128	132	61	297	405	628	191	669	103
Future Volume (vph)	0	0	0	128	132	61	297	405	628	191	669	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.91		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3281		1745	3538	
Flt Permitted				0.95	1.00	1.00	0.30	1.00		0.23	1.00	
Satd. Flow (perm)				1745	1900	1597	557	3281		424	3538	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	131	135	62	303	413	641	195	683	105
RTOR Reduction (vph)	0	0	0	0	0	53	0	155	0	0	6	0
Lane Group Flow (vph)	0	0	0	131	135	9	303	899	0	195	782	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				14.3	14.3	14.3	89.1	76.9		84.3	74.5	
Effective Green, g (s)				18.3	18.3	18.3	87.1	80.9		82.3	78.5	
Actuated g/C Ratio				0.15	0.15	0.15	0.73	0.67		0.69	0.65	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				266	289	243	515	2211		387	2314	
v/s Ratio Prot					0.07		c0.05	0.27		0.04	0.22	
v/s Ratio Perm				c0.08		0.01	c0.37			0.31		
v/c Ratio				0.49	0.47	0.04	0.59	0.41		0.50	0.34	
Uniform Delay, d1				46.6	46.4	43.4	6.4	8.8		7.5	9.2	
Progression Factor				1.00	1.00	1.00	0.79	0.41		1.00	1.00	
Incremental Delay, d2				1.4	1.2	0.1	1.6	0.5		1.0	0.4	
Delay (s)				48.0	47.6	43.4	6.6	4.1		8.5	9.6	
Level of Service				D	D	D	A	A		A	A	
Approach Delay (s)		0.0			47.0			4.7			9.4	
Approach LOS		A			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.56				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	59.1%	ICU Level of Service		B	
Analysis Period (min)	15				

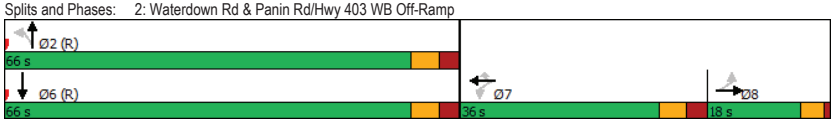
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	336	0	275	0	1044	0	0	776	0
Future Volume (vph)	7	0	1	336	0	275	0	1044	0	0	776	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.983				0.850						
Flt Protected		0.958		0.950	0.950							
Satd. Flow (prot)	0	1789	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.875	0.875							
Satd. Flow (perm)	0	1868	0	1527	1579	1597	0	3610	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		100				243						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	0	1	346	0	284	0	1076	0	0	800	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	173	173	284	0	1076	0	0	800	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	18.0	18.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	18.0	18.0		36.0	36.0	36.0	66.0	66.0			66.0	
Total Split (%)	15.0%	15.0%		30.0%	30.0%	30.0%	55.0%	55.0%			55.0%	
Maximum Green (s)	13.5	13.5		29.0	29.0	29.0	59.0	59.0			59.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		22.3	22.3	22.3		87.7			87.7	
Actuated g/C Ratio		0.05		0.19	0.19	0.19		0.73			0.73	
v/c Ratio		0.04		0.61	0.59	0.57		0.41			0.30	
Control Delay		0.4		53.1	51.9	12.7		5.3			5.6	
Queue Delay		0.0		0.0	0.0	0.0		0.3			0.1	
Total Delay		0.4		53.1	51.9	12.7		5.5			5.8	
LOS		A		D	D	B		A			A	
Approach Delay		0.4			34.6			5.5			5.8	
Approach LOS		A			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 25 (21%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 12.9		Intersection LOS: B	
Intersection Capacity Utilization 60.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	8	173	173	284	1076	800
v/c Ratio	0.04	0.61	0.59	0.57	0.41	0.30
Control Delay	0.4	53.1	51.9	12.7	5.3	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.1
Total Delay	0.4	53.1	51.9	12.7	5.5	5.8
Queue Length 50th (m)	0.0	42.0	41.8	8.6	19.9	22.6
Queue Length 95th (m)	0.0	62.1	61.5	32.4	m50.3	48.3
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	306	407	421	604	2637	2637
Starvation Cap Reductn	0	0	0	0	770	802
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.43	0.41	0.47	0.58	0.44

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	336	0	275	0	1044	0	0	776	0
Future Volume (vph)	7	0	1	336	0	275	0	1044	0	0	776	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.98		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.96		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1790		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.88	0.88	1.00		1.00			1.00	
Satd. Flow (perm)		1868		1527	1579	1597		3610			3610	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	7	0	1	346	0	284	0	1076	0	0	800	0
RTOR Reduction (vph)	0	8	0	0	0	198	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	173	173	86	0	1076	0	0	800	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		19.3	19.3	19.3		81.1			81.1	
Effective Green, g (s)		1.6		22.3	22.3	22.3		84.1			84.1	
Actuated g/C Ratio		0.01		0.19	0.19	0.19		0.70			0.70	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		283	293	296		2530			2530	
v/s Ratio Prot								c0.30			0.22	
v/s Ratio Perm		c0.00		c0.11	0.11	0.05						
v/c Ratio		0.00		0.61	0.59	0.29		0.43			0.32	
Uniform Delay, d1		58.4		44.9	44.7	42.0		7.7			6.9	
Progression Factor		1.00		1.00	1.00	1.00		0.68			0.79	
Incremental Delay, d2		0.1		3.9	3.2	0.5		0.2			0.3	
Delay (s)		58.5		48.7	47.8	42.6		5.4			5.7	
Level of Service		E		D	D	D		A			A	
Approach Delay (s)		58.5			45.7			5.4			5.7	
Approach LOS		E			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.46				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B		
Analysis Period (min)	15				

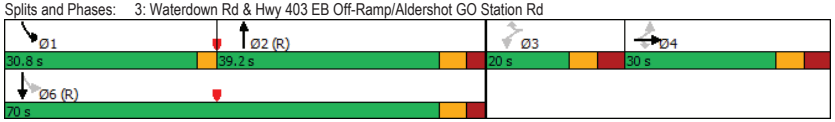
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	312	221	331	24	0	80	0	608	586	490	579	0
Future Volume (vph)	312	221	331	24	0	80	0	608	586	490	579	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.926				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3343	0	1805	3610	0
Flt Permitted	0.950			0.336						0.118		
Satd. Flow (perm)	1745	1900	1597	1197	0	1597	0	3343	0	224	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			352			136		205				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
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 (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	332	235	352	26	0	85	0	647	623	521	616	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	332	235	352	26	0	85	0	1270	0	521	616	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	30.0	30.0	30.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	30.0	30.0	30.0	20.0		20.0		39.2		30.8	70.0	
Total Split (%)	25.0%	25.0%	25.0%	16.7%		16.7%		32.7%		25.7%	58.3%	
Maximum Green (s)	22.0	22.0	22.0	12.0		12.0		32.2		27.8	63.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	27.5	27.5	27.5	13.5		13.5		35.6		70.2	70.2	
Actuated g/C Ratio	0.23	0.23	0.23	0.11		0.11		0.30		0.58	0.58	
v/c Ratio	0.83	0.54	0.55	0.19		0.28		1.12		0.98	0.29	
Control Delay	62.7	46.1	7.7	52.4		5.4		99.1		64.0	12.4	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	62.7	46.1	7.7	52.4		5.4		99.1		64.0	12.4	
LOS	E	D	A	D		A		F		E	B	
Approach Delay		37.4			16.4			99.1			36.1	
Approach LOS		D			B			F			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.12			
Intersection Signal Delay: 59.1		Intersection LOS: E	
Intersection Capacity Utilization 94.4%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Queues

200584

3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Background 2033 AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	332	235	352	26	85	1270	521	616
v/c Ratio	0.83	0.54	0.55	0.19	0.28	1.12	0.98	0.29
Control Delay	62.7	46.1	7.7	52.4	5.4	99.1	64.0	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	46.1	7.7	52.4	5.4	99.1	64.0	12.4
Queue Length 50th (m)	77.4	50.6	0.0	3.1	0.0	~172.3	~119.2	34.0
Queue Length 95th (m)	#132.6	79.8	25.7	7.8	4.8	#217.0	#193.1	60.4
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	402	437	638	159	330	1135	534	2110
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.54	0.55	0.16	0.26	1.12	0.98	0.29

Intersection Summary

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

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

HCM Signalized Intersection Capacity Analysis

200584

3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Background 2033 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	312	221	331	24	0	80	0	608	586	490	579	0
Future Volume (vph)	312	221	331	24	0	80	0	608	586	490	579	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.93		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3344		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.34		1.00		1.00		0.12	1.00	
Satd. Flow (perm)	1745	1900	1597	1198		1597		3344		224	3610	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	332	235	352	26	0	85	0	647	623	521	616	0
RTOR Reduction (vph)	0	0	271	0	0	77	0	147	0	0	0	0
Lane Group Flow (vph)	332	235	81	26	0	8	0	1123	0	521	616	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	23.5	23.5	23.5	7.9		7.9		31.0		65.6	65.6	
Effective Green, g (s)	27.5	27.5	27.5	11.9		11.9		34.0		64.6	68.6	
Actuated g/C Ratio	0.23	0.23	0.23	0.10		0.10		0.28		0.54	0.57	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	399	435	365	118		158		947		523	2063	
v/s Ratio Prot		0.12						c0.34		c0.25	0.17	
v/s Ratio Perm	c0.19		0.05	c0.02		0.01				0.28		
v/c Ratio	0.83	0.54	0.22	0.22		0.05		1.19		1.00	0.30	
Uniform Delay, d1	44.1	40.7	37.6	49.8		48.9		43.0		35.8	13.3	
Progression Factor	1.00	1.00	1.00	1.03		2.06		1.00		0.89	0.89	
Incremental Delay, d2	13.8	1.4	0.3	0.9		0.1		94.4		37.3	0.4	
Delay (s)	57.8	42.1	37.9	52.0		100.7		137.4		69.2	12.2	
Level of Service	E	D	D	D		F		F		E	B	
Approach Delay (s)		46.1			89.3			137.4			38.3	
Approach LOS		D			F			F			D	

Intersection Summary

HCM 2000 Control Delay	78.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

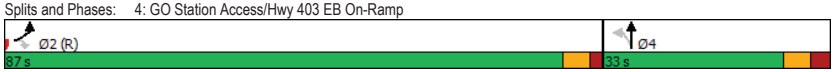
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	893	224	13	34	0	0
Future Volume (vph)	893	224	13	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.986		
Satd. Flow (prot)	1745	1597	0	1873	0	0
Flt Permitted	0.950			0.986		
Satd. Flow (perm)	1745	1597	0	1873	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		236				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	940	236	14	36	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	940	236	0	50	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	87.0	87.0	33.0	33.0		
Total Split (%)	72.5%	72.5%	27.5%	27.5%		
Maximum Green (s)	81.0	81.0	26.0	26.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	103.6	103.6		12.2		
Actuated g/C Ratio	0.86	0.86		0.10		
v/c Ratio	0.62	0.17		0.26		
Control Delay	0.8	0.1		52.9		
Queue Delay	0.0	0.0		0.0		
Total Delay	0.8	0.1		52.9		
LOS	A	A		D		
Approach Delay	0.6			52.9		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 106 (88%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 2.7		Intersection LOS: A	
Intersection Capacity Utilization 62.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp





Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	940	236	50
v/c Ratio	0.62	0.17	0.26
Control Delay	0.8	0.1	52.9
Queue Delay	0.0	0.0	0.0
Total Delay	0.8	0.1	52.9
Queue Length 50th (m)	2.5	0.0	11.7
Queue Length 95th (m)	m3.0	m0.0	24.1
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1506	1410	452
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.62	0.17	0.11

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	893	224	13	34	0	0
Future Volume (vph)	893	224	13	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.99		
Satd. Flow (prot)	1745	1597		1874		
Flt Permitted	0.95	1.00		0.99		
Satd. Flow (perm)	1745	1597		1874		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	940	236	14	36	0	0
RTOR Reduction (vph)	0	37	0	0	0	0
Lane Group Flow (vph)	940	199	0	50	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	99.4	99.4		7.6		
Effective Green, g (s)	101.4	101.4		10.6		
Actuated g/C Ratio	0.85	0.85		0.09		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1474	1349		165		
v/s Ratio Prot	c0.54					
v/s Ratio Perm		0.12		0.03		
v/c Ratio	0.64	0.15		0.30		
Uniform Delay, d1	3.1	1.6		51.2		
Progression Factor	0.05	0.00		1.00		
Incremental Delay, d2	0.6	0.1		1.0		
Delay (s)	0.8	0.1		52.3		
Level of Service	A	A		D		
Approach Delay (s)	0.6			52.3	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	819	321	0	0	0
Future Volume (vph)	0	819	321	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	1863	0
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	1863	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		286.2	
Travel Time (s)		56.6	12.1		20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	890	349	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	890	349	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	819	321	0	0	0
Future Volume (Veh/h)	0	819	321	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	890	349	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	349				1239	349
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	349				1239	349
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1210				194	694

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	890	349	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1210	1700	1700
Volume to Capacity	0.00	0.21	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		46.4%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	L	T	TR	L	T	TR	T
Maximum Queue (m)	60.4	57.1	18.3	58.2	40.9	51.9	65.5	95.4	71.7	8.6
Average Queue (m)	26.8	24.3	7.4	25.4	17.0	21.2	25.6	47.9	26.2	0.4
95th Queue (m)	51.5	45.7	14.5	45.8	34.9	39.5	47.7	79.4	60.5	4.2
Link Distance (m)		281.2			124.2	124.2		83.3		88.5
Upstream Blk Time (%)								1	0	
Queuing Penalty (veh)								0	0	
Storage Bay Dist (m)	150.0		130.0	90.0			70.0		70.0	
Storage Blk Time (%)							0	1	0	
Queuing Penalty (veh)							0	7	0	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	12.6	68.0	62.7	60.1	50.5	53.4	61.1	42.9
Average Queue (m)	2.7	33.1	33.4	25.9	20.8	19.9	32.6	12.6
95th Queue (m)	9.5	56.6	55.7	46.8	40.8	40.7	54.3	33.9
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	115.1	115.7	71.3	17.9	9.8	25.3	401.1	401.3	37.4	163.3	162.6
Average Queue (m)	70.2	43.5	30.3	7.1	0.8	10.7	388.3	392.1	36.4	97.0	68.6
95th Queue (m)	107.7	81.2	53.2	16.3	6.0	19.1	474.3	462.3	41.7	171.5	143.8
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)							66	86		1	0
Queuing Penalty (veh)							0	0		6	0
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)	2	0							57	1	
Queuing Penalty (veh)	4	0							165	3	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	68.9	18.3	30.5
Average Queue (m)	24.1	5.6	11.9
95th Queue (m)	58.2	15.2	24.3
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

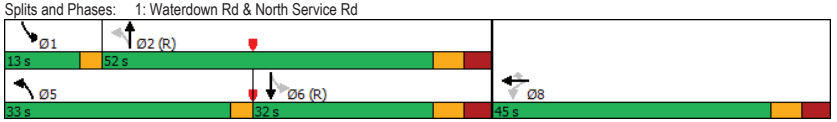
Network wide Queuing Penalty: 186

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	353	737	160	550	721	266	119	557	102
Future Volume (vph)	0	0	0	353	737	160	550	721	266	119	557	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.960			0.977	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3466	0	1745	3527	0
Flt Permitted				0.950			0.148			0.227		
Satd. Flow (perm)	0	0	0	1745	1900	1597	272	3466	0	417	3527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						176		61			18	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	388	810	176	604	792	292	131	612	112
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	388	810	176	604	1084	0	131	724	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.0	31.0	
Total Split (s)				45.0	45.0	45.0	33.0	52.0		13.0	32.0	
Total Split (%)				40.9%	40.9%	40.9%	30.0%	47.3%		11.8%	29.1%	
Maximum Green (s)				37.0	37.0	37.0	30.0	44.0		10.0	24.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				41.0	41.0	41.0	61.0	49.1		35.9	28.0	
Actuated g/C Ratio				0.37	0.37	0.37	0.55	0.45		0.33	0.25	
v/c Ratio				0.60	1.14	0.25	1.12	0.69		0.57	0.79	
Control Delay				32.5	114.2	4.4	106.0	12.8		26.2	44.8	
Queue Delay				0.0	0.0	0.0	0.0	0.5		0.0	0.0	
Total Delay				32.5	114.2	4.4	106.0	13.3		26.2	44.8	
LOS				C	F	A	F	B		C	D	
Approach Delay					77.0			46.5			42.0	
Approach LOS					E			D			D	

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 52 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 120		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.14		
Intersection Signal Delay: 56.2	Intersection LOS: E	
Intersection Capacity Utilization 97.9%	ICU Level of Service F	
Analysis Period (min) 15		

Splits and Phases: 1: Waterdown Rd & North Service Rd



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	388	810	176	604	1084	131	724
v/c Ratio	0.60	1.14	0.25	1.12	0.69	0.57	0.79
Control Delay	32.5	114.2	4.4	106.0	12.8	26.2	44.8
Queue Delay	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	32.5	114.2	4.4	106.0	13.3	26.2	44.8
Queue Length 50th (m)	69.9	~214.9	0.0	~132.7	23.8	13.5	78.8
Queue Length 95th (m)	102.6	#290.3	14.2	#204.3	53.6	23.4	101.7
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	650	708	705	539	1579	248	911
Starvation Cap Reductn	0	0	0	0	174	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	1.14	0.25	1.12	0.77	0.53	0.79

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	353	737	160	550	721	266	119	557	102
Future Volume (vph)	0	0	0	353	737	160	550	721	266	119	557	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3464		1745	3526	
Flt Permitted				0.95	1.00	1.00	0.15	1.00		0.23	1.00	
Satd. Flow (perm)				1745	1900	1597	272	3464		418	3526	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	388	810	176	604	792	292	131	612	112
RTOR Reduction (vph)	0	0	0	0	0	110	0	34	0	0	13	0
Lane Group Flow (vph)	0	0	0	388	810	66	604	1050	0	131	711	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				37.0	37.0	37.0	57.0	45.1		32.9	24.0	
Effective Green, g (s)				41.0	41.0	41.0	56.0	49.1		30.9	28.0	
Actuated g/C Ratio				0.37	0.37	0.37	0.51	0.45		0.28	0.25	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				650	708	595	526	1546		212	897	
v/s Ratio Prot					c0.43		c0.30	0.30		0.04	0.20	
v/s Ratio Perm				0.22		0.04	c0.28			0.13		
v/c Ratio				0.60	1.14	0.11	1.15	0.68		0.62	0.79	
Uniform Delay, d1				27.8	34.5	22.6	31.5	24.2		30.8	38.3	
Progression Factor				1.00	1.00	1.00	1.26	0.47		1.00	1.00	
Incremental Delay, d2				1.5	81.0	0.1	82.4	1.8		5.3	7.1	
Delay (s)				29.3	115.5	22.7	122.1	13.2		36.1	45.4	
Level of Service				C	F	C	F	B		D	D	
Approach Delay (s)		0.0			79.3			52.2			44.0	
Approach LOS		A			E			D			D	

Intersection Summary				
HCM 2000 Control Delay	59.9	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.12			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	97.9%	ICU Level of Service	F	
Analysis Period (min)	15			

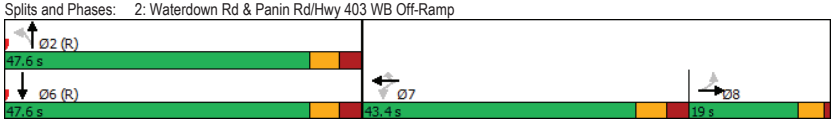
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	316	0	278	3	1249	0	0	908	0
Future Volume (vph)	1	0	3	316	0	278	3	1249	0	0	908	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.899				0.850						
Flt Protected		0.988		0.950	0.950							
Satd. Flow (prot)	0	1688	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.251	0.251			0.953				
Satd. Flow (perm)	0	1708	0	438	453	1597	0	3440	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109				291						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	0	3	351	0	309	3	1388	0	0	1009	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	4	0	175	176	309	0	1391	0	0	1009	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	19.0	19.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	19.0	19.0		43.4	43.4	43.4	47.6	47.6			47.6	
Total Split (%)	17.3%	17.3%		39.5%	39.5%	39.5%	43.3%	43.3%			43.3%	
Maximum Green (s)	14.5	14.5		36.4	36.4	36.4	40.6	40.6			40.6	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		39.4	39.4	39.4		60.6			60.6	
Actuated g/C Ratio		0.05		0.36	0.36	0.36		0.55			0.55	
v/c Ratio		0.02		1.12	1.09	0.41		0.73			0.51	
Control Delay		0.2		143.8	131.7	5.4		14.5			17.8	
Queue Delay		0.0		0.0	0.0	0.3		0.3			0.3	
Total Delay		0.2		143.8	131.7	5.7		14.8			18.1	
LOS		A		F	F	A		B			B	
Approach Delay		0.3			75.9			14.8			18.1	
Approach LOS		A			E			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 40 (36%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.12			
Intersection Signal Delay: 29.0		Intersection LOS: C	
Intersection Capacity Utilization 66.0%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	4	175	176	309	1391	1009
v/c Ratio	0.02	1.12	1.09	0.41	0.73	0.51
Control Delay	0.2	143.8	131.7	5.4	14.5	17.8
Queue Delay	0.0	0.0	0.0	0.3	0.3	0.3
Total Delay	0.2	143.8	131.7	5.7	14.8	18.1
Queue Length 50th (m)	0.0	~47.8	~47.0	2.6	113.5	56.5
Queue Length 95th (m)	0.0	#94.5	#94.2	21.4	m143.5	82.8
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	327	156	162	758	1894	1988
Starvation Cap Reductn	0	0	0	0	0	400
Spillback Cap Reductn	0	0	0	112	107	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.12	1.09	0.48	0.78	0.64

Intersection Summary

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

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	316	0	278	3	1249	0	0	908	0
Future Volume (vph)	1	0	3	316	0	278	3	1249	0	0	908	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.90		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.99		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1687		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.25	0.25	1.00		0.95			1.00	
Satd. Flow (perm)		1708		438	453	1597		3441			3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1	0	3	351	0	309	3	1388	0	0	1009	0
RTOR Reduction (vph)	0	4	0	0	0	187	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	175	176	122	0	1391	0	0	1009	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		36.4	36.4	36.4		54.0			54.0	
Effective Green, g (s)		1.6		39.4	39.4	39.4		57.0			57.0	
Actuated g/C Ratio		0.01		0.36	0.36	0.36		0.52			0.52	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		156	162	572		1783			1870	
v/s Ratio Prot											0.28	
v/s Ratio Perm		c0.00		c0.40	0.39	0.08		c0.40				
v/c Ratio		0.00		1.12	1.09	0.21		0.78			0.54	
Uniform Delay, d1		53.4		35.3	35.3	24.5		21.4			17.7	
Progression Factor		1.00		1.00	1.00	1.00		0.68			1.06	
Incremental Delay, d2		0.0		108.5	95.7	0.2		1.5			0.8	
Delay (s)		53.5		143.8	131.0	24.7		16.0			19.6	
Level of Service		D		F	F	C		B			B	
Approach Delay (s)		53.5			84.6			16.0			19.6	
Approach LOS		D			F			B			B	

Intersection Summary				
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	66.0%	ICU Level of Service	C	
Analysis Period (min)	15			

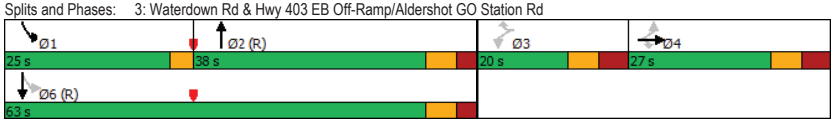
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	85	300	96	0	401	0	630	476	378	812	0
Future Volume (vph)	198	85	300	96	0	401	0	630	476	378	812	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.935				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3375	0	1805	3610	0
Flt Permitted	0.950			0.250						0.118		
Satd. Flow (perm)	1745	1900	1597	891	0	1597	0	3375	0	224	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			168			425		179				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	225	97	341	109	0	456	0	716	541	430	923	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	225	97	341	109	0	456	0	1257	0	430	923	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	27.0	27.0	27.0	20.0		20.0		38.0		25.0	63.0	
Total Split (%)	24.5%	24.5%	24.5%	18.2%		18.2%		34.5%		22.7%	57.3%	
Maximum Green (s)	19.0	19.0	19.0	12.0		12.0		31.0		22.0	56.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	21.2	21.2	21.2	16.0		16.0		34.0		60.8	60.8	
Actuated g/C Ratio	0.19	0.19	0.19	0.15		0.15		0.31		0.55	0.55	
v/c Ratio	0.67	0.27	0.77	0.84		0.77		1.08		0.95	0.46	
Control Delay	51.4	39.1	33.2	84.2		27.1		82.0		50.7	16.4	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	51.4	39.1	33.2	84.2		27.1		82.0		50.7	16.4	
LOS	D	D	C	F		C		F		D	B	
Approach Delay		40.2			38.1			82.0			27.3	
Approach LOS		D			D			F			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 101 (92%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.08			
Intersection Signal Delay: 49.1		Intersection LOS: D	
Intersection Capacity Utilization 80.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Queues

200584

3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Background 2033 PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	225	97	341	109	456	1257	430	923
v/c Ratio	0.67	0.27	0.77	0.84	0.77	1.08	0.95	0.46
Control Delay	51.4	39.1	33.2	84.2	27.1	82.0	50.7	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	39.1	33.2	84.2	27.1	82.0	50.7	16.4
Queue Length 50th (m)	46.5	18.4	36.8	13.3	56.0	~151.5	~66.8	61.4
Queue Length 95th (m)	71.1	32.9	68.6	m#23.1	82.5	#187.7 m	#119.0	m85.1
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	364	397	466	129	595	1166	451	1995
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.24	0.73	0.84	0.77	1.08	0.95	0.46

Intersection Summary

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

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

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

200584

3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Background 2033 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	85	300	96	0	401	0	630	476	378	812	0
Future Volume (vph)	198	85	300	96	0	401	0	630	476	378	812	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3377		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.25		1.00		1.00		0.12	1.00	
Satd. Flow (perm)	1745	1900	1597	891		1597		3377		224	3610	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	225	97	341	109	0	456	0	716	541	430	923	0
RTOR Reduction (vph)	0	0	136	0	0	363	0	124	0	0	0	0
Lane Group Flow (vph)	225	97	205	109	0	93	0	1133	0	430	923	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	17.2	17.2	17.2	12.0		12.0		31.0		57.8	57.8	
Effective Green, g (s)	21.2	21.2	21.2	16.0		16.0		34.0		56.8	60.8	
Actuated g/C Ratio	0.19	0.19	0.19	0.15		0.15		0.31		0.52	0.55	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	336	366	307	129		232		1043		443	1995	
v/s Ratio Prot		0.05						c0.34		c0.20	0.26	
v/s Ratio Perm	c0.13		0.13	c0.12		0.06				0.30		
v/c Ratio	0.67	0.27	0.67	0.84		0.40		1.09		0.97	0.46	
Uniform Delay, d1	41.2	37.8	41.1	45.8		42.6		38.0		32.6	14.8	
Progression Factor	1.00	1.00	1.00	0.86		3.14		1.00		0.72	1.04	
Incremental Delay, d2	5.0	0.4	5.4	33.8		1.0		54.5		29.5	0.6	
Delay (s)	46.2	38.2	46.6	73.4		134.8		92.5		53.0	15.9	
Level of Service	D	D	D	E		F		F		D	B	
Approach Delay (s)		45.2			123.0			92.5			27.7	
Approach LOS		D			F			F			C	

Intersection Summary				
HCM 2000 Control Delay	66.0	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	80.3%	ICU Level of Service	D	
Analysis Period (min)	15			

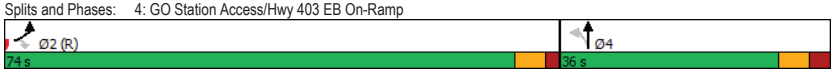
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	725	19	279	37	0	0
Future Volume (vph)	725	19	279	37	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.958		
Satd. Flow (prot)	1745	1597	0	1820	0	0
Flt Permitted	0.950			0.958		
Satd. Flow (perm)	1745	1597	0	1820	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		24				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	929	24	358	47	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	929	24	0	405	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	74.0	74.0	36.0	36.0		
Total Split (%)	67.3%	67.3%	32.7%	32.7%		
Maximum Green (s)	68.0	68.0	29.0	29.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	72.1	72.1		29.9		
Actuated g/C Ratio	0.66	0.66		0.27		
v/c Ratio	0.81	0.02		0.82		
Control Delay	5.1	0.5		51.9		
Queue Delay	0.0	0.0		0.0		
Total Delay	5.1	0.5		51.9		
LOS	A	A		D		
Approach Delay	5.0			51.9		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 100 (91%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	929	24	405
v/c Ratio	0.81	0.02	0.82
Control Delay	5.1	0.5	51.9
Queue Delay	0.0	0.0	0.0
Total Delay	5.1	0.5	51.9
Queue Length 50th (m)	26.6	0.2	83.4
Queue Length 95th (m)	m25.7	m0.1	99.4
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1144	1055	529
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.81	0.02	0.77

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	725	19	279	37	0	0
Future Volume (vph)	725	19	279	37	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.96		
Satd. Flow (prot)	1745	1597		1820		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1745	1597		1820		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	929	24	358	47	0	0
RTOR Reduction (vph)	0	8	0	0	0	0
Lane Group Flow (vph)	929	16	0	405	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	70.1	70.1		26.9		
Effective Green, g (s)	72.1	72.1		29.9		
Actuated g/C Ratio	0.66	0.66		0.27		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1143	1046		494		
v/s Ratio Prot	c0.53					
v/s Ratio Perm		0.01		0.22		
v/c Ratio	0.81	0.02		0.82		
Uniform Delay, d1	14.0	6.6		37.5		
Progression Factor	0.16	0.16		1.00		
Incremental Delay, d2	2.1	0.0		10.2		
Delay (s)	4.4	1.1		47.8		
Level of Service	A	A		D		
Approach Delay (s)	4.3			47.8	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	64.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	385	1250	0	0	0
Future Volume (vph)	0	385	1250	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	1863	0
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	1863	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		228.3	
Travel Time (s)		56.6	12.1		16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	418	1359	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	418	1359	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	385	1250	0	0	0
Future Volume (Veh/h)	0	385	1250	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	418	1359	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1359				1777	1359
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1359				1777	1359
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	506				91	182

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	418	1359	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	506	1700	1700
Volume to Capacity	0.00	0.80	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	B16	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	T	L	T	TR	L	T	TR	T
Maximum Queue (m)	157.5	314.1	137.5	930.0	97.5	137.1	140.0	77.3	104.7	77.5	71.3
Average Queue (m)	144.7	303.9	96.3	839.2	97.3	128.5	114.4	39.2	87.2	67.2	14.9
95th Queue (m)	201.9	309.6	193.5	1166.3	97.8	140.0	160.4	82.6	119.5	91.0	58.3
Link Distance (m)		281.2		929.4		124.2	124.2		83.3		88.5
Upstream Blk Time (%)		50		2		23	10	0	15	0	2
Queuing Penalty (veh)		620		30		172	75	0	0	0	0
Storage Bay Dist (m)	150.0		130.0		90.0			70.0		70.0	
Storage Blk Time (%)	0	54	0		37	15		0	22	4	
Queuing Penalty (veh)	2	277	2		133	83		0	110	16	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	11.2	52.3	77.0	102.4	179.6	180.4	66.1	63.6
Average Queue (m)	1.4	24.5	33.9	47.8	158.2	146.2	39.1	35.1
95th Queue (m)	6.8	44.9	63.1	86.3	210.9	216.5	61.9	57.4
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)					13	3		
Queuing Penalty (veh)					78	16		
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)				1				
Queuing Penalty (veh)				2				

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	105.0	139.0	147.0	52.6	142.4	67.5	394.4	397.4	37.4	107.0	93.4
Average Queue (m)	67.5	56.2	37.9	15.7	54.8	58.8	244.0	256.5	35.2	53.4	38.9
95th Queue (m)	120.6	194.9	109.5	39.2	143.4	78.4	452.4	460.5	42.0	97.0	74.9
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)		2	1				20	23			
Queuing Penalty (veh)		0	0				0	0			
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)	19				0	36			45	8	
Queuing Penalty (veh)	16				0	17			183	29	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	86.0	9.9	48.3
Average Queue (m)	39.7	1.2	45.0
95th Queue (m)	69.4	6.2	55.3
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			20
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	WB	B5
Directions Served	TR	T
Maximum Queue (m)	215.6	111.7
Average Queue (m)	155.9	71.6
95th Queue (m)	298.8	148.8
Link Distance (m)	182.3	95.3
Upstream Blk Time (%)	61	59
Queuing Penalty (veh)	0	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 20: Bend

Movement	NW
Directions Served	T
Maximum Queue (m)	58.0
Average Queue (m)	3.1
95th Queue (m)	31.0
Link Distance (m)	83.3
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1860

Appendix H1

Total Traffic Operations – Opening Date



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	126	126	51	230	333	553	159	552	87
Future Volume (vph)	0	0	0	126	126	51	230	333	553	159	552	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.906			0.980	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3271	0	1745	3538	0
Flt Permitted				0.950			0.367			0.278		
Satd. Flow (perm)	0	0	0	1745	1900	1597	674	3271	0	511	3538	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109		524			19	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	129	129	52	235	340	564	162	563	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	129	129	52	235	904	0	162	652	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.5	31.0	
Total Split (s)				28.0	28.0	28.0	33.0	57.0		25.0	49.0	
Total Split (%)				25.5%	25.5%	25.5%	30.0%	51.8%		22.7%	44.5%	
Maximum Green (s)				20.0	20.0	20.0	30.0	49.0		22.0	41.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				17.4	17.4	17.4	81.9	73.2		79.3	71.9	
Actuated g/C Ratio				0.16	0.16	0.16	0.74	0.67		0.72	0.65	
v/c Ratio				0.47	0.43	0.15	0.40	0.38		0.36	0.28	
Control Delay				46.9	45.4	0.9	4.3	2.5		6.2	8.9	
Queue Delay				0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay				46.9	45.4	0.9	4.3	2.6		6.2	8.9	
LOS				D	D	A	A	A		A	A	
Approach Delay					38.6			3.0			8.4	
Approach LOS					D			A			A	

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 52 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 65		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.47		
Intersection Signal Delay: 9.8	Intersection LOS: A	
Intersection Capacity Utilization 52.8%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 1: Waterdown Rd & North Service Rd



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	129	129	52	235	904	162	652
v/c Ratio	0.47	0.43	0.15	0.40	0.38	0.36	0.28
Control Delay	46.9	45.4	0.9	4.3	2.5	6.2	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	46.9	45.4	0.9	4.3	2.6	6.2	8.9
Queue Length 50th (m)	26.8	26.7	0.0	3.3	0.0	7.7	28.7
Queue Length 95th (m)	43.7	43.2	0.0	7.4	15.7	16.2	47.9
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	380	414	433	800	2352	628	2319
Starvation Cap Reductn	0	0	0	0	499	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.31	0.12	0.29	0.49	0.26	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	126	126	51	230	333	553	159	552	87
Future Volume (vph)	0	0	0	126	126	51	230	333	553	159	552	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.91		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3272		1745	3536	
Flt Permitted				0.95	1.00	1.00	0.37	1.00		0.28	1.00	
Satd. Flow (perm)				1745	1900	1597	674	3272		510	3536	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	129	129	52	235	340	564	162	563	89
RTOR Reduction (vph)	0	0	0	0	0	44	0	175	0	0	7	0
Lane Group Flow (vph)	0	0	0	129	129	8	235	729	0	162	645	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				13.4	13.4	13.4	78.9	69.2		76.3	67.9	
Effective Green, g (s)				17.4	17.4	17.4	76.9	73.2		74.3	71.9	
Actuated g/C Ratio				0.16	0.16	0.16	0.70	0.67		0.68	0.65	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				276	300	252	555	2177		427	2311	
v/s Ratio Prot					0.07		c0.03	0.22		0.03	0.18	
v/s Ratio Perm				c0.07		0.01	c0.26			0.23		
v/c Ratio				0.47	0.43	0.03	0.42	0.33		0.38	0.28	
Uniform Delay, d1				42.1	41.8	39.2	6.0	7.9		6.8	8.1	
Progression Factor				1.00	1.00	1.00	0.59	0.58		1.00	1.00	
Incremental Delay, d2				1.3	1.0	0.1	0.5	0.4		0.6	0.3	
Delay (s)				43.3	42.8	39.2	4.1	5.0		7.3	8.4	
Level of Service				D	D	D	A	A		A	A	
Approach Delay (s)		0.0			42.4			4.8			8.2	
Approach LOS		A			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.41			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	52.8%	ICU Level of Service	A	
Analysis Period (min)	15			

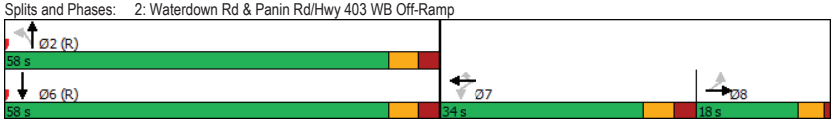
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	262	0	242	0	866	0	0	660	0
Future Volume (vph)	7	0	1	262	0	242	0	866	0	0	660	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.983				0.850						
Flt Protected		0.958		0.950	0.950							
Satd. Flow (prot)	0	1789	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.875	0.875							
Satd. Flow (perm)	0	1868	0	1527	1579	1597	0	3610	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109				249						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	0	1	270	0	249	0	893	0	0	680	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	135	135	249	0	893	0	0	680	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	18.0	18.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	18.0	18.0		34.0	34.0	34.0	58.0	58.0			58.0	
Total Split (%)	16.4%	16.4%		30.9%	30.9%	30.9%	52.7%	52.7%			52.7%	
Maximum Green (s)	13.5	13.5		27.0	27.0	27.0	51.0	51.0			51.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		18.2	18.2	18.2		81.8			81.8	
Actuated g/C Ratio		0.05		0.17	0.17	0.17		0.74			0.74	
v/c Ratio		0.04		0.54	0.52	0.53		0.33			0.25	
Control Delay		0.4		49.0	48.1	9.0		4.8			4.5	
Queue Delay		0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay		0.4		49.0	48.1	9.0		4.8			4.5	
LOS		A		D	D	A		A			A	
Approach Delay		0.4			29.6			4.8			4.5	
Approach LOS		A			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 26 (24%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.54			
Intersection Signal Delay: 10.8		Intersection LOS: B	
Intersection Capacity Utilization 53.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	8	135	135	249	893	680
v/c Ratio	0.04	0.54	0.52	0.53	0.33	0.25
Control Delay	0.4	49.0	48.1	9.0	4.8	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.4	49.0	48.1	9.0	4.8	4.5
Queue Length 50th (m)	0.0	29.7	29.6	0.0	14.1	15.3
Queue Length 95th (m)	0.0	47.5	47.2	20.4	m38.5	41.0
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	332	416	430	616	2685	2685
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	0.32	0.31	0.40	0.33	0.25

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	262	0	242	0	866	0	0	660	0
Future Volume (vph)	7	0	1	262	0	242	0	866	0	0	660	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.98		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.96		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1790		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.88	0.88	1.00		1.00			1.00	
Satd. Flow (perm)		1868		1527	1579	1597		3610			3610	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	7	0	1	270	0	249	0	893	0	0	680	0
RTOR Reduction (vph)	0	8	0	0	0	208	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	135	135	41	0	893	0	0	680	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		15.2	15.2	15.2		75.2			75.2	
Effective Green, g (s)		1.6		18.2	18.2	18.2		78.2			78.2	
Actuated g/C Ratio		0.01		0.17	0.17	0.17		0.71			0.71	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		27		252	261	264		2566			2566	
v/s Ratio Prot								c0.25			0.19	
v/s Ratio Perm		c0.00		c0.09	0.09	0.03						
v/c Ratio		0.00		0.54	0.52	0.16		0.35			0.27	
Uniform Delay, d1		53.4		42.0	41.9	39.3		6.1			5.7	
Progression Factor		1.00		1.00	1.00	1.00		0.77			0.79	
Incremental Delay, d2		0.1		2.2	1.7	0.3		0.2			0.2	
Delay (s)		53.5		44.2	43.6	39.6		5.0			4.7	
Level of Service		D		D	D	D		A			A	
Approach Delay (s)		53.5			41.8			5.0			4.7	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	53.1%	ICU Level of Service	A	
Analysis Period (min)	15			

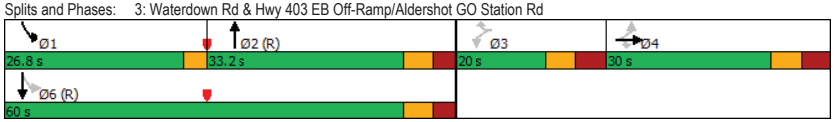
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	278	184	253	22	0	71	0	487	467	425	463	0
Future Volume (vph)	278	184	253	22	0	71	0	487	467	425	463	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.927				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3346	0	1805	3610	0
Flt Permitted	0.950			0.345						0.123		
Satd. Flow (perm)	1745	1900	1597	1229	0	1597	0	3346	0	234	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			269			149		215				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
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 (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	296	196	269	23	0	76	0	518	497	452	493	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	196	269	23	0	76	0	1015	0	452	493	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	30.0	30.0	30.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	30.0	30.0	30.0	20.0		20.0		33.2		26.8	60.0	
Total Split (%)	27.3%	27.3%	27.3%	18.2%		18.2%		30.2%		24.4%	54.5%	
Maximum Green (s)	22.0	22.0	22.0	12.0		12.0		26.2		23.8	53.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	25.5	25.5	25.5	13.2		13.2		34.3		62.5	62.5	
Actuated g/C Ratio	0.23	0.23	0.23	0.12		0.12		0.31		0.57	0.57	
v/c Ratio	0.73	0.45	0.47	0.16		0.24		0.85		0.94	0.24	
Control Delay	50.6	39.4	7.0	45.8		3.4		37.7		58.6	11.8	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	50.6	39.4	7.0	45.8		3.4		37.7		58.6	11.8	
LOS	D	D	A	D		A		D		E	B	
Approach Delay		32.3			13.3			37.7			34.2	
Approach LOS		C			B			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 2 (2%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 34.2		Intersection LOS: C	
Intersection Capacity Utilization 81.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Queues

200584

3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Future Total 2023 AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	296	196	269	23	76	1015	452	493
v/c Ratio	0.73	0.45	0.47	0.16	0.24	0.85	0.94	0.24
Control Delay	50.6	39.4	7.0	45.8	3.4	37.7	58.6	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	39.4	7.0	45.8	3.4	37.7	58.6	11.8
Queue Length 50th (m)	59.8	36.7	0.0	2.5	0.0	98.3	68.4	24.0
Queue Length 95th (m)	93.5	60.6	20.9	6.6	0.0	#144.2	#151.0	48.2
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	427	465	593	178	359	1190	479	2051
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.42	0.45	0.13	0.21	0.85	0.94	0.24

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

200584

3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Future Total 2023 AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	278	184	253	22	0	71	0	487	467	425	463	0
Future Volume (vph)	278	184	253	22	0	71	0	487	467	425	463	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.93		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3345		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.34		1.00		1.00		0.12	1.00	
Satd. Flow (perm)	1745	1900	1597	1229		1597		3345		233	3610	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	296	196	269	23	0	76	0	518	497	452	493	0
RTOR Reduction (vph)	0	0	207	0	0	68	0	151	0	0	0	0
Lane Group Flow (vph)	296	196	62	23	0	8	0	864	0	452	493	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	21.5	21.5	21.5	7.6		7.6		29.6		57.9	57.9	
Effective Green, g (s)	25.5	25.5	25.5	11.6		11.6		32.6		56.9	60.9	
Actuated g/C Ratio	0.23	0.23	0.23	0.11		0.11		0.30		0.52	0.55	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	404	440	370	129		168		991		467	1998	
v/s Ratio Prot		0.10						0.26		c0.21	0.14	
v/s Ratio Perm	c0.17		0.04	c0.02		0.01				c0.29		
v/c Ratio	0.73	0.45	0.17	0.18		0.05		0.87		0.97	0.25	
Uniform Delay, d1	39.1	36.2	33.8	44.9		44.2		36.7		32.2	12.7	
Progression Factor	1.00	1.00	1.00	1.01		1.00		1.00		1.00	0.86	
Incremental Delay, d2	6.7	0.7	0.2	0.7		0.1		10.4		32.6	0.3	
Delay (s)	45.8	36.9	34.0	46.1		44.4		47.2		64.9	11.2	
Level of Service	D	D	C	D		D		D		E	B	
Approach Delay (s)		39.3			44.8			47.2			36.9	
Approach LOS		D			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	81.7%	ICU Level of Service	D	
Analysis Period (min)	15			

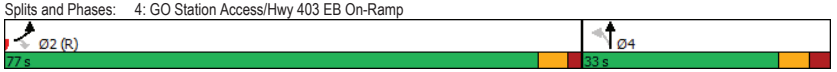
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	738	185	11	28	0	0
Future Volume (vph)	738	185	11	28	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.986		
Satd. Flow (prot)	1745	1597	0	1873	0	0
Flt Permitted	0.950			0.986		
Satd. Flow (perm)	1745	1597	0	1873	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		195				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	777	195	12	29	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	777	195	0	41	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	77.0	77.0	33.0	33.0		
Total Split (%)	70.0%	70.0%	30.0%	30.0%		
Maximum Green (s)	71.0	71.0	26.0	26.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	97.9	97.9		11.7		
Actuated g/C Ratio	0.89	0.89		0.11		
v/c Ratio	0.50	0.14		0.21		
Control Delay	0.8	0.1		47.3		
Queue Delay	0.0	0.0		0.0		
Total Delay	0.8	0.1		47.3		
LOS	A	A		D		
Approach Delay	0.6			47.3		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 102 (93%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 2.5		Intersection LOS: A	
Intersection Capacity Utilization 54.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	777	195	41
v/c Ratio	0.50	0.14	0.21
Control Delay	0.8	0.1	47.3
Queue Delay	0.0	0.0	0.0
Total Delay	0.8	0.1	47.3
Queue Length 50th (m)	2.2	0.0	8.7
Queue Length 95th (m)	m2.9	m0.0	19.3
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1553	1443	493
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.50	0.14	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	738	185	11	28	0	0
Future Volume (vph)	738	185	11	28	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.99		
Satd. Flow (prot)	1745	1597		1873		
Flt Permitted	0.95	1.00		0.99		
Satd. Flow (perm)	1745	1597		1873		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	777	195	12	29	0	0
RTOR Reduction (vph)	0	29	0	0	0	0
Lane Group Flow (vph)	777	166	0	41	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	91.5	91.5		5.5		
Effective Green, g (s)	93.5	93.5		8.5		
Actuated g/C Ratio	0.85	0.85		0.08		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1483	1357		144		
v/s Ratio Prot	c0.45					
v/s Ratio Perm		0.10		0.02		
v/c Ratio	0.52	0.12		0.28		
Uniform Delay, d1	2.2	1.4		47.9		
Progression Factor	0.05	0.00		1.00		
Incremental Delay, d2	0.7	0.1		1.1		
Delay (s)	0.8	0.1		49.0		
Level of Service	A	A		D		
Approach Delay (s)	0.7			49.0	0.0	
Approach LOS	A			D	A	

Intersection Summary

HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	34	678	269	0	0	34
Future Volume (vph)	34	678	269	0	0	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected		0.998				
Satd. Flow (prot)	0	1859	1863	0	1611	0
Flt Permitted		0.998				
Satd. Flow (perm)	0	1859	1863	0	1611	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		286.2	
Travel Time (s)		56.6	12.1		20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	737	292	0	0	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	774	292	0	37	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	678	269	0	0	34
Future Volume (Veh/h)	34	678	269	0	0	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	737	292	0	0	37
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	292				1103	292
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	292				1103	292
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	95
cM capacity (veh/h)	1270				227	747

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	774	292	37
Volume Left	37	0	0
Volume Right	0	0	37
cSH	1270	1700	747
Volume to Capacity	0.03	0.17	0.05
Queue Length 95th (m)	0.7	0.0	1.2
Control Delay (s)	0.8	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	0.8	0.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	L	T	TR	L	T	TR	T
Maximum Queue (m)	61.9	57.2	17.1	49.8	45.3	61.1	68.9	81.6	62.0	1.3
Average Queue (m)	27.0	26.3	6.5	19.4	17.1	21.3	22.5	37.3	18.2	0.0
95th Queue (m)	47.8	46.7	13.9	36.9	39.3	46.2	44.6	67.5	47.7	0.9
Link Distance (m)		281.2			124.2	124.2		83.3		88.5
Upstream Blk Time (%)								0		
Queuing Penalty (veh)								0		
Storage Bay Dist (m)	150.0		130.0	90.0			70.0		70.0	
Storage Blk Time (%)								1	0	
Queuing Penalty (veh)								3	0	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	10.2	53.4	51.2	50.4	44.2	54.4	52.0	36.7
Average Queue (m)	2.2	28.0	27.7	22.3	15.5	16.8	20.3	6.3
95th Queue (m)	8.3	46.3	44.5	40.4	35.1	39.9	42.2	23.0
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	85.1	70.0	36.2	17.9	9.8	18.3	306.0	330.6	37.4	137.9	124.3
Average Queue (m)	51.6	34.4	20.4	6.4	0.7	9.1	147.5	176.6	35.1	60.0	36.3
95th Queue (m)	78.9	60.0	32.3	15.5	4.7	15.9	306.7	335.4	42.4	121.9	93.1
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)							2	4		0	
Queuing Penalty (veh)							0	0		0	
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)									37	1	
Queuing Penalty (veh)									85	2	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	66.3	15.8	32.6
Average Queue (m)	23.8	4.9	10.7
95th Queue (m)	56.6	13.3	23.6
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	17.1	15.0
Average Queue (m)	2.1	7.0
95th Queue (m)	10.4	13.5
Link Distance (m)	929.3	277.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

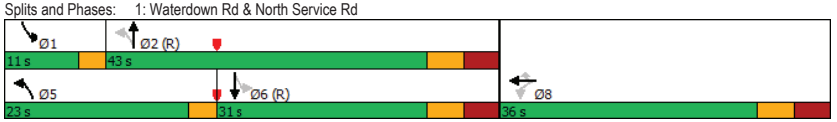
Network wide Queuing Penalty: 91

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	304	620	132	447	597	242	98	460	85
Future Volume (vph)	0	0	0	304	620	132	447	597	242	98	460	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.957			0.977	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3455	0	1745	3527	0
Flt Permitted				0.950			0.207			0.305		
Satd. Flow (perm)	0	0	0	1745	1900	1597	380	3455	0	560	3527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						145		86			24	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	334	681	145	491	656	266	108	505	93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	334	681	145	491	922	0	108	598	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.0	31.0	
Total Split (s)				36.0	36.0	36.0	23.0	43.0		11.0	31.0	
Total Split (%)				40.0%	40.0%	40.0%	25.6%	47.8%		12.2%	34.4%	
Maximum Green (s)				28.0	28.0	28.0	20.0	35.0		8.0	23.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				32.0	32.0	32.0	50.0	41.4		33.6	27.0	
Actuated g/C Ratio				0.36	0.36	0.36	0.56	0.46		0.37	0.30	
v/c Ratio				0.54	1.01	0.22	0.98	0.56		0.36	0.56	
Control Delay				27.1	67.5	4.5	57.7	7.0		15.0	27.7	
Queue Delay				0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay				27.1	67.5	4.5	57.7	7.1		15.0	27.7	
LOS				C	E	A	E	A		B	C	
Approach Delay					48.0			24.7			25.8	
Approach LOS					D			C			C	

Intersection Summary		
Area Type:	Other	
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 42 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 90		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.01		
Intersection Signal Delay: 33.2	Intersection LOS: C	
Intersection Capacity Utilization 82.8%	ICU Level of Service E	
Analysis Period (min) 15		

Splits and Phases: 1: Waterdown Rd & North Service Rd



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	334	681	145	491	922	108	598
v/c Ratio	0.54	1.01	0.22	0.98	0.56	0.36	0.56
Control Delay	27.1	67.5	4.5	57.7	7.0	15.0	27.7
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	27.1	67.5	4.5	57.7	7.1	15.0	27.7
Queue Length 50th (m)	47.8	~124.3	0.0	36.4	17.4	8.7	45.8
Queue Length 95th (m)	74.9	#198.6	12.1	#126.6	21.0	16.5	63.1
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	620	675	661	499	1633	303	1074
Starvation Cap Reductn	0	0	0	0	93	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	1.01	0.22	0.98	0.60	0.36	0.56

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	304	620	132	447	597	242	98	460	85
Future Volume (vph)	0	0	0	304	620	132	447	597	242	98	460	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3454		1745	3526	
Flt Permitted				0.95	1.00	1.00	0.21	1.00		0.30	1.00	
Satd. Flow (perm)				1745	1900	1597	381	3454		559	3526	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	334	681	145	491	656	266	108	505	93
RTOR Reduction (vph)	0	0	0	0	0	93	0	47	0	0	17	0
Lane Group Flow (vph)	0	0	0	334	681	52	491	875	0	108	581	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				28.0	28.0	28.0	46.0	36.8		29.2	23.0	
Effective Green, g (s)				32.0	32.0	32.0	45.0	40.8		27.2	27.0	
Actuated g/C Ratio				0.36	0.36	0.36	0.50	0.45		0.30	0.30	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				620	675	567	478	1565		237	1057	
v/s Ratio Prot					c0.36		c0.22	0.25		0.03	0.16	
v/s Ratio Perm				0.19		0.03	c0.30			0.11		
v/c Ratio				0.54	1.01	0.09	1.03	0.56		0.46	0.55	
Uniform Delay, d1				23.1	29.0	19.3	21.5	18.0		23.4	26.4	
Progression Factor				1.00	1.00	1.00	1.27	0.35		1.00	1.00	
Incremental Delay, d2				0.9	36.9	0.1	44.7	1.2		1.4	2.1	
Delay (s)				24.0	65.9	19.4	72.1	7.5		24.7	28.5	
Level of Service				C	E	B	E	A		C	C	
Approach Delay (s)		0.0			48.0			29.9			27.9	
Approach LOS		A			D			C			C	

Intersection Summary

HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

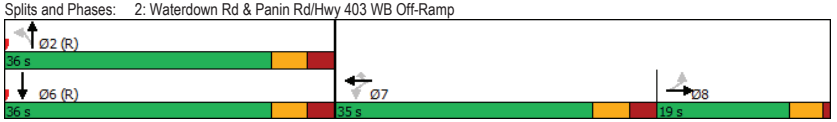
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	251	0	241	3	1036	0	0	762	0
Future Volume (vph)	1	0	3	251	0	241	3	1036	0	0	762	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.899				0.850						
Flt Protected		0.988		0.950	0.950							
Satd. Flow (prot)	0	1688	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.253	0.253			0.953				
Satd. Flow (perm)	0	1708	0	441	457	1597	0	3440	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		133				268						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	0	3	279	0	268	3	1151	0	0	847	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	4	0	139	140	268	0	1154	0	0	847	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	19.0	19.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	19.0	19.0		35.0	35.0	35.0	36.0	36.0			36.0	
Total Split (%)	21.1%	21.1%		38.9%	38.9%	38.9%	40.0%	40.0%			40.0%	
Maximum Green (s)	14.5	14.5		28.0	28.0	28.0	29.0	29.0			29.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		30.2	30.2	30.2		49.8			49.8	
Actuated g/C Ratio		0.07		0.34	0.34	0.34		0.55			0.55	
v/c Ratio		0.02		0.95	0.92	0.38		0.61			0.42	
Control Delay		0.2		93.7	85.6	4.5		10.2			13.6	
Queue Delay		0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay		0.2		93.7	85.6	4.5		10.2			13.6	
LOS		A		F	F	A		B			B	
Approach Delay		0.3			47.9			10.2			13.6	
Approach LOS		A			D			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 34 (38%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 19.4		Intersection LOS: B	
Intersection Capacity Utilization 57.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	4	139	140	268	1154	847
v/c Ratio	0.02	0.95	0.92	0.38	0.61	0.42
Control Delay	0.2	93.7	85.6	4.5	10.2	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.2	93.7	85.6	4.5	10.2	13.6
Queue Length 50th (m)	0.0	25.1	25.0	0.0	66.6	41.7
Queue Length 95th (m)	0.0	#64.4	#63.6	16.1	m101.1	65.7
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	395	151	157	725	1902	1996
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	0.92	0.89	0.37	0.61	0.42

Intersection Summary

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	251	0	241	3	1036	0	0	762	0
Future Volume (vph)	1	0	3	251	0	241	3	1036	0	0	762	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.90		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.99		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1687		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.25	0.25	1.00		0.95			1.00	
Satd. Flow (perm)		1708		442	457	1597		3441			3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1	0	3	279	0	268	3	1151	0	0	847	0
RTOR Reduction (vph)	0	4	0	0	0	178	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	139	140	90	0	1154	0	0	847	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		27.2	27.2	27.2		43.2			43.2	
Effective Green, g (s)		1.6		30.2	30.2	30.2		46.2			46.2	
Actuated g/C Ratio		0.02		0.34	0.34	0.34		0.51			0.51	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		30		148	153	535		1766			1853	
v/s Ratio Prot											0.23	
v/s Ratio Perm		c0.00		c0.31	0.31	0.06		c0.34				
v/c Ratio		0.00		0.94	0.92	0.17		0.65			0.46	
Uniform Delay, d1		43.4		29.0	28.7	21.1		16.0			13.9	
Progression Factor		1.00		1.00	1.00	1.00		0.63			1.03	
Incremental Delay, d2		0.0		55.2	48.1	0.1		1.2			0.7	
Delay (s)		43.4		84.3	76.7	21.2		11.4			15.0	
Level of Service		D		F	E	C		B			B	
Approach Delay (s)		43.4			51.4			11.4			15.0	
Approach LOS		D			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	57.8%	ICU Level of Service	B	
Analysis Period (min)	15			

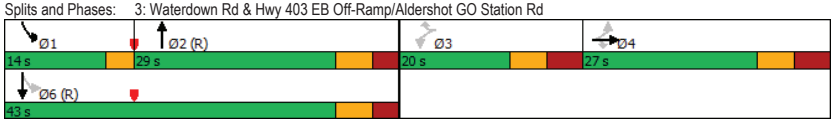
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	177	69	235	77	0	332	0	510	379	326	663	0
Future Volume (vph)	177	69	235	77	0	332	0	510	379	326	663	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.936				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3379	0	1805	3610	0
Flt Permitted	0.950			0.267						0.159		
Satd. Flow (perm)	1745	1900	1597	951	0	1597	0	3379	0	302	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			234			377		206				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	201	78	267	88	0	377	0	580	431	370	753	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	201	78	267	88	0	377	0	1011	0	370	753	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		14.0	43.0	
Total Split (%)	30.0%	30.0%	30.0%	22.2%		22.2%		32.2%		15.6%	47.8%	
Maximum Green (s)	19.0	19.0	19.0	12.0		12.0		22.0		11.0	36.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	19.2	19.2	19.2	15.0		15.0		25.0		43.7	43.7	
Actuated g/C Ratio	0.21	0.21	0.21	0.17		0.17		0.28		0.49	0.49	
v/c Ratio	0.54	0.19	0.51	0.55		0.65		0.93		0.94	0.43	
Control Delay	36.4	28.8	9.5	33.6		13.2		41.0		55.3	16.2	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	36.4	28.8	9.5	33.6		13.2		41.0		55.3	16.2	
LOS	D	C	A	C		B		D		E	B	
Approach Delay		22.1			17.1			41.0			29.1	
Approach LOS		C			B			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 78 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 29.9		Intersection LOS: C	
Intersection Capacity Utilization 70.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	201	78	267	88	377	1011	370	753
v/c Ratio	0.54	0.19	0.51	0.55	0.65	0.93	0.94	0.43
Control Delay	36.4	28.8	9.5	33.6	13.2	41.0	55.3	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	28.8	9.5	33.6	13.2	41.0	55.3	16.2
Queue Length 50th (m)	32.6	11.7	4.8	8.1	39.1	77.2	~40.3	36.9
Queue Length 95th (m)	50.5	22.1	22.9	m15.3	62.2	#113.0	m#104.4	m65.5
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	445	485	582	169	593	1087	392	1753
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.16	0.46	0.52	0.64	0.93	0.94	0.43

Intersection Summary

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

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	177	69	235	77	0	332	0	510	379	326	663	0
Future Volume (vph)	177	69	235	77	0	332	0	510	379	326	663	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3379		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.27		1.00		1.00		0.16	1.00	
Satd. Flow (perm)	1745	1900	1597	950		1597		3379		303	3610	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	201	78	267	88	0	377	0	580	431	370	753	0
RTOR Reduction (vph)	0	0	184	0	0	314	0	149	0	0	0	0
Lane Group Flow (vph)	201	78	83	88	0	63	0	862	0	370	753	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	15.2	15.2	15.2	11.0		11.0		22.1		40.8	40.8	
Effective Green, g (s)	19.2	19.2	19.2	15.0		15.0		25.1		39.8	43.8	
Actuated g/C Ratio	0.21	0.21	0.21	0.17		0.17		0.28		0.44	0.49	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	372	405	340	158		266		942		379	1756	
v/s Ratio Prot		0.04						0.26		c0.16	0.21	
v/s Ratio Perm	c0.12		0.05	c0.09		0.04				c0.27		
v/c Ratio	0.54	0.19	0.24	0.56		0.24		0.92		0.98	0.43	
Uniform Delay, d1	31.5	29.0	29.4	34.4		32.5		31.4		23.9	15.0	
Progression Factor	1.00	1.00	1.00	0.60		1.99		1.00		1.05	0.96	
Incremental Delay, d2	1.6	0.2	0.4	4.0		0.4		14.9		36.1	0.7	
Delay (s)	33.1	29.3	29.8	24.6		65.2		46.3		61.2	15.1	
Level of Service	C	C	C	C		E		D		E	B	
Approach Delay (s)		30.9			57.6			46.3			30.3	
Approach LOS		C			E			D			C	

Intersection Summary					
HCM 2000 Control Delay	39.6	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.80				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C		
Analysis Period (min)	15				

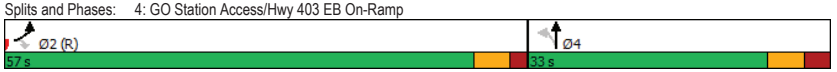
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	600	15	231	31	0	0
Future Volume (vph)	600	15	231	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.958		
Satd. Flow (prot)	1745	1597	0	1820	0	0
Flt Permitted	0.950			0.958		
Satd. Flow (perm)	1745	1597	0	1820	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		19				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	769	19	296	40	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	769	19	0	336	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	57.0	57.0	33.0	33.0		
Total Split (%)	63.3%	63.3%	36.7%	36.7%		
Maximum Green (s)	51.0	51.0	26.0	26.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	57.9	57.9		24.1		
Actuated g/C Ratio	0.64	0.64		0.27		
v/c Ratio	0.69	0.02		0.69		
Control Delay	4.7	0.5		36.8		
Queue Delay	0.0	0.0		0.0		
Total Delay	4.7	0.5		36.8		
LOS	A	A		D		
Approach Delay	4.6			36.8		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 14.2		Intersection LOS: B	
Intersection Capacity Utilization 54.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	769	19	336
v/c Ratio	0.69	0.02	0.69
Control Delay	4.7	0.5	36.8
Queue Delay	0.0	0.0	0.0
Total Delay	4.7	0.5	36.8
Queue Length 50th (m)	18.4	0.2	54.3
Queue Length 95th (m)	m20.1	m0.1	64.9
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1121	1033	586
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.69	0.02	0.57

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	600	15	231	31	0	0
Future Volume (vph)	600	15	231	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.96		
Satd. Flow (prot)	1745	1597		1820		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1745	1597		1820		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	769	19	296	40	0	0
RTOR Reduction (vph)	0	7	0	0	0	0
Lane Group Flow (vph)	769	12	0	336	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	55.9	55.9		21.1		
Effective Green, g (s)	57.9	57.9		24.1		
Actuated g/C Ratio	0.64	0.64		0.27		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1122	1027		487		
v/s Ratio Prot	c0.44					
v/s Ratio Perm		0.01		0.18		
v/c Ratio	0.69	0.01		0.69		
Uniform Delay, d1	10.2	5.8		29.6		
Progression Factor	0.26	0.15		1.00		
Incremental Delay, d2	1.6	0.0		4.1		
Delay (s)	4.2	0.9		33.7		
Level of Service	A	A		C		
Approach Delay (s)	4.2			33.7	0.0	
Approach LOS	A			C	A	

Intersection Summary				
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	54.3%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	22	318	1034	0	0	22
Future Volume (vph)	22	318	1034	0	0	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected		0.997				
Satd. Flow (prot)	0	1857	1863	0	1611	0
Flt Permitted		0.997				
Satd. Flow (perm)	0	1857	1863	0	1611	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		228.3	
Travel Time (s)		56.6	12.1		16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	346	1124	0	0	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	370	1124	0	24	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	318	1034	0	0	22
Future Volume (Veh/h)	22	318	1034	0	0	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	346	1124	0	0	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1124				1518	1124
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1124				1518	1124
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				100	90
cM capacity (veh/h)	621				126	250

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	370	1124	24
Volume Left	24	0	0
Volume Right	0	0	24
cSH	621	1700	250
Volume to Capacity	0.04	0.66	0.10
Queue Length 95th (m)	1.0	0.0	2.5
Control Delay (s)	1.2	0.0	20.9
Lane LOS	A		C
Approach Delay (s)	1.2	0.0	20.9
Approach LOS			C

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization		64.4%	ICU Level of Service	C
Analysis Period (min)		15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	B16	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	T	L	T	TR	L	T	TR	T
Maximum Queue (m)	157.5	314.6	137.5	831.8	96.9	125.1	119.7	54.7	85.6	73.6	2.4
Average Queue (m)	138.7	284.0	107.7	409.4	63.7	65.6	48.7	17.1	53.2	38.8	0.1
95th Queue (m)	208.5	374.3	197.7	922.0	104.7	121.6	107.1	35.4	76.7	64.8	1.7
Link Distance (m)		281.2		929.4		124.2	124.2		83.3		88.5
Upstream Blk Time (%)		47		0		2	1		0	0	
Queuing Penalty (veh)		495		2		13	3		0	0	
Storage Bay Dist (m)	150.0		130.0		90.0			70.0		70.0	
Storage Blk Time (%)	1	56	0		7	2			1	0	
Queuing Penalty (veh)	6	245	2		19	9			6	0	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	7.0	36.1	44.9	61.0	95.1	89.7	57.2	50.0
Average Queue (m)	0.6	18.0	26.6	24.9	37.0	19.9	30.2	21.2
95th Queue (m)	4.2	31.2	42.0	48.0	93.8	75.9	50.7	42.3
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)					0	0		
Queuing Penalty (veh)					1	1		
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	65.5	33.2	38.1	23.1	17.2	52.9	138.1	146.8	37.4	95.6	86.5
Average Queue (m)	32.9	13.1	20.7	10.4	5.1	24.9	67.7	78.5	33.0	42.9	33.4
95th Queue (m)	54.7	25.8	34.3	19.1	14.3	42.9	117.3	136.1	43.9	84.1	61.3
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)						0			31	5	
Queuing Penalty (veh)						0			101	17	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	68.1	8.7	48.3
Average Queue (m)	29.4	0.9	40.8
95th Queue (m)	53.9	5.0	55.6
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			9
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	49.8	90.9	12.2
Average Queue (m)	8.5	4.9	4.6
95th Queue (m)	29.4	44.9	11.5
Link Distance (m)	929.4	182.3	219.0
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 920

Appendix H2

Total Traffic Operations – 5-Year Horizon



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	136	136	56	255	368	604	174	608	95
Future Volume (vph)	0	0	0	136	136	56	255	368	604	174	608	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.907			0.980	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3274	0	1745	3538	0
Flt Permitted				0.950			0.339			0.249		
Satd. Flow (perm)	0	0	0	1745	1900	1597	623	3274	0	457	3538	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						100		501			18	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	139	139	57	260	376	616	178	620	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	139	139	57	260	992	0	178	717	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.5	31.0	
Total Split (s)				28.0	28.0	28.0	39.0	65.0		27.0	53.0	
Total Split (%)				23.3%	23.3%	23.3%	32.5%	54.2%		22.5%	44.2%	
Maximum Green (s)				20.0	20.0	20.0	36.0	57.0		24.0	45.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				18.7	18.7	18.7	90.8	81.4		87.7	79.9	
Actuated g/C Ratio				0.16	0.16	0.16	0.76	0.68		0.73	0.67	
v/c Ratio				0.51	0.47	0.17	0.47	0.42		0.43	0.30	
Control Delay				52.4	50.6	2.5	4.9	2.6		7.2	9.3	
Queue Delay				0.0	0.0	0.0	0.0	0.2		0.0	0.0	
Total Delay				52.4	50.6	2.5	4.9	2.7		7.2	9.3	
LOS				D	D	A	A	A		A	A	
Approach Delay					43.2			3.2			8.9	
Approach LOS					D			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 58 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 10.6		Intersection LOS: B	
Intersection Capacity Utilization 56.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	139	139	57	260	992	178	717
v/c Ratio	0.51	0.47	0.17	0.47	0.42	0.43	0.30
Control Delay	52.4	50.6	2.5	4.9	2.6	7.2	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	52.4	50.6	2.5	4.9	2.7	7.2	9.3
Queue Length 50th (m)	32.0	31.7	0.0	8.5	0.0	9.2	34.5
Queue Length 95th (m)	50.6	50.0	2.6	7.8	47.1	18.3	56.1
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	349	380	399	811	2382	602	2360
Starvation Cap Reductn	0	0	0	0	486	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.37	0.14	0.32	0.52	0.30	0.30

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	136	136	56	255	368	604	174	608	95
Future Volume (vph)	0	0	0	136	136	56	255	368	604	174	608	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.91		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3274		1745	3537	
Flt Permitted				0.95	1.00	1.00	0.34	1.00		0.25	1.00	
Satd. Flow (perm)				1745	1900	1597	622	3274		458	3537	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	139	139	57	260	376	616	178	620	97
RTOR Reduction (vph)	0	0	0	0	0	48	0	161	0	0	6	0
Lane Group Flow (vph)	0	0	0	139	139	9	260	831	0	178	711	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				14.7	14.7	14.7	87.8	77.4		84.8	75.9	
Effective Green, g (s)				18.7	18.7	18.7	85.8	81.4		82.8	79.9	
Actuated g/C Ratio				0.16	0.16	0.16	0.71	0.68		0.69	0.67	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				271	296	248	532	2220		400	2355	
v/s Ratio Prot					0.07		c0.04	0.25		0.03	0.20	
v/s Ratio Perm				c0.08		0.01	c0.31			0.28		
v/c Ratio				0.51	0.47	0.04	0.49	0.37		0.45	0.30	
Uniform Delay, d1				46.5	46.1	43.0	6.2	8.3		7.1	8.4	
Progression Factor				1.00	1.00	1.00	0.58	0.48		1.00	1.00	
Incremental Delay, d2				1.6	1.2	0.1	0.7	0.5		0.8	0.3	
Delay (s)				48.1	47.3	43.1	4.2	4.5		7.9	8.7	
Level of Service				D	D	D	A	A		A	A	
Approach Delay (s)		0.0			46.9			4.4			8.5	
Approach LOS		A			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.48				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	56.8%	ICU Level of Service		B	
Analysis Period (min)	15				

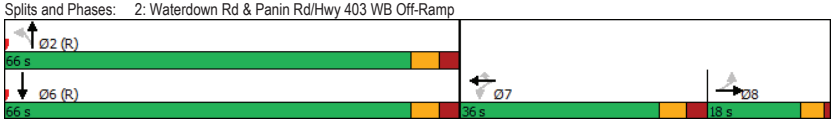
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	289	0	264	0	952	0	0	723	0
Future Volume (vph)	7	0	1	289	0	264	0	952	0	0	723	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.983				0.850						
Flt Protected		0.958		0.950	0.950							
Satd. Flow (prot)	0	1789	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.875	0.875							
Satd. Flow (perm)	0	1868	0	1527	1579	1597	0	3610	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		100				259						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	0	1	298	0	272	0	981	0	0	745	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	149	149	272	0	981	0	0	745	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	18.0	18.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	18.0	18.0		36.0	36.0	36.0	66.0	66.0			66.0	
Total Split (%)	15.0%	15.0%		30.0%	30.0%	30.0%	55.0%	55.0%			55.0%	
Maximum Green (s)	13.5	13.5		29.0	29.0	29.0	59.0	59.0			59.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		20.3	20.3	20.3		89.7			89.7	
Actuated g/C Ratio		0.05		0.17	0.17	0.17		0.75			0.75	
v/c Ratio		0.04		0.58	0.56	0.56		0.36			0.28	
Control Delay		0.4		53.9	52.8	10.5		4.3			4.8	
Queue Delay		0.0		0.0	0.0	0.0		0.0			0.2	
Total Delay		0.4		53.9	52.8	10.5		4.3			5.0	
LOS		A		D	D	B		A			A	
Approach Delay		0.4			32.9			4.3			5.0	
Approach LOS		A			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 26 (22%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 11.6		Intersection LOS: B	
Intersection Capacity Utilization 56.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	8	149	149	272	981	745
v/c Ratio	0.04	0.58	0.56	0.56	0.36	0.28
Control Delay	0.4	53.9	52.8	10.5	4.3	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2
Total Delay	0.4	53.9	52.8	10.5	4.3	5.0
Queue Length 50th (m)	0.0	36.3	36.2	2.7	14.4	19.0
Queue Length 95th (m)	0.0	55.5	55.3	25.8	m38.4	47.3
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	306	407	421	615	2697	2697
Starvation Cap Reductn	0	0	0	0	0	949
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.37	0.35	0.44	0.36	0.43

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	289	0	264	0	952	0	0	723	0
Future Volume (vph)	7	0	1	289	0	264	0	952	0	0	723	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.98		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.96		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1790		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.88	0.88	1.00		1.00			1.00	
Satd. Flow (perm)		1868		1527	1579	1597		3610			3610	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	7	0	1	298	0	272	0	981	0	0	745	0
RTOR Reduction (vph)	0	8	0	0	0	215	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	149	149	57	0	981	0	0	745	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		17.3	17.3	17.3		83.1			83.1	
Effective Green, g (s)		1.6		20.3	20.3	20.3		86.1			86.1	
Actuated g/C Ratio		0.01		0.17	0.17	0.17		0.72			0.72	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		258	267	270		2590			2590	
v/s Ratio Prot								c0.27			0.21	
v/s Ratio Perm		c0.00		c0.10	0.09	0.04						
v/c Ratio		0.00		0.58	0.56	0.21		0.38			0.29	
Uniform Delay, d1		58.4		45.9	45.7	42.9		6.6			6.0	
Progression Factor		1.00		1.00	1.00	1.00		0.65			0.79	
Incremental Delay, d2		0.1		3.1	2.5	0.4		0.2			0.3	
Delay (s)		58.5		49.0	48.3	43.3		4.5			5.0	
Level of Service		E		D	D	D		A			A	
Approach Delay (s)		58.5			46.1			4.5			5.0	
Approach LOS		E			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.41			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	56.8%	ICU Level of Service	B	
Analysis Period (min)	15			

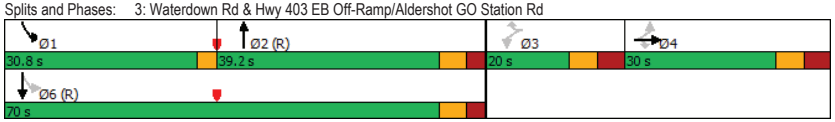
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	303	202	281	23	0	75	0	538	515	465	510	0
Future Volume (vph)	303	202	281	23	0	75	0	538	515	465	510	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.927				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3346	0	1805	3610	0
Flt Permitted	0.950			0.339						0.110		
Satd. Flow (perm)	1745	1900	1597	1208	0	1597	0	3346	0	209	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			299			136		204				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
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 (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	322	215	299	24	0	80	0	572	548	495	543	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	215	299	24	0	80	0	1120	0	495	543	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	30.0	30.0	30.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	30.0	30.0	30.0	20.0		20.0		39.2		30.8	70.0	
Total Split (%)	25.0%	25.0%	25.0%	16.7%		16.7%		32.7%		25.7%	58.3%	
Maximum Green (s)	22.0	22.0	22.0	12.0		12.0		32.2		27.8	63.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	27.4	27.4	27.4	13.4		13.4		37.8		70.4	70.4	
Actuated g/C Ratio	0.23	0.23	0.23	0.11		0.11		0.32		0.59	0.59	
v/c Ratio	0.81	0.50	0.50	0.18		0.27		0.94		0.98	0.26	
Control Delay	60.6	44.9	7.5	52.0		4.9		48.7		69.9	11.5	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	60.6	44.9	7.5	52.0		4.9		48.7		69.9	11.5	
LOS	E	D	A	D		A		D		E	B	
Approach Delay		37.6			15.8			48.7			39.3	
Approach LOS		D			B			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 41.4		Intersection LOS: D	
Intersection Capacity Utilization 87.8%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	322	215	299	24	80	1120	495	543
v/c Ratio	0.81	0.50	0.50	0.18	0.27	0.94	0.98	0.26
Control Delay	60.6	44.9	7.5	52.0	4.9	48.7	69.9	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.6	44.9	7.5	52.0	4.9	48.7	69.9	11.5
Queue Length 50th (m)	74.3	45.6	0.0	2.9	0.0	124.7	~89.1	28.6
Queue Length 95th (m)	#127.4	73.0	23.8	7.3	4.5	#175.1	#180.1	48.7
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	404	439	599	161	330	1192	503	2117
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.49	0.50	0.15	0.24	0.94	0.98	0.26

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	303	202	281	23	0	75	0	538	515	465	510	0
Future Volume (vph)	303	202	281	23	0	75	0	538	515	465	510	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.93		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3345		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.34		1.00		1.00		0.11	1.00	
Satd. Flow (perm)	1745	1900	1597	1208		1597		3345		210	3610	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	322	215	299	24	0	80	0	572	548	495	543	0
RTOR Reduction (vph)	0	0	231	0	0	72	0	142	0	0	0	0
Lane Group Flow (vph)	322	215	68	24	0	8	0	978	0	495	543	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	23.4	23.4	23.4	7.8		7.8		33.2		65.8	65.8	
Effective Green, g (s)	27.4	27.4	27.4	11.8		11.8		36.2		64.8	68.8	
Actuated g/C Ratio	0.23	0.23	0.23	0.10		0.10		0.30		0.54	0.57	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	398	433	364	118		157		1009		493	2069	
v/s Ratio Prot		0.11						c0.29		c0.24	0.15	
v/s Ratio Perm	c0.18		0.04	c0.02		0.00				0.30		
v/c Ratio	0.81	0.50	0.19	0.20		0.05		0.97		1.00	0.26	
Uniform Delay, d1	43.8	40.3	37.3	49.8		49.0		41.3		36.5	12.9	
Progression Factor	1.00	1.00	1.00	1.02		3.47		1.00		1.00	0.85	
Incremental Delay, d2	11.5	0.9	0.3	0.9		0.1		21.7		40.9	0.3	
Delay (s)	55.3	41.2	37.6	51.8		170.0		63.1		77.2	11.2	
Level of Service	E	D	D	D		F		E		E	B	
Approach Delay (s)		45.3			142.8			63.1			42.7	
Approach LOS		D			F			E			D	

Intersection Summary				
HCM 2000 Control Delay	54.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	87.8%	ICU Level of Service	E	
Analysis Period (min)	15			

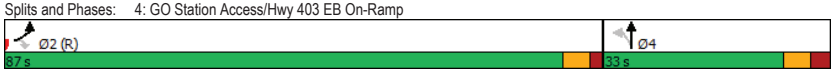
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	811	204	12	31	0	0
Future Volume (vph)	811	204	12	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.986		
Satd. Flow (prot)	1745	1597	0	1873	0	0
Flt Permitted	0.950			0.986		
Satd. Flow (perm)	1745	1597	0	1873	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		215				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	854	215	13	33	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	854	215	0	46	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	87.0	87.0	33.0	33.0		
Total Split (%)	72.5%	72.5%	27.5%	27.5%		
Maximum Green (s)	81.0	81.0	26.0	26.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	103.7	103.7		12.1		
Actuated g/C Ratio	0.86	0.86		0.10		
v/c Ratio	0.57	0.15		0.24		
Control Delay	0.8	0.1		52.7		
Queue Delay	0.0	0.0		0.0		
Total Delay	0.8	0.1		52.7		
LOS	A	A		D		
Approach Delay	0.7			52.7		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 106 (88%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 2.8		Intersection LOS: A	
Intersection Capacity Utilization 58.3%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	854	215	46
v/c Ratio	0.57	0.15	0.24
Control Delay	0.8	0.1	52.7
Queue Delay	0.0	0.0	0.0
Total Delay	0.8	0.1	52.7
Queue Length 50th (m)	2.1	0.0	10.8
Queue Length 95th (m)	m2.7	m0.0	22.4
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1508	1409	452
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.57	0.15	0.10

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	811	204	12	31	0	0
Future Volume (vph)	811	204	12	31	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.99		
Satd. Flow (prot)	1745	1597		1874		
Flt Permitted	0.95	1.00		0.99		
Satd. Flow (perm)	1745	1597		1874		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	854	215	13	33	0	0
RTOR Reduction (vph)	0	33	0	0	0	0
Lane Group Flow (vph)	854	182	0	46	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	99.5	99.5		7.5		
Effective Green, g (s)	101.5	101.5		10.5		
Actuated g/C Ratio	0.85	0.85		0.09		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1475	1350		163		
v/s Ratio Prot	c0.49					
v/s Ratio Perm		0.11		0.02		
v/c Ratio	0.58	0.13		0.28		
Uniform Delay, d1	2.8	1.6		51.2		
Progression Factor	0.04	0.00		1.00		
Incremental Delay, d2	0.8	0.1		1.0		
Delay (s)	0.9	0.1		52.2		
Level of Service	A	A		D		
Approach Delay (s)	0.7			52.2	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	2.8	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	58.3%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	34	744	294	0	0	34
Future Volume (vph)	34	744	294	0	0	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected		0.998				
Satd. Flow (prot)	0	1859	1863	0	1611	0
Flt Permitted		0.998				
Satd. Flow (perm)	0	1859	1863	0	1611	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		286.2	
Travel Time (s)		56.6	12.1		20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	809	320	0	0	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	846	320	0	37	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	744	294	0	0	34
Future Volume (Veh/h)	34	744	294	0	0	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	809	320	0	0	37
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	320				1203	320
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	320				1203	320
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	95
cM capacity (veh/h)	1240				198	721

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	846	320	37
Volume Left	37	0	0
Volume Right	0	0	37
cSH	1240	1700	721
Volume to Capacity	0.03	0.19	0.05
Queue Length 95th (m)	0.7	0.0	1.3
Control Delay (s)	0.8	0.0	10.3
Lane LOS	A		B
Approach Delay (s)	0.8	0.0	10.3
Approach LOS			B

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		69.8%	ICU Level of Service	C
Analysis Period (min)		15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	TR	L	T	TR
Maximum Queue (m)	54.2	54.8	16.3	52.0	53.1	71.6	51.7	78.2	67.7
Average Queue (m)	28.1	26.3	6.9	21.5	20.6	22.5	21.7	40.3	21.4
95th Queue (m)	51.0	47.3	13.7	40.2	43.3	48.2	39.8	67.3	51.3
Link Distance (m)		281.2			124.2	124.2		83.3	
Upstream Blk Time (%)								0	
Queuing Penalty (veh)								0	
Storage Bay Dist (m)	150.0		130.0	90.0			70.0		70.0
Storage Blk Time (%)								0	0
Queuing Penalty (veh)								2	0

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	12.6	52.4	55.6	50.6	48.1	47.3	59.4	47.1
Average Queue (m)	2.7	29.6	29.0	24.0	15.5	17.2	30.4	10.4
95th Queue (m)	9.7	49.3	49.9	42.5	37.0	38.6	52.3	31.8
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	103.7	94.2	52.1	20.4	12.7	27.5	401.2	401.3	37.4	139.1	121.8
Average Queue (m)	63.5	40.5	24.8	6.2	0.8	10.9	354.5	367.6	36.1	71.7	45.1
95th Queue (m)	100.7	73.9	42.9	16.6	6.0	20.1	483.4	468.8	42.1	128.8	102.7
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)							43	58		0	
Queuing Penalty (veh)							0	0		1	
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)	1								45	0	
Queuing Penalty (veh)	1								115	2	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	72.2	16.8	31.2
Average Queue (m)	25.4	4.4	12.5
95th Queue (m)	61.1	12.8	25.4
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	23.6	15.5
Average Queue (m)	3.1	6.2
95th Queue (m)	14.1	13.4
Link Distance (m)	929.3	277.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

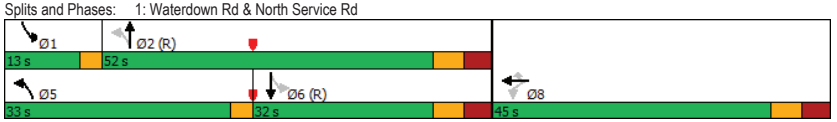
Network wide Queuing Penalty: 121

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	334	680	145	492	656	264	108	506	93
Future Volume (vph)	0	0	0	334	680	145	492	656	264	108	506	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.957			0.977	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3455	0	1745	3527	0
Flt Permitted				0.950			0.148			0.280		
Satd. Flow (perm)	0	0	0	1745	1900	1597	272	3455	0	514	3527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						159		70			18	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	367	747	159	541	721	290	119	556	102
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	367	747	159	541	1011	0	119	658	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.0	31.0	
Total Split (s)				45.0	45.0	45.0	33.0	52.0		13.0	32.0	
Total Split (%)				40.9%	40.9%	40.9%	30.0%	47.3%		11.8%	29.1%	
Maximum Green (s)				37.0	37.0	37.0	30.0	44.0		10.0	24.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				41.0	41.0	41.0	61.0	49.2		35.8	28.0	
Actuated g/C Ratio				0.37	0.37	0.37	0.55	0.45		0.33	0.25	
v/c Ratio				0.56	1.06	0.23	1.00	0.64		0.47	0.72	
Control Delay				31.6	83.8	4.5	66.7	9.6		21.9	41.7	
Queue Delay				0.0	0.0	0.0	0.0	0.3		0.0	0.0	
Total Delay				31.6	83.8	4.5	66.7	10.0		21.9	41.7	
LOS				C	F	A	E	A		C	D	
Approach Delay					58.8			29.7			38.6	
Approach LOS					E			C			D	

Intersection Summary		
Area Type:	Other	
Cycle Length: 110		
Actuated Cycle Length: 110		
Offset: 55 (50%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 110		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 1.06		
Intersection Signal Delay: 41.9	Intersection LOS: D	
Intersection Capacity Utilization 90.0%	ICU Level of Service E	
Analysis Period (min) 15		

Splits and Phases: 1: Waterdown Rd & North Service Rd





Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	367	747	159	541	1011	119	658
v/c Ratio	0.56	1.06	0.23	1.00	0.64	0.47	0.72
Control Delay	31.6	83.8	4.5	66.7	9.6	21.9	41.7
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	31.6	83.8	4.5	66.7	10.0	21.9	41.7
Queue Length 50th (m)	65.0	~185.2	0.0	~57.4	20.2	12.2	69.7
Queue Length 95th (m)	96.0	#259.2	13.5	#170.9	34.2	21.6	91.0
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	650	708	694	539	1584	273	911
Starvation Cap Reductn	0	0	0	0	169	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	1.06	0.23	1.00	0.71	0.44	0.72

Intersection Summary

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	334	680	145	492	656	264	108	506	93
Future Volume (vph)	0	0	0	334	680	145	492	656	264	108	506	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3455		1745	3526	
Flt Permitted				0.95	1.00	1.00	0.15	1.00		0.28	1.00	
Satd. Flow (perm)				1745	1900	1597	272	3455		513	3526	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	367	747	159	541	721	290	119	556	102
RTOR Reduction (vph)	0	0	0	0	0	100	0	39	0	0	13	0
Lane Group Flow (vph)	0	0	0	367	747	59	541	972	0	119	645	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				37.0	37.0	37.0	57.0	45.2		32.8	24.0	
Effective Green, g (s)				41.0	41.0	41.0	56.0	49.2		30.8	28.0	
Actuated g/C Ratio				0.37	0.37	0.37	0.51	0.45		0.28	0.25	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				650	708	595	526	1545		231	897	
v/s Ratio Prot					c0.39		c0.27	0.28		0.04	0.18	
v/s Ratio Perm				0.21		0.04	c0.25			0.11		
v/c Ratio				0.56	1.06	0.10	1.03	0.63		0.52	0.72	
Uniform Delay, d1				27.4	34.5	22.5	31.3	23.4		30.6	37.4	
Progression Factor				1.00	1.00	1.00	1.07	0.36		1.00	1.00	
Incremental Delay, d2				1.1	49.3	0.1	42.3	1.5		1.9	4.9	
Delay (s)				28.5	83.8	22.5	75.7	10.1		32.5	42.3	
Level of Service				C	F	C	E	B		C	D	
Approach Delay (s)		0.0			60.2			32.9			40.8	
Approach LOS		A			E			C			D	

Intersection Summary				
HCM 2000 Control Delay	44.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.01			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	90.0%	ICU Level of Service	E	
Analysis Period (min)	15			

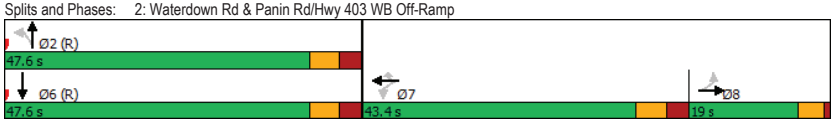
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	278	0	263	3	1138	0	0	838	0
Future Volume (vph)	1	0	3	278	0	263	3	1138	0	0	838	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.899				0.850						
Flt Protected		0.988		0.950	0.950							
Satd. Flow (prot)	0	1688	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.251	0.251			0.953				
Satd. Flow (perm)	0	1708	0	438	453	1597	0	3440	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109				292						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	0	3	309	0	292	3	1264	0	0	931	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	4	0	154	155	292	0	1267	0	0	931	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	19.0	19.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	19.0	19.0		43.4	43.4	43.4	47.6	47.6			47.6	
Total Split (%)	17.3%	17.3%		39.5%	39.5%	39.5%	43.3%	43.3%			43.3%	
Maximum Green (s)	14.5	14.5		36.4	36.4	36.4	40.6	40.6			40.6	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		39.4	39.4	39.4		60.6			60.6	
Actuated g/C Ratio		0.05		0.36	0.36	0.36		0.55			0.55	
v/c Ratio		0.02		0.99	0.96	0.38		0.67			0.47	
Control Delay		0.2		106.5	97.4	4.4		13.8			18.3	
Queue Delay		0.0		0.0	0.0	0.1		0.1			0.3	
Total Delay		0.2		106.5	97.4	4.5		13.9			18.6	
LOS		A		F	F	A		B			B	
Approach Delay		0.3			54.6			13.9			18.6	
Approach LOS		A			D			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 40 (36%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay: 24.2		Intersection LOS: C	
Intersection Capacity Utilization 62.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	4	154	155	292	1267	931
v/c Ratio	0.02	0.99	0.96	0.38	0.67	0.47
Control Delay	0.2	106.5	97.4	4.4	13.8	18.3
Queue Delay	0.0	0.0	0.0	0.1	0.1	0.3
Total Delay	0.2	106.5	97.4	4.5	13.9	18.6
Queue Length 50th (m)	0.0	35.8	35.5	0.0	101.0	55.7
Queue Length 95th (m)	0.0	#82.1	#81.2	18.0	m139.5	83.1
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	327	156	162	759	1894	1988
Starvation Cap Reductn	0	0	0	0	0	480
Spillback Cap Reductn	0	0	0	34	58	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.99	0.96	0.40	0.69	0.62

Intersection Summary

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	278	0	263	3	1138	0	0	838	0
Future Volume (vph)	1	0	3	278	0	263	3	1138	0	0	838	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.90		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.99		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1687		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.25	0.25	1.00		0.95			1.00	
Satd. Flow (perm)		1708		438	453	1597		3441			3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1	0	3	309	0	292	3	1264	0	0	931	0
RTOR Reduction (vph)	0	4	0	0	0	187	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	154	155	105	0	1267	0	0	931	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		36.4	36.4	36.4		54.0			54.0	
Effective Green, g (s)		1.6		39.4	39.4	39.4		57.0			57.0	
Actuated g/C Ratio		0.01		0.36	0.36	0.36		0.52			0.52	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		156	162	572		1783			1870	
v/s Ratio Prot											0.26	
v/s Ratio Perm		c0.00		c0.35	0.34	0.07		c0.37				
v/c Ratio		0.00		0.99	0.96	0.18		0.71			0.50	
Uniform Delay, d1		53.4		35.0	34.5	24.2		20.2			17.2	
Progression Factor		1.00		1.00	1.00	1.00		0.68			1.13	
Incremental Delay, d2		0.0		67.6	57.3	0.2		1.4			0.7	
Delay (s)		53.5		102.7	91.8	24.4		15.3			20.1	
Level of Service		D		F	F	C		B			C	
Approach Delay (s)		53.5			61.8			15.3			20.1	
Approach LOS		D			E			B			C	

Intersection Summary					
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0		
Intersection Capacity Utilization	62.0%	ICU Level of Service	B		
Analysis Period (min)	15				

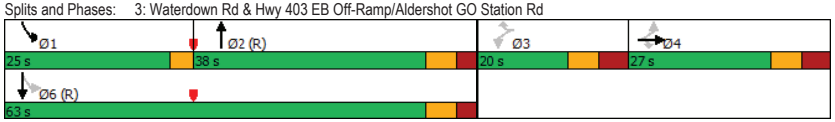
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	77	260	86	0	365	0	563	419	357	730	0
Future Volume (vph)	193	77	260	86	0	365	0	563	419	357	730	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.936				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3379	0	1805	3610	0
Flt Permitted	0.950			0.256						0.111		
Satd. Flow (perm)	1745	1900	1597	912	0	1597	0	3379	0	211	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			200			415		176				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	219	88	295	98	0	415	0	640	476	406	830	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	219	88	295	98	0	415	0	1116	0	406	830	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	27.0	27.0	27.0	20.0		20.0		38.0		25.0	63.0	
Total Split (%)	24.5%	24.5%	24.5%	18.2%		18.2%		34.5%		22.7%	57.3%	
Maximum Green (s)	19.0	19.0	19.0	12.0		12.0		31.0		22.0	56.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	21.1	21.1	21.1	15.6		15.6		36.2		61.3	61.3	
Actuated g/C Ratio	0.19	0.19	0.19	0.14		0.14		0.33		0.56	0.56	
v/c Ratio	0.66	0.24	0.63	0.76		0.71		0.91		0.96	0.41	
Control Delay	50.8	38.7	19.8	72.2		24.1		42.2		54.7	16.2	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	50.8	38.7	19.8	72.2		24.1		42.2		54.7	16.2	
LOS	D	D	B	E		C		D		D	B	
Approach Delay		33.9			33.3			42.2			28.8	
Approach LOS		C			C			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 101 (92%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 34.6		Intersection LOS: C	
Intersection Capacity Utilization 75.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	219	88	295	98	415	1116	406	830
v/c Ratio	0.66	0.24	0.63	0.76	0.71	0.91	0.96	0.41
Control Delay	50.8	38.7	19.8	72.2	24.1	42.2	54.7	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	38.7	19.8	72.2	24.1	42.2	54.7	16.2
Queue Length 50th (m)	45.1	16.7	18.2	11.9	49.5	113.1	49.4	41.6
Queue Length 95th (m)	69.2	30.4	45.1	m#20.9	73.8	#152.2	m#115.3	m74.0
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	364	397	492	132	586	1229	430	2012
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.22	0.60	0.74	0.71	0.91	0.94	0.41

Intersection Summary

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	77	260	86	0	365	0	563	419	357	730	0
Future Volume (vph)	193	77	260	86	0	365	0	563	419	357	730	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3379		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.26		1.00		1.00		0.11	1.00	
Satd. Flow (perm)	1745	1900	1597	914		1597		3379		211	3610	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	219	88	295	98	0	415	0	640	476	406	830	0
RTOR Reduction (vph)	0	0	162	0	0	356	0	118	0	0	0	0
Lane Group Flow (vph)	219	88	133	98	0	59	0	998	0	406	830	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	17.1	17.1	17.1	11.6		11.6		33.1		58.3	58.3	
Effective Green, g (s)	21.1	21.1	21.1	15.6		15.6		36.1		57.3	61.3	
Actuated g/C Ratio	0.19	0.19	0.19	0.14		0.14		0.33		0.52	0.56	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	334	364	306	129		226		1108		417	2011	
v/s Ratio Prot		0.05						0.30		c0.19	0.23	
v/s Ratio Perm	c0.13		0.08	c0.11		0.04				c0.32		
v/c Ratio	0.66	0.24	0.44	0.76		0.26		0.90		0.97	0.41	
Uniform Delay, d1	41.1	37.7	39.2	45.4		42.1		35.2		33.0	14.0	
Progression Factor	1.00	1.00	1.00	0.86		3.83		1.00		0.77	1.08	
Incremental Delay, d2	4.6	0.3	1.0	20.6		0.6		11.7		32.7	0.5	
Delay (s)	45.7	38.0	40.2	59.6		161.8		46.9		58.3	15.6	
Level of Service	D	D	D	E		F		D		E	B	
Approach Delay (s)		41.9			142.3			46.9			29.6	
Approach LOS		D			F			D			C	

Intersection Summary				
HCM 2000 Control Delay	54.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	75.4%	ICU Level of Service	D	
Analysis Period (min)	15			

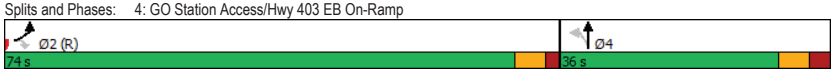
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	660	17	254	34	0	0
Future Volume (vph)	660	17	254	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.958		
Satd. Flow (prot)	1745	1597	0	1820	0	0
Flt Permitted	0.950			0.958		
Satd. Flow (perm)	1745	1597	0	1820	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		22				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	846	22	326	44	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	846	22	0	370	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	74.0	74.0	36.0	36.0		
Total Split (%)	67.3%	67.3%	32.7%	32.7%		
Maximum Green (s)	68.0	68.0	29.0	29.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	73.3	73.3		28.7		
Actuated g/C Ratio	0.67	0.67		0.26		
v/c Ratio	0.73	0.02		0.78		
Control Delay	4.3	0.5		49.6		
Queue Delay	0.0	0.0		0.0		
Total Delay	4.3	0.5		49.6		
LOS	A	A		D		
Approach Delay	4.2			49.6		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 101 (92%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 17.7		Intersection LOS: B	
Intersection Capacity Utilization 59.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp

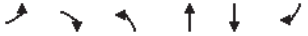




Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	846	22	370
v/c Ratio	0.73	0.02	0.78
Control Delay	4.3	0.5	49.6
Queue Delay	0.0	0.0	0.0
Total Delay	4.3	0.5	49.6
Queue Length 50th (m)	23.6	0.2	76.1
Queue Length 95th (m)	24.7	m0.2	90.2
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1163	1071	529
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.73	0.02	0.70

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	660	17	254	34	0	0
Future Volume (vph)	660	17	254	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.96		
Satd. Flow (prot)	1745	1597		1820		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1745	1597		1820		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	846	22	326	44	0	0
RTOR Reduction (vph)	0	7	0	0	0	0
Lane Group Flow (vph)	846	15	0	370	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	71.3	71.3		25.7		
Effective Green, g (s)	73.3	73.3		28.7		
Actuated g/C Ratio	0.67	0.67		0.26		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1162	1064		474		
v/s Ratio Prot	c0.48					
v/s Ratio Perm		0.01		0.20		
v/c Ratio	0.73	0.01		0.78		
Uniform Delay, d1	11.9	6.2		37.7		
Progression Factor	0.17	0.17		1.00		
Incremental Delay, d2	2.0	0.0		8.1		
Delay (s)	4.0	1.1		45.9		
Level of Service	A	A		D		
Approach Delay (s)	3.9			45.9	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	59.1%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	22	350	1137	0	0	22
Future Volume (vph)	22	350	1137	0	0	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected		0.997				
Satd. Flow (prot)	0	1857	1863	0	1611	0
Flt Permitted		0.997				
Satd. Flow (perm)	0	1857	1863	0	1611	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		228.3	
Travel Time (s)		56.6	12.1		16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	380	1236	0	0	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	404	1236	0	24	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	350	1137	0	0	22
Future Volume (Veh/h)	22	350	1137	0	0	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	380	1236	0	0	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1236				1664	1236
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1236				1664	1236
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				100	89
cM capacity (veh/h)	564				102	215

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	404	1236	24
Volume Left	24	0	0
Volume Right	0	0	24
cSH	564	1700	215
Volume to Capacity	0.04	0.73	0.11
Queue Length 95th (m)	1.1	0.0	3.0
Control Delay (s)	1.3	0.0	23.9
Lane LOS	A		C
Approach Delay (s)	1.3	0.0	23.9
Approach LOS			C

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization		69.8%	ICU Level of Service	C
Analysis Period (min)		15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	B16	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	T	L	T	TR	L	T	TR	T
Maximum Queue (m)	157.5	314.3	137.5	886.1	97.4	133.1	129.9	77.4	104.7	77.5	36.5
Average Queue (m)	132.3	287.9	92.2	549.4	77.2	89.2	69.2	35.1	75.5	57.9	4.4
95th Queue (m)	203.2	367.7	191.8	1127.2	115.6	148.3	133.4	79.6	108.4	84.6	22.4
Link Distance (m)		281.2		929.4		124.2	124.2		83.3		88.5
Upstream Blk Time (%)		42		1		4	1	0	7	0	
Queuing Penalty (veh)		482		9		30	8	0	0	0	
Storage Bay Dist (m)	150.0		130.0		90.0			70.0		70.0	
Storage Blk Time (%)	0	49	0		13	4		0	12	1	
Queuing Penalty (veh)	2	236	1		43	18		0	56	5	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	7.0	49.1	55.0	70.9	144.9	141.4	66.3	61.0
Average Queue (m)	0.8	24.6	32.5	30.6	60.4	39.1	36.9	29.8
95th Queue (m)	4.8	44.4	51.3	58.3	141.0	114.4	62.1	56.5
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)					0	0		
Queuing Penalty (veh)					2	1		
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	74.6	37.2	49.9	26.3	93.0	67.3	143.0	160.7	37.4	127.0	117.0
Average Queue (m)	40.7	16.7	24.6	13.2	20.2	46.4	76.0	87.0	35.0	56.7	37.8
95th Queue (m)	66.7	31.0	42.7	22.9	66.2	73.0	129.9	153.8	42.3	121.6	85.8
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)										0	0
Queuing Penalty (veh)										1	0
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)						5			42	7	
Queuing Penalty (veh)						2			152	24	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	77.0	9.9	48.3
Average Queue (m)	36.7	1.1	43.6
95th Queue (m)	67.8	5.9	56.4
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			20
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	EB	WB	B5	SB
Directions Served	LT	TR	T	LR
Maximum Queue (m)	63.2	138.5	57.9	12.3
Average Queue (m)	12.0	54.5	20.4	5.4
95th Queue (m)	42.2	197.7	87.8	14.4
Link Distance (m)	929.4	182.3	95.3	219.0
Upstream Blk Time (%)		18	17	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 20: Bend

Movement	NW
Directions Served	T
Maximum Queue (m)	56.6
Average Queue (m)	1.9
95th Queue (m)	23.7
Link Distance (m)	83.3
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1071

Appendix H3

Total Traffic Operations – 10-Year Horizon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	147	147	61	282	405	662	191	669	103
Future Volume (vph)	0	0	0	147	147	61	282	405	662	191	669	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.907			0.980	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3274	0	1745	3538	0
Flt Permitted				0.950			0.304			0.215		
Satd. Flow (perm)	0	0	0	1745	1900	1597	558	3274	0	395	3538	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						100		503			17	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	150	150	62	288	413	676	195	683	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	150	150	62	288	1089	0	195	788	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.5	31.0	
Total Split (s)				28.0	28.0	28.0	39.0	65.0		27.0	53.0	
Total Split (%)				23.3%	23.3%	23.3%	32.5%	54.2%		22.5%	44.2%	
Maximum Green (s)				20.0	20.0	20.0	36.0	57.0		24.0	45.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				19.3	19.3	19.3	90.4	79.5		87.0	77.8	
Actuated g/C Ratio				0.16	0.16	0.16	0.75	0.66		0.72	0.65	
v/c Ratio				0.54	0.49	0.18	0.55	0.47		0.50	0.34	
Control Delay				52.7	50.8	3.3	7.1	3.4		8.9	10.8	
Queue Delay				0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay				52.7	50.8	3.3	7.1	3.5		8.9	10.8	
LOS				D	D	A	A	A		A	B	
Approach Delay					43.5			4.3			10.4	
Approach LOS					D			A			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 56 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 11.7		Intersection LOS: B	
Intersection Capacity Utilization 61.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	150	150	62	288	1089	195	788
v/c Ratio	0.54	0.49	0.18	0.55	0.47	0.50	0.34
Control Delay	52.7	50.8	3.3	7.1	3.4	8.9	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	52.7	50.8	3.3	7.1	3.5	8.9	10.8
Queue Length 50th (m)	34.4	34.2	0.0	5.4	0.0	10.6	41.0
Queue Length 95th (m)	54.1	53.4	4.1	17.8	57.0	20.0	69.6
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	349	380	399	777	2339	563	2300
Starvation Cap Reductn	0	0	0	0	387	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.39	0.16	0.37	0.56	0.35	0.34

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	147	147	61	282	405	662	191	669	103
Future Volume (vph)	0	0	0	147	147	61	282	405	662	191	669	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.91		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3274		1745	3538	
Flt Permitted				0.95	1.00	1.00	0.30	1.00		0.21	1.00	
Satd. Flow (perm)				1745	1900	1597	559	3274		394	3538	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	150	150	62	288	413	676	195	683	105
RTOR Reduction (vph)	0	0	0	0	0	52	0	170	0	0	6	0
Lane Group Flow (vph)	0	0	0	150	150	10	288	919	0	195	782	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				15.3	15.3	15.3	87.4	75.5		84.0	73.8	
Effective Green, g (s)				19.3	19.3	19.3	85.4	79.5		82.0	77.8	
Actuated g/C Ratio				0.16	0.16	0.16	0.71	0.66		0.68	0.65	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				280	305	256	505	2169		372	2293	
v/s Ratio Prot					0.08		c0.05	0.28		0.04	0.22	
v/s Ratio Perm				c0.09		0.01	c0.35			0.32		
v/c Ratio				0.54	0.49	0.04	0.57	0.42		0.52	0.34	
Uniform Delay, d1				46.2	45.9	42.5	6.8	9.5		8.0	9.5	
Progression Factor				1.00	1.00	1.00	0.80	0.51		1.00	1.00	
Incremental Delay, d2				2.0	1.2	0.1	1.4	0.6		1.3	0.4	
Delay (s)				48.2	47.1	42.6	6.8	5.4		9.3	9.9	
Level of Service				D	D	D	A	A		A	A	
Approach Delay (s)		0.0			46.8			5.7			9.8	
Approach LOS		A			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	61.2%	ICU Level of Service	B	
Analysis Period (min)	15			

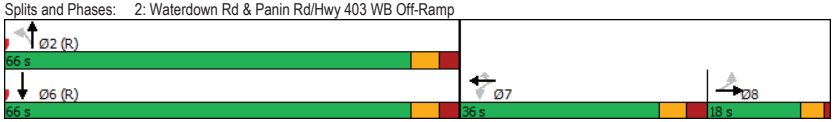
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	321	0	290	0	1048	0	0	795	0
Future Volume (vph)	7	0	1	321	0	290	0	1048	0	0	795	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.983				0.850						
Flt Protected		0.958		0.950	0.950							
Satd. Flow (prot)	0	1789	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.875	0.875							
Satd. Flow (perm)	0	1868	0	1527	1579	1597	0	3610	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		100				243						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	0	1	331	0	299	0	1080	0	0	820	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	165	166	299	0	1080	0	0	820	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	18.0	18.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	18.0	18.0		36.0	36.0	36.0	66.0	66.0			66.0	
Total Split (%)	15.0%	15.0%		30.0%	30.0%	30.0%	55.0%	55.0%			55.0%	
Maximum Green (s)	13.5	13.5		29.0	29.0	29.0	59.0	59.0			59.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		21.7	21.7	21.7		88.3			88.3	
Actuated g/C Ratio		0.05		0.18	0.18	0.18		0.74			0.74	
v/c Ratio		0.04		0.60	0.58	0.61		0.41			0.31	
Control Delay		0.4		53.2	52.2	14.9		5.5			5.4	
Queue Delay		0.0		0.0	0.0	0.0		0.3			0.1	
Total Delay		0.4		53.2	52.2	14.9		5.7			5.5	
LOS		A		D	D	B		A			A	
Approach Delay		0.4			34.8			5.7			5.5	
Approach LOS		A			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 25 (21%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 12.9		Intersection LOS: B	
Intersection Capacity Utilization 61.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	8	165	166	299	1080	820
v/c Ratio	0.04	0.60	0.58	0.61	0.41	0.31
Control Delay	0.4	53.2	52.2	14.9	5.5	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.1
Total Delay	0.4	53.2	52.2	14.9	5.7	5.5
Queue Length 50th (m)	0.0	40.1	40.2	12.0	22.6	22.5
Queue Length 95th (m)	0.0	59.7	59.5	37.6	m49.8	51.1
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	306	407	421	604	2655	2655
Starvation Cap Reductn	0	0	0	0	781	823
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.41	0.39	0.50	0.58	0.45

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	321	0	290	0	1048	0	0	795	0
Future Volume (vph)	7	0	1	321	0	290	0	1048	0	0	795	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.98		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.96		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1790		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.88	0.88	1.00		1.00			1.00	
Satd. Flow (perm)		1868		1527	1579	1597		3610			3610	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	7	0	1	331	0	299	0	1080	0	0	820	0
RTOR Reduction (vph)	0	8	0	0	0	199	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	165	166	100	0	1080	0	0	820	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		18.7	18.7	18.7		81.7			81.7	
Effective Green, g (s)		1.6		21.7	21.7	21.7		84.7			84.7	
Actuated g/C Ratio		0.01		0.18	0.18	0.18		0.71			0.71	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		276	285	288		2548			2548	
v/s Ratio Prot								c0.30			0.23	
v/s Ratio Perm		c0.00		c0.11	0.11	0.06						
v/c Ratio		0.00		0.60	0.58	0.35		0.42			0.32	
Uniform Delay, d1		58.4		45.1	45.0	43.0		7.4			6.7	
Progression Factor		1.00		1.00	1.00	1.00		0.73			0.77	
Incremental Delay, d2		0.1		3.5	3.0	0.7		0.2			0.3	
Delay (s)		58.5		48.6	48.0	43.7		5.6			5.5	
Level of Service		E		D	D	D		A			A	
Approach Delay (s)		58.5			46.1			5.6			5.5	
Approach LOS		E			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.45			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	61.1%	ICU Level of Service	B	
Analysis Period (min)	15			

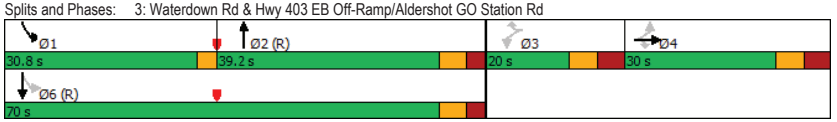
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	331	221	312	24	0	80	0	593	567	509	564	0
Future Volume (vph)	331	221	312	24	0	80	0	593	567	509	564	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.927				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3346	0	1805	3610	0
Flt Permitted	0.950			0.336						0.119		
Satd. Flow (perm)	1745	1900	1597	1197	0	1597	0	3346	0	226	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			332			136		203				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
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 (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	352	235	332	26	0	85	0	631	603	541	600	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	352	235	332	26	0	85	0	1234	0	541	600	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	30.0	30.0	30.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	30.0	30.0	30.0	20.0		20.0		39.2		30.8	70.0	
Total Split (%)	25.0%	25.0%	25.0%	16.7%		16.7%		32.7%		25.7%	58.3%	
Maximum Green (s)	22.0	22.0	22.0	12.0		12.0		32.2		27.8	63.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	28.0	28.0	28.0	13.5		13.5		35.2		69.6	69.6	
Actuated g/C Ratio	0.23	0.23	0.23	0.11		0.11		0.29		0.58	0.58	
v/c Ratio	0.86	0.53	0.53	0.19		0.28		1.10		1.02	0.29	
Control Delay	66.0	45.6	7.5	52.4		5.4		91.5		75.2	12.4	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	66.0	45.6	7.5	52.4		5.4		91.5		75.2	12.4	
LOS	E	D	A	D		A		F		E	B	
Approach Delay		39.6			16.4			91.5			42.2	
Approach LOS		D			B			F			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.10			
Intersection Signal Delay: 58.5		Intersection LOS: E	
Intersection Capacity Utilization 94.4%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	352	235	332	26	85	1234	541	600
v/c Ratio	0.86	0.53	0.53	0.19	0.28	1.10	1.02	0.29
Control Delay	66.0	45.6	7.5	52.4	5.4	91.5	75.2	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.0	45.6	7.5	52.4	5.4	91.5	75.2	12.4
Queue Length 50th (m)	83.2	50.6	0.0	3.1	0.0	~162.6	~128.9	32.9
Queue Length 95th (m)	#144.4	79.8	24.9	7.8	4.8	#207.3	#203.6	58.8
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	407	443	627	159	330	1124	531	2094
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.53	0.53	0.16	0.26	1.10	1.02	0.29

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	331	221	312	24	0	80	0	593	567	509	564	0
Future Volume (vph)	331	221	312	24	0	80	0	593	567	509	564	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.93		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3345		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.34		1.00		1.00		0.12	1.00	
Satd. Flow (perm)	1745	1900	1597	1198		1597		3345		226	3610	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	352	235	332	26	0	85	0	631	603	541	600	0
RTOR Reduction (vph)	0	0	255	0	0	77	0	146	0	0	0	0
Lane Group Flow (vph)	352	235	77	26	0	8	0	1088	0	541	600	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	24.0	24.0	24.0	7.9		7.9		30.7		65.1	65.1	
Effective Green, g (s)	28.0	28.0	28.0	11.9		11.9		33.7		64.1	68.1	
Actuated g/C Ratio	0.23	0.23	0.23	0.10		0.10		0.28		0.53	0.57	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	407	443	372	118		158		939		520	2048	
v/s Ratio Prot		0.12						c0.33		c0.26	0.17	
v/s Ratio Perm	c0.20		0.05	c0.02		0.01				0.29		
v/c Ratio	0.86	0.53	0.21	0.22		0.05		1.16		1.04	0.29	
Uniform Delay, d1	44.2	40.2	37.1	49.8		48.9		43.1		35.9	13.5	
Progression Factor	1.00	1.00	1.00	1.03		2.06		1.00		0.91	0.89	
Incremental Delay, d2	17.1	1.2	0.3	0.9		0.1		83.4		49.5	0.3	
Delay (s)	61.3	41.5	37.3	52.0		100.7		126.5		82.1	12.3	
Level of Service	E	D	D	D		F		F		F	B	
Approach Delay (s)		47.6			89.3			126.5			45.4	
Approach LOS		D			F			F			D	

Intersection Summary				
HCM 2000 Control Delay	76.8	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	94.4%	ICU Level of Service	F	
Analysis Period (min)	15			

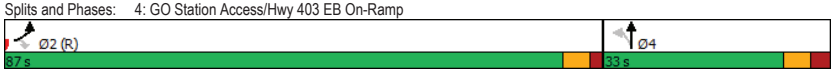
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	893	224	13	34	0	0
Future Volume (vph)	893	224	13	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.986		
Satd. Flow (prot)	1745	1597	0	1873	0	0
Flt Permitted	0.950			0.986		
Satd. Flow (perm)	1745	1597	0	1873	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		236				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	940	236	14	36	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	940	236	0	50	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	87.0	87.0	33.0	33.0		
Total Split (%)	72.5%	72.5%	27.5%	27.5%		
Maximum Green (s)	81.0	81.0	26.0	26.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	103.6	103.6		12.2		
Actuated g/C Ratio	0.86	0.86		0.10		
v/c Ratio	0.62	0.17		0.26		
Control Delay	0.8	0.1		52.9		
Queue Delay	0.0	0.0		0.0		
Total Delay	0.8	0.1		52.9		
LOS	A	A		D		
Approach Delay	0.6			52.9		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 106 (88%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 2.7		Intersection LOS: A	
Intersection Capacity Utilization 62.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	940	236	50
v/c Ratio	0.62	0.17	0.26
Control Delay	0.8	0.1	52.9
Queue Delay	0.0	0.0	0.0
Total Delay	0.8	0.1	52.9
Queue Length 50th (m)	2.4	0.0	11.7
Queue Length 95th (m)	m2.8	m0.0	24.1
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1506	1410	452
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.62	0.17	0.11

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	893	224	13	34	0	0
Future Volume (vph)	893	224	13	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.99		
Satd. Flow (prot)	1745	1597		1874		
Flt Permitted	0.95	1.00		0.99		
Satd. Flow (perm)	1745	1597		1874		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	940	236	14	36	0	0
RTOR Reduction (vph)	0	37	0	0	0	0
Lane Group Flow (vph)	940	199	0	50	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	99.4	99.4		7.6		
Effective Green, g (s)	101.4	101.4		10.6		
Actuated g/C Ratio	0.85	0.85		0.09		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1474	1349		165		
v/s Ratio Prot	c0.54					
v/s Ratio Perm		0.12		0.03		
v/c Ratio	0.64	0.15		0.30		
Uniform Delay, d1	3.1	1.6		51.2		
Progression Factor	0.05	0.00		1.00		
Incremental Delay, d2	0.6	0.1		1.0		
Delay (s)	0.8	0.1		52.3		
Level of Service	A	A		D		
Approach Delay (s)	0.6			52.3	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	34	819	321	0	0	34
Future Volume (vph)	34	819	321	0	0	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected		0.998				
Satd. Flow (prot)	0	1859	1863	0	1611	0
Flt Permitted		0.998				
Satd. Flow (perm)	0	1859	1863	0	1611	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		286.2	
Travel Time (s)		56.6	12.1		20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	890	349	0	0	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	927	349	0	37	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	819	321	0	0	34
Future Volume (Veh/h)	34	819	321	0	0	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	890	349	0	0	37
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	349				1313	349
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	349				1313	349
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	95
cM capacity (veh/h)	1210				169	694

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	927	349	37
Volume Left	37	0	0
Volume Right	0	0	37
cSH	1210	1700	694
Volume to Capacity	0.03	0.21	0.05
Queue Length 95th (m)	0.8	0.0	1.3
Control Delay (s)	0.8	0.0	10.5
Lane LOS	A		B
Approach Delay (s)	0.8	0.0	10.5
Approach LOS			B

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		75.2%	ICU Level of Service	D
Analysis Period (min)		15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	L	T	TR	L	T	TR	T
Maximum Queue (m)	60.1	65.8	16.1	63.6	48.0	67.0	73.1	96.2	77.4	21.9
Average Queue (m)	29.8	30.2	6.8	25.2	19.5	22.9	28.9	46.6	25.0	1.0
95th Queue (m)	55.7	53.1	14.2	48.1	38.9	46.6	54.2	80.1	63.3	10.9
Link Distance (m)		281.2			124.2	124.2		83.3		88.5
Upstream Blk Time (%)								1	0	
Queuing Penalty (veh)								0	0	
Storage Bay Dist (m)	150.0		130.0	90.0			70.0		70.0	
Storage Blk Time (%)							0	1	0	
Queuing Penalty (veh)							1	9	0	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	15.0	81.4	63.4	61.4	47.0	50.5	70.0	54.6
Average Queue (m)	2.6	37.6	32.2	25.9	19.8	21.2	35.2	16.4
95th Queue (m)	9.6	71.5	56.5	48.2	40.8	41.8	64.7	45.0
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)		0						
Queuing Penalty (veh)		0						

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	112.7	117.4	55.6	17.8	7.0	22.5	401.1	401.3	37.4	172.2	161.8
Average Queue (m)	70.2	44.4	28.0	7.1	0.7	10.9	396.4	398.1	37.0	112.8	77.0
95th Queue (m)	109.3	81.9	47.5	15.6	4.4	18.2	434.8	426.5	40.4	188.3	157.7
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)							68	91		4	0
Queuing Penalty (veh)							0	0		21	0
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)	2								63	1	
Queuing Penalty (veh)	4								177	5	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	75.9	17.0	28.6
Average Queue (m)	25.7	5.4	11.9
95th Queue (m)	61.8	15.2	23.9
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	22.4	13.6
Average Queue (m)	3.3	5.4
95th Queue (m)	13.5	12.6
Link Distance (m)	929.3	277.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

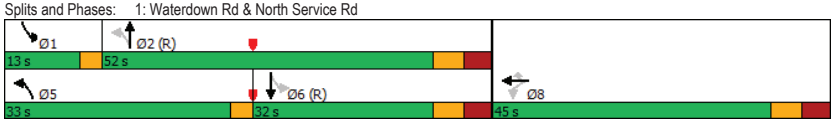
Network wide Queuing Penalty: 217

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	366	746	160	541	721	288	119	557	102
Future Volume (vph)	0	0	0	366	746	160	541	721	288	119	557	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.957			0.977	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	1745	3455	0	1745	3527	0
Flt Permitted				0.950			0.148			0.212		
Satd. Flow (perm)	0	0	0	1745	1900	1597	272	3455	0	389	3527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						176		69			18	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	402	820	176	595	792	316	131	612	112
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	402	820	176	595	1108	0	131	724	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)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.0	31.0	
Total Split (s)				45.0	45.0	45.0	33.0	52.0		13.0	32.0	
Total Split (%)				40.9%	40.9%	40.9%	30.0%	47.3%		11.8%	29.1%	
Maximum Green (s)				37.0	37.0	37.0	30.0	44.0		10.0	24.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				41.0	41.0	41.0	61.0	49.1		35.9	28.0	
Actuated g/C Ratio				0.37	0.37	0.37	0.55	0.45		0.33	0.25	
v/c Ratio				0.62	1.16	0.25	1.10	0.70		0.58	0.79	
Control Delay				33.2	119.5	4.4	100.0	13.5		27.6	44.8	
Queue Delay				0.0	0.0	0.0	0.0	0.6		0.0	0.0	
Total Delay				33.2	119.5	4.4	100.0	14.1		27.6	44.8	
LOS				C	F	A	F	B		C	D	
Approach Delay					80.2			44.1			42.2	
Approach LOS					F			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 52 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 56.4		Intersection LOS: E	
Intersection Capacity Utilization 97.9%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	402	820	176	595	1108	131	724
v/c Ratio	0.62	1.16	0.25	1.10	0.70	0.58	0.79
Control Delay	33.2	119.5	4.4	100.0	13.5	27.6	44.8
Queue Delay	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Total Delay	33.2	119.5	4.4	100.0	14.1	27.6	44.8
Queue Length 50th (m)	73.1	~219.6	0.0	~128.1	26.6	13.5	78.8
Queue Length 95th (m)	107.2	#295.0	14.2	#199.8	54.8	24.1	101.7
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	650	708	705	539	1578	241	911
Starvation Cap Reductn	0	0	0	0	165	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	1.16	0.25	1.10	0.78	0.54	0.79

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	366	746	160	541	721	288	119	557	102
Future Volume (vph)	0	0	0	366	746	160	541	721	288	119	557	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	1745	3456		1745	3526	
Flt Permitted				0.95	1.00	1.00	0.15	1.00		0.21	1.00	
Satd. Flow (perm)				1745	1900	1597	272	3456		389	3526	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	402	820	176	595	792	316	131	612	112
RTOR Reduction (vph)	0	0	0	0	0	110	0	38	0	0	13	0
Lane Group Flow (vph)	0	0	0	402	820	66	595	1070	0	131	711	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8	2			6		
Actuated Green, G (s)				37.0	37.0	37.0	57.0	45.1		32.9	24.0	
Effective Green, g (s)				41.0	41.0	41.0	56.0	49.1		30.9	28.0	
Actuated g/C Ratio				0.37	0.37	0.37	0.51	0.45		0.28	0.25	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				650	708	595	526	1542		206	897	
v/s Ratio Prot					c0.43		c0.30	0.31		0.05	0.20	
v/s Ratio Perm				0.23		0.04	c0.28			0.13		
v/c Ratio				0.62	1.16	0.11	1.13	0.69		0.64	0.79	
Uniform Delay, d1				28.1	34.5	22.6	31.5	24.4		30.9	38.3	
Progression Factor				1.00	1.00	1.00	1.26	0.50		1.00	1.00	
Incremental Delay, d2				1.8	86.5	0.1	75.8	1.9		6.3	7.1	
Delay (s)				29.9	121.0	22.7	115.4	14.0		37.1	45.4	
Level of Service				C	F	C	F	B		D	D	
Approach Delay (s)		0.0			82.4			49.4			44.1	
Approach LOS		A			F			D			D	

Intersection Summary				
HCM 2000 Control Delay	59.9	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.12			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	97.9%	ICU Level of Service	F	
Analysis Period (min)	15			

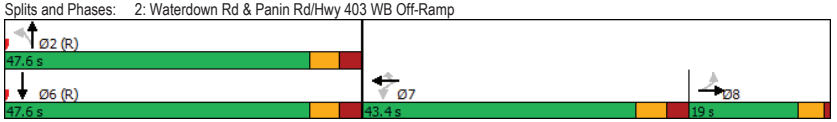
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	307	0	287	3	1253	0	0	921	0
Future Volume (vph)	1	0	3	307	0	287	3	1253	0	0	921	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.899				0.850						
Flt Protected		0.988		0.950	0.950							
Satd. Flow (prot)	0	1688	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.251	0.251			0.953				
Satd. Flow (perm)	0	1708	0	438	453	1597	0	3440	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109				291						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	0	3	341	0	319	3	1392	0	0	1023	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	4	0	170	171	319	0	1395	0	0	1023	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)		3.3			3.3			3.6			3.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	19.0	19.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	19.0	19.0		43.4	43.4	43.4	47.6	47.6			47.6	
Total Split (%)	17.3%	17.3%		39.5%	39.5%	39.5%	43.3%	43.3%			43.3%	
Maximum Green (s)	14.5	14.5		36.4	36.4	36.4	40.6	40.6			40.6	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		39.4	39.4	39.4		60.6			60.6	
Actuated g/C Ratio		0.05		0.36	0.36	0.36		0.55			0.55	
v/c Ratio		0.02		1.09	1.06	0.42		0.74			0.51	
Control Delay		0.2		134.1	122.9	5.9		14.5			18.0	
Queue Delay		0.0		0.0	0.0	0.3		0.2			0.3	
Total Delay		0.2		134.1	122.9	6.2		14.8			18.3	
LOS		A		F	F	A		B			B	
Approach Delay		0.3			69.4			14.8			18.3	
Approach LOS		A			E			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 40 (36%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 130			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.09			
Intersection Signal Delay: 27.6		Intersection LOS: C	
Intersection Capacity Utilization 66.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	4	170	171	319	1395	1023
v/c Ratio	0.02	1.09	1.06	0.42	0.74	0.51
Control Delay	0.2	134.1	122.9	5.9	14.5	18.0
Queue Delay	0.0	0.0	0.0	0.3	0.2	0.3
Total Delay	0.2	134.1	122.9	6.2	14.8	18.3
Queue Length 50th (m)	0.0	~45.4	~44.6	4.1	111.8	58.3
Queue Length 95th (m)	0.0	#92.1	#91.2	23.8	m145.8	84.8
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	327	156	162	758	1894	1988
Starvation Cap Reductn	0	0	0	0	0	400
Spillback Cap Reductn	0	0	0	111	95	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.09	1.06	0.49	0.78	0.64

Intersection Summary

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

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	307	0	287	3	1253	0	0	921	0
Future Volume (vph)	1	0	3	307	0	287	3	1253	0	0	921	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.90		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.99		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1687		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.25	0.25	1.00		0.95			1.00	
Satd. Flow (perm)		1708		438	453	1597		3441			3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1	0	3	341	0	319	3	1392	0	0	1023	0
RTOR Reduction (vph)	0	4	0	0	0	187	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	170	171	132	0	1395	0	0	1023	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		36.4	36.4	36.4		54.0			54.0	
Effective Green, g (s)		1.6		39.4	39.4	39.4		57.0			57.0	
Actuated g/C Ratio		0.01		0.36	0.36	0.36		0.52			0.52	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		156	162	572		1783			1870	
v/s Ratio Prot											0.28	
v/s Ratio Perm		c0.00		c0.39	0.38	0.08		c0.41				
v/c Ratio		0.00		1.09	1.06	0.23		0.78			0.55	
Uniform Delay, d1		53.4		35.3	35.3	24.7		21.5			17.8	
Progression Factor		1.00		1.00	1.00	1.00		0.67			1.07	
Incremental Delay, d2		0.0		98.1	86.2	0.2		1.5			0.8	
Delay (s)		53.5		133.4	121.5	24.9		16.0			19.8	
Level of Service		D		F	F	C		B			B	
Approach Delay (s)		53.5			77.9			16.0			19.8	
Approach LOS		D			E			B			B	

Intersection Summary				
HCM 2000 Control Delay	30.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	66.7%	ICU Level of Service	C	
Analysis Period (min)	15			

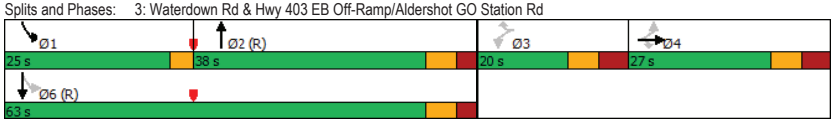
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	85	287	96	0	401	0	621	463	391	803	0
Future Volume (vph)	211	85	287	96	0	401	0	621	463	391	803	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.936				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3379	0	1805	3610	0
Flt Permitted	0.950			0.250						0.118		
Satd. Flow (perm)	1745	1900	1597	891	0	1597	0	3379	0	224	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			170			419		177				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	240	97	326	109	0	456	0	706	526	444	913	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	240	97	326	109	0	456	0	1232	0	444	913	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	27.0	27.0	27.0	20.0		20.0		38.0		25.0	63.0	
Total Split (%)	24.5%	24.5%	24.5%	18.2%		18.2%		34.5%		22.7%	57.3%	
Maximum Green (s)	19.0	19.0	19.0	12.0		12.0		31.0		22.0	56.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	21.5	21.5	21.5	16.0		16.0		34.0		60.5	60.5	
Actuated g/C Ratio	0.20	0.20	0.20	0.15		0.15		0.31		0.55	0.55	
v/c Ratio	0.71	0.26	0.73	0.84		0.77		1.06		1.00	0.46	
Control Delay	53.1	38.9	29.4	84.2		27.7		74.9		60.6	16.8	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	53.1	38.9	29.4	84.2		27.7		74.9		60.6	16.8	
LOS	D	D	C	F		C		E		E	B	
Approach Delay		39.4			38.6			74.9			31.1	
Approach LOS		D			D			E			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 101 (92%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 47.8		Intersection LOS: D	
Intersection Capacity Utilization 80.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	240	97	326	109	456	1232	444	913
v/c Ratio	0.71	0.26	0.73	0.84	0.77	1.06	1.00	0.46
Control Delay	53.1	38.9	29.4	84.2	27.7	74.9	60.6	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	38.9	29.4	84.2	27.7	74.9	60.6	16.8
Queue Length 50th (m)	50.1	18.4	32.5	13.3	56.5	~145.4	~86.8	61.9
Queue Length 95th (m)	76.1	32.9	62.8	m#23.1	83.0	#181.6	m#128.4	m86.2
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	364	397	468	129	590	1166	446	1985
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.24	0.70	0.84	0.77	1.06	1.00	0.46

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	85	287	96	0	401	0	621	463	391	803	0
Future Volume (vph)	211	85	287	96	0	401	0	621	463	391	803	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3379		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.25		1.00		1.00		0.12	1.00	
Satd. Flow (perm)	1745	1900	1597	891		1597		3379		224	3610	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	240	97	326	109	0	456	0	706	526	444	912	0
RTOR Reduction (vph)	0	0	137	0	0	358	0	122	0	0	0	0
Lane Group Flow (vph)	240	97	189	109	0	98	0	1110	0	444	913	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	17.5	17.5	17.5	12.0		12.0		31.0		57.5	57.5	
Effective Green, g (s)	21.5	21.5	21.5	16.0		16.0		34.0		56.5	60.5	
Actuated g/C Ratio	0.20	0.20	0.20	0.15		0.15		0.31		0.51	0.55	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	341	371	312	129		232		1044		438	1985	
v/s Ratio Prot		0.05						c0.33		c0.21	0.25	
v/s Ratio Perm	c0.14		0.12	c0.12		0.06				0.31		
v/c Ratio	0.70	0.26	0.61	0.84		0.42		1.06		1.01	0.46	
Uniform Delay, d1	41.3	37.5	40.4	45.8		42.8		38.0		33.2	14.9	
Progression Factor	1.00	1.00	1.00	0.86		3.02		1.00		0.71	1.06	
Incremental Delay, d2	6.5	0.4	3.3	33.8		1.1		46.2		40.8	0.6	
Delay (s)	47.7	37.9	43.7	73.4		130.5		84.2		64.5	16.3	
Level of Service	D	D	D	E		F		F		E	B	
Approach Delay (s)		44.3			119.5			84.2			32.1	
Approach LOS		D			F			F			C	

Intersection Summary				
HCM 2000 Control Delay	64.0	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	80.3%	ICU Level of Service	D	
Analysis Period (min)	15			

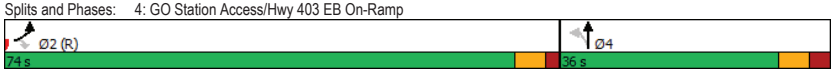
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	725	19	279	37	0	0
Future Volume (vph)	725	19	279	37	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.958		
Satd. Flow (prot)	1745	1597	0	1820	0	0
Flt Permitted	0.950			0.958		
Satd. Flow (perm)	1745	1597	0	1820	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		24				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	929	24	358	47	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	929	24	0	405	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	74.0	74.0	36.0	36.0		
Total Split (%)	67.3%	67.3%	32.7%	32.7%		
Maximum Green (s)	68.0	68.0	29.0	29.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	72.1	72.1		29.9		
Actuated g/C Ratio	0.66	0.66		0.27		
v/c Ratio	0.81	0.02		0.82		
Control Delay	5.1	0.5		51.9		
Queue Delay	0.0	0.0		0.0		
Total Delay	5.1	0.5		51.9		
LOS	A	A		D		
Approach Delay	5.0			51.9		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 100 (91%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	929	24	405
v/c Ratio	0.81	0.02	0.82
Control Delay	5.1	0.5	51.9
Queue Delay	0.0	0.0	0.0
Total Delay	5.1	0.5	51.9
Queue Length 50th (m)	26.4	0.2	83.4
Queue Length 95th (m)	m25.7	m0.1	99.4
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1144	1055	529
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.81	0.02	0.77

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	725	19	279	37	0	0
Future Volume (vph)	725	19	279	37	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.96		
Satd. Flow (prot)	1745	1597		1820		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1745	1597		1820		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	929	24	358	47	0	0
RTOR Reduction (vph)	0	8	0	0	0	0
Lane Group Flow (vph)	929	16	0	405	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	70.1	70.1		26.9		
Effective Green, g (s)	72.1	72.1		29.9		
Actuated g/C Ratio	0.66	0.66		0.27		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1143	1046		494		
v/s Ratio Prot	c0.53					
v/s Ratio Perm		0.01		0.22		
v/c Ratio	0.81	0.02		0.82		
Uniform Delay, d1	14.0	6.6		37.5		
Progression Factor	0.16	0.16		1.00		
Incremental Delay, d2	2.1	0.0		10.2		
Delay (s)	4.4	1.0		47.8		
Level of Service	A	A		D		
Approach Delay (s)	4.3			47.8	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	64.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	22	385	1250	0	0	22
Future Volume (vph)	22	385	1250	0	0	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected		0.997				
Satd. Flow (prot)	0	1857	1863	0	1611	0
Flt Permitted		0.997				
Satd. Flow (perm)	0	1857	1863	0	1611	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		228.3	
Travel Time (s)		56.6	12.1		16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	418	1359	0	0	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	442	1359	0	24	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	385	1250	0	0	22
Future Volume (Veh/h)	22	385	1250	0	0	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	418	1359	0	0	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1359				1825	1359
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1359				1825	1359
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				100	87
cM capacity (veh/h)	506				81	182

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	442	1359	24
Volume Left	24	0	0
Volume Right	0	0	24
cSH	506	1700	182
Volume to Capacity	0.05	0.80	0.13
Queue Length 95th (m)	1.2	0.0	3.6
Control Delay (s)	1.4	0.0	27.8
Lane LOS	A		D
Approach Delay (s)	1.4	0.0	27.8
Approach LOS			D

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization		75.8%	ICU Level of Service	D
Analysis Period (min)		15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	B16	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	T	L	T	TR	L	T	TR	T
Maximum Queue (m)	157.5	314.9	137.5	930.2	97.5	138.2	139.8	77.4	104.7	77.5	91.1
Average Queue (m)	143.9	304.0	94.1	869.8	96.7	126.7	111.4	41.0	88.0	67.7	24.4
95th Queue (m)	201.3	311.9	193.5	1074.6	101.7	145.5	163.3	86.3	120.1	90.2	84.3
Link Distance (m)		281.2		929.4		124.2	124.2		83.3		88.5
Upstream Blk Time (%)		50		3		22	9	0	20	0	6
Queuing Penalty (veh)		640		32		168	72	0	0	0	0
Storage Bay Dist (m)	150.0		130.0		90.0			70.0		70.0	
Storage Blk Time (%)	1	54	0		31	17		0	26	6	
Queuing Penalty (veh)	10	284	1		112	92		1	130	24	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	5.1	105.2	143.5	105.2	182.5	181.4	73.6	66.7
Average Queue (m)	0.3	34.7	49.3	53.1	158.1	145.2	41.5	38.1
95th Queue (m)	3.1	91.2	122.9	103.4	213.3	221.5	64.7	61.6
Link Distance (m)	91.0		172.4		168.6	168.6	124.2	124.2
Upstream Blk Time (%)			5		13	3		
Queuing Penalty (veh)			0		81	21		
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)		0	0	8				
Queuing Penalty (veh)		0	2	25				

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	111.6	225.4	150.9	79.7	129.4	67.5	365.4	372.1	37.4	145.2	136.6
Average Queue (m)	90.3	107.7	50.7	17.6	62.0	60.2	265.6	274.6	35.9	71.0	49.7
95th Queue (m)	142.9	280.9	173.2	45.0	156.0	78.8	490.2	490.5	42.3	145.7	113.6
Link Distance (m)		296.2	296.2	218.6	218.6		396.5	396.5		168.6	168.6
Upstream Blk Time (%)		8	2				31	38		1	0
Queuing Penalty (veh)		0	0				0	0		4	0
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)	42					40			54	7	
Queuing Penalty (veh)	36					19			215	28	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	82.0	9.8	48.3
Average Queue (m)	40.9	0.7	45.5
95th Queue (m)	73.7	4.8	55.3
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			23
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	EB	WB	B5	SB
Directions Served	LT	TR	T	LR
Maximum Queue (m)	64.9	215.6	111.7	26.2
Average Queue (m)	9.5	154.5	70.0	7.1
95th Queue (m)	47.0	295.8	149.2	20.1
Link Distance (m)	929.4	182.3	95.3	219.0
Upstream Blk Time (%)		60	59	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

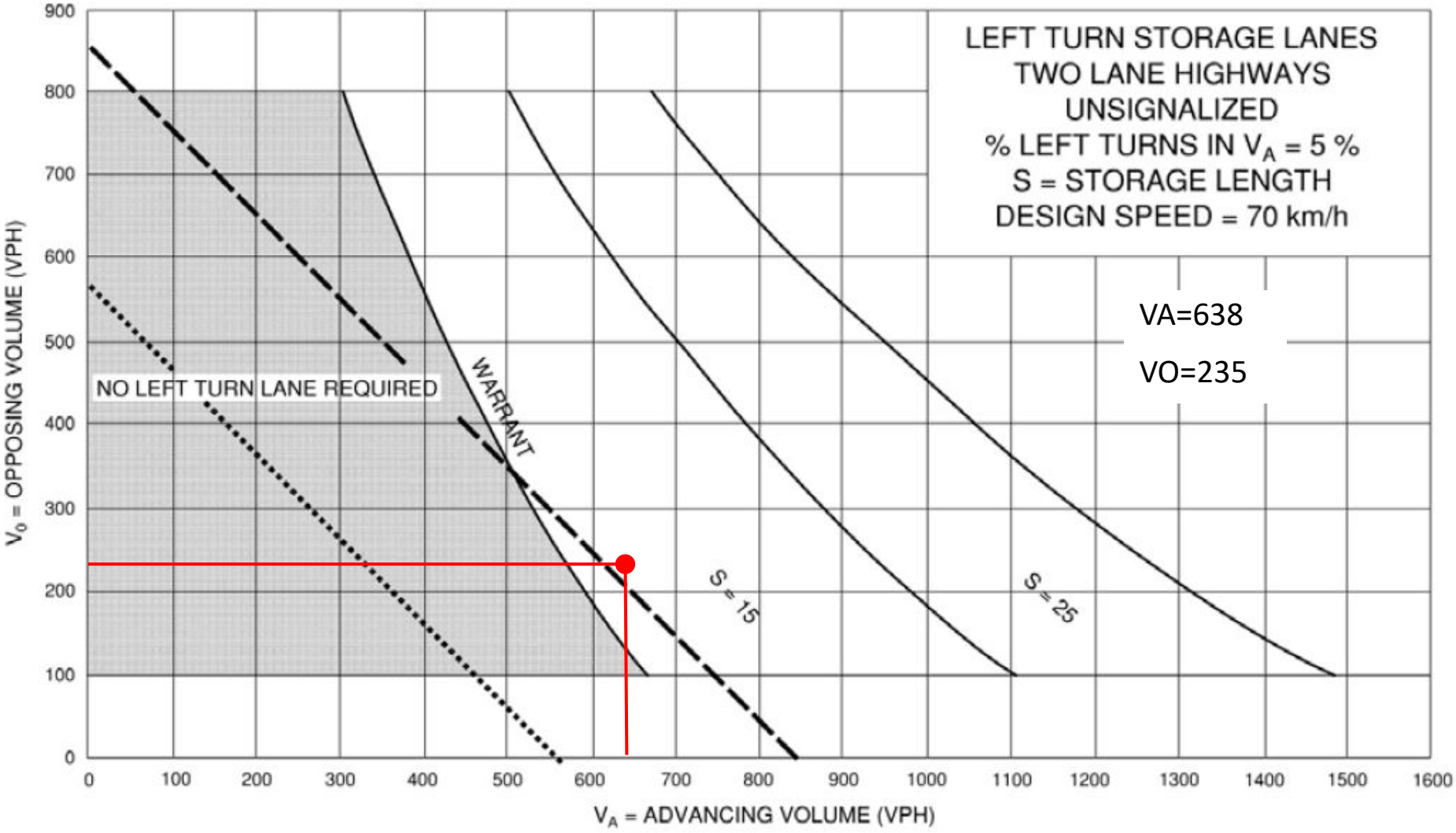
Network Summary

Network wide Queuing Penalty: 1999

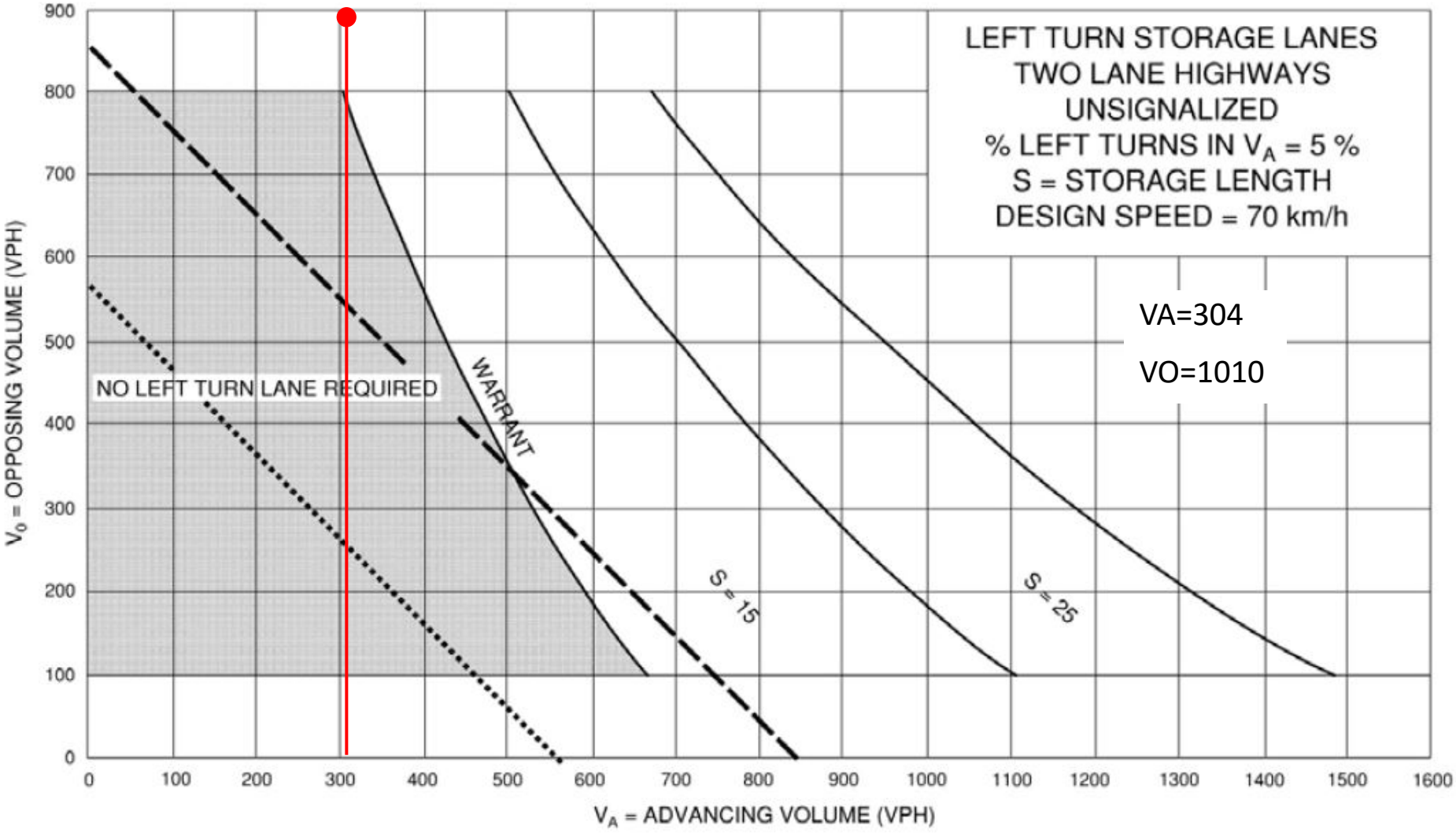
Appendix I

Auxiliary Left-Turn Warrant Analysis

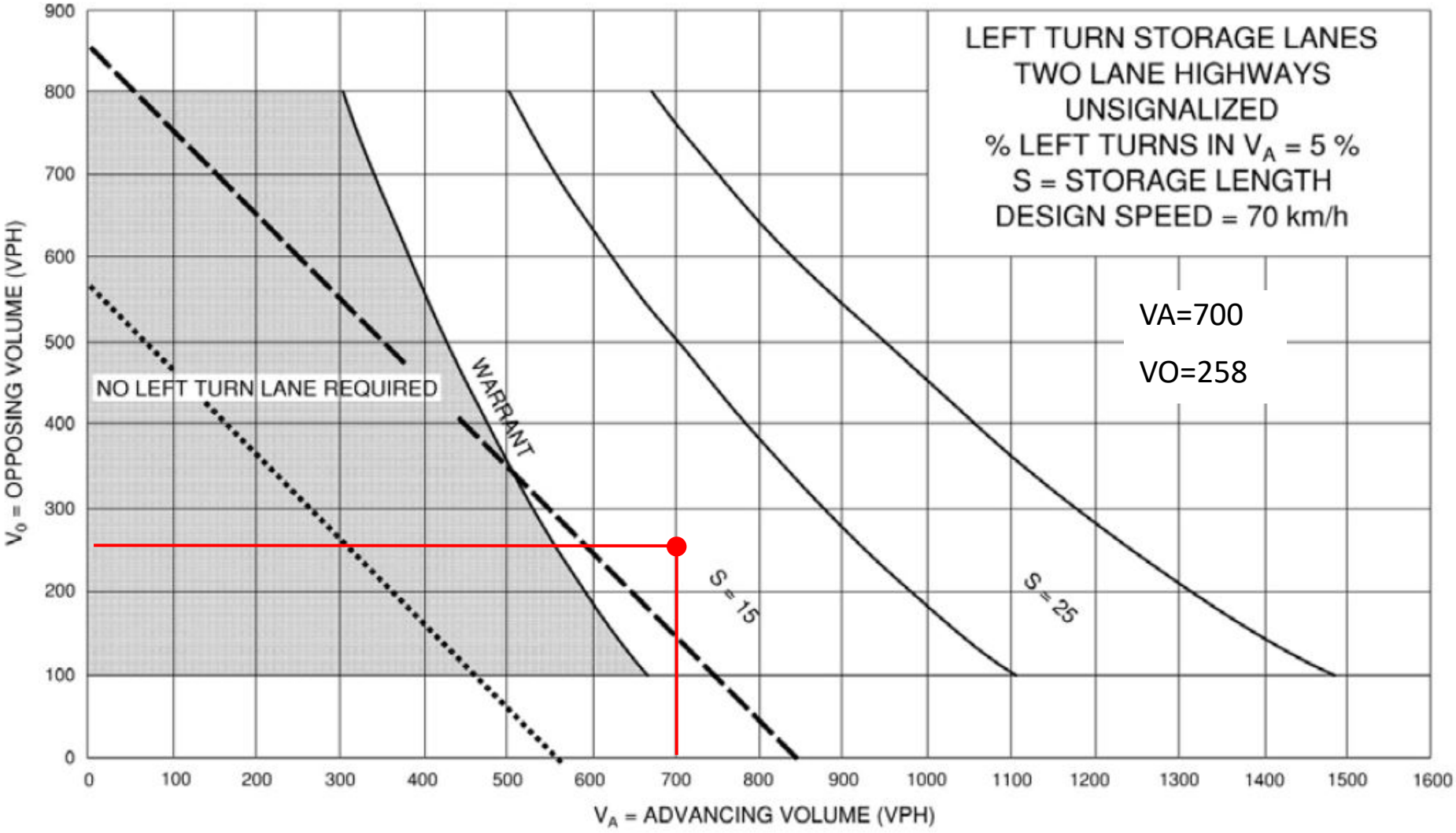
2023 Total Future Traffic - AM Peak Hour



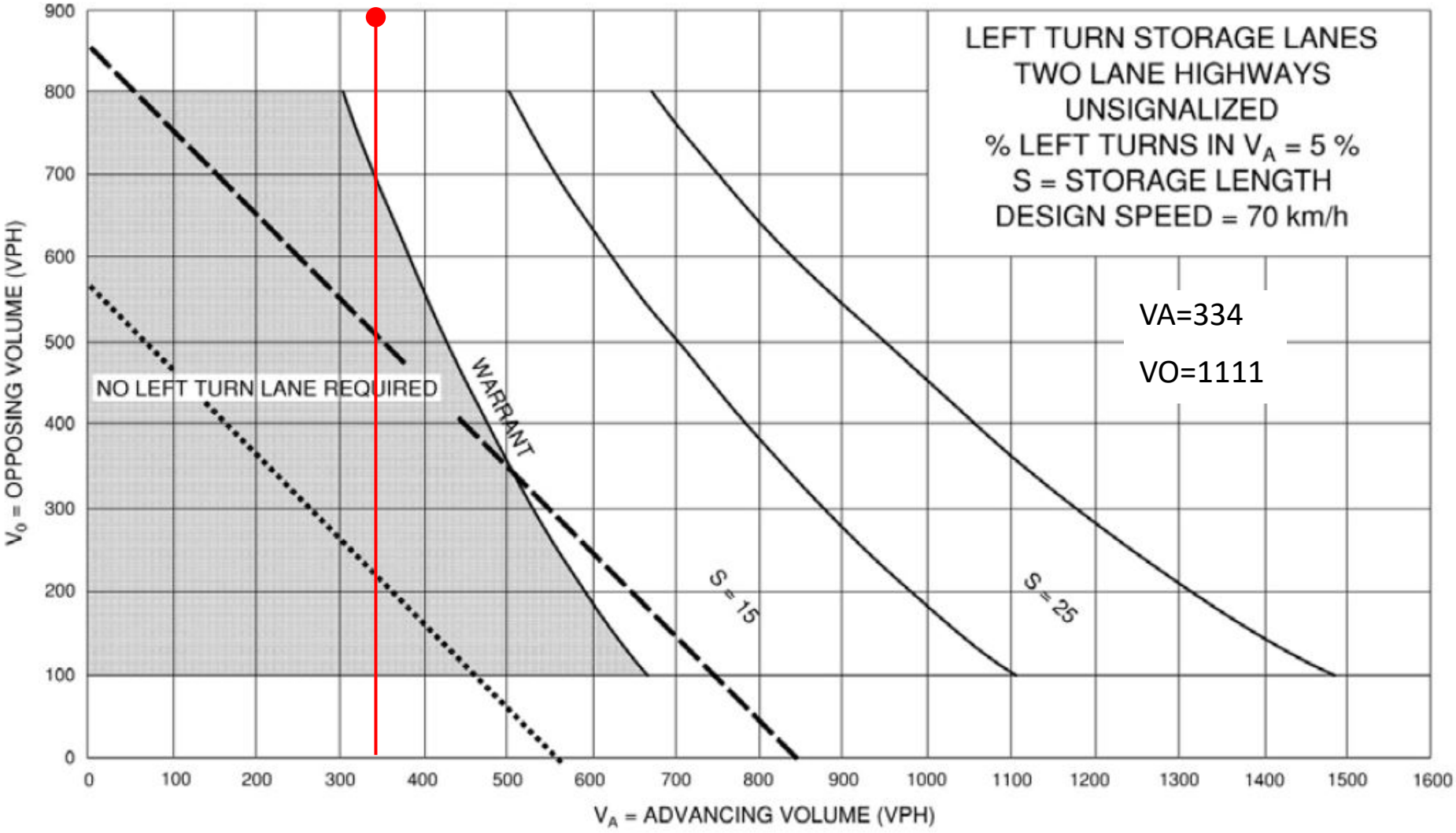
2023 Total Future Traffic - PM Peak Hour



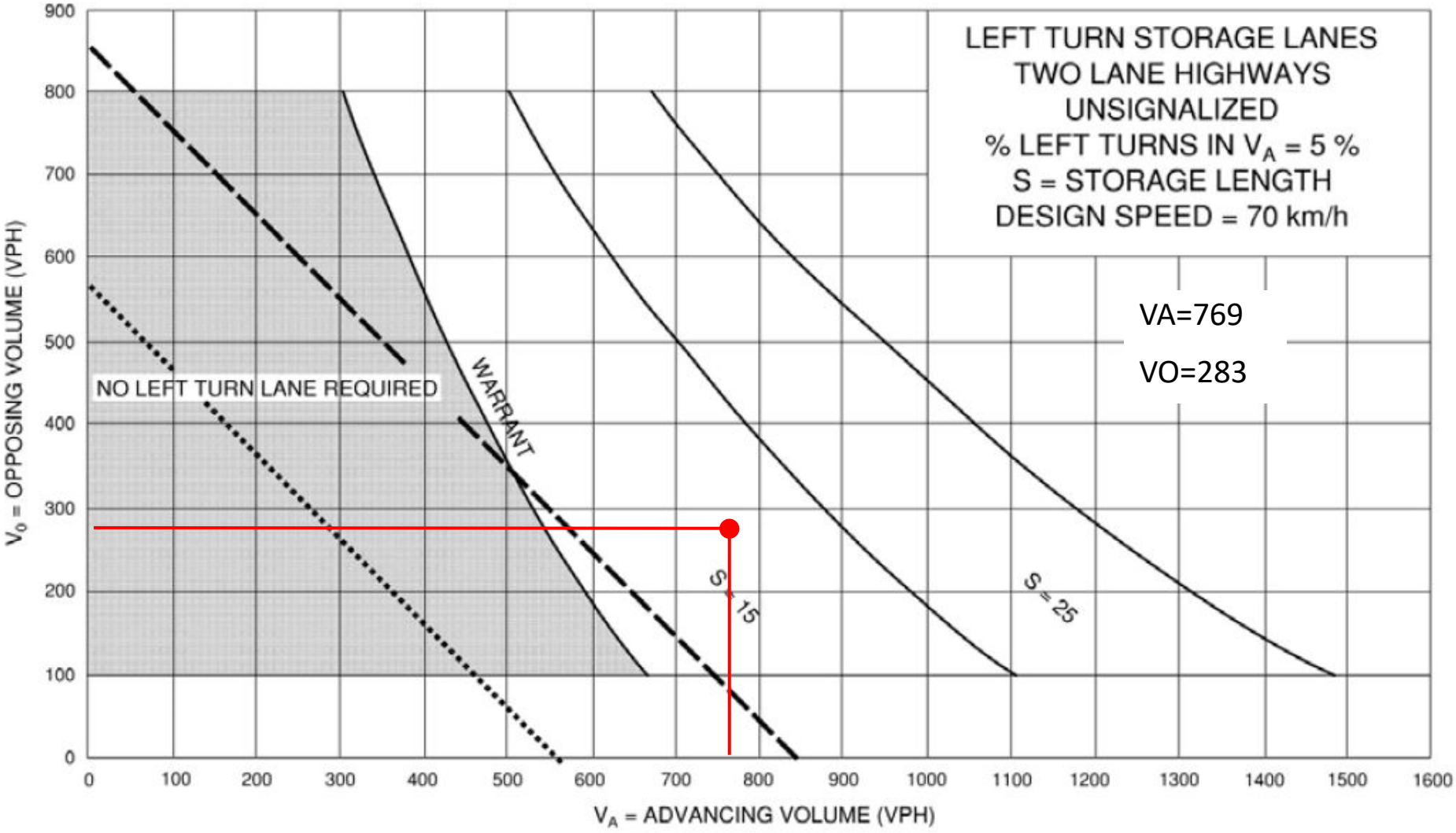
2028 Total Future Traffic - AM Peak Hour



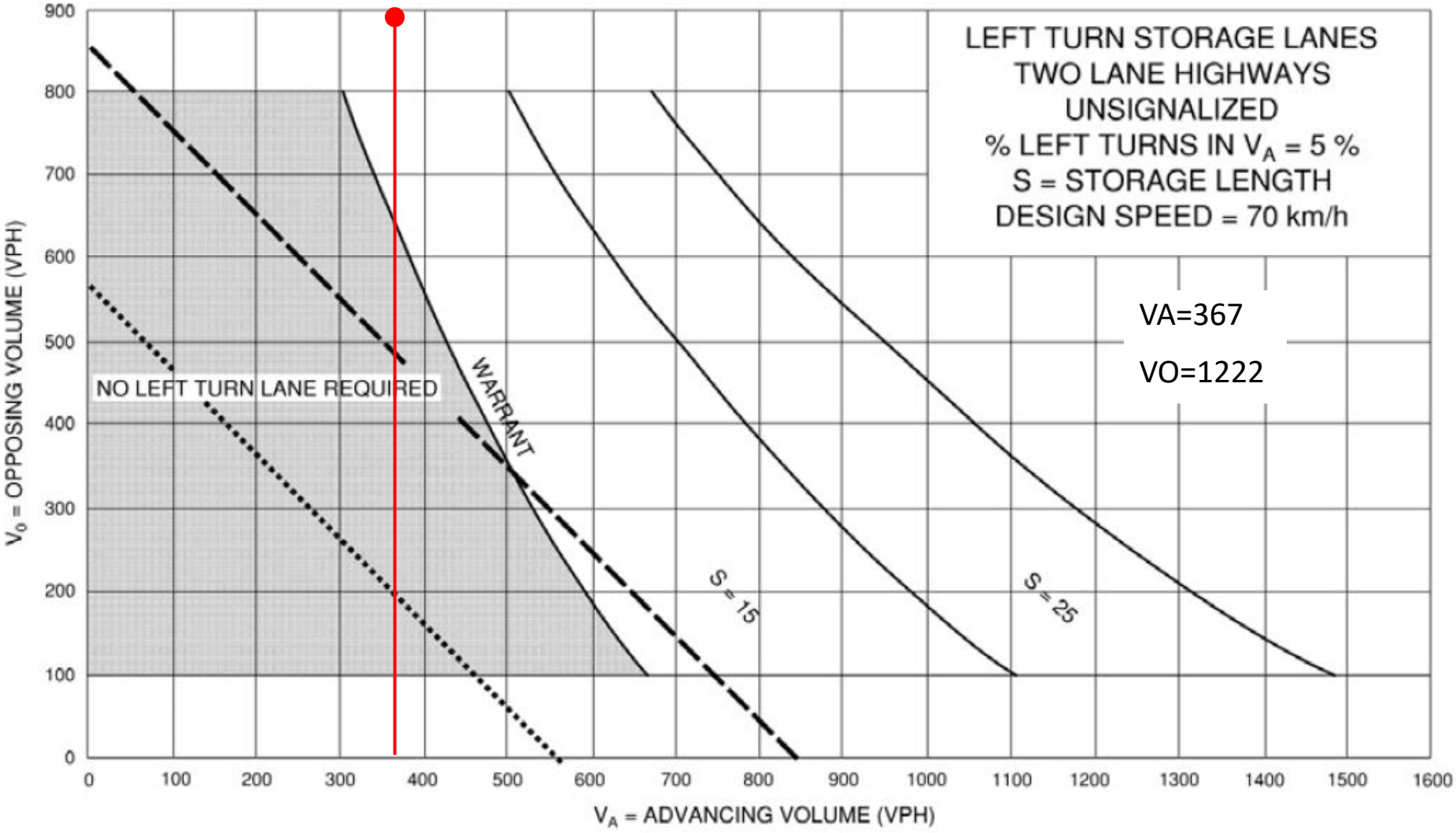
2028 Total Future Traffic - PM Peak Hour



2033 Total Future Traffic - AM Peak Hour



2033 Total Future Traffic - PM Peak Hour



Appendix J

Total Traffic Operations Sensitivity Analysis – 10-Year Horizon



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	147	147	61	282	405	662	191	669	103
Future Volume (vph)	0	0	0	147	147	61	282	405	662	191	669	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.907			0.980	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	3385	3274	0	1745	3538	0
Flt Permitted				0.950			0.950			0.224		
Satd. Flow (perm)	0	0	0	1745	1900	1597	3385	3274	0	411	3538	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73		495			21	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	150	150	62	288	413	676	195	683	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	150	150	62	288	1089	0	195	788	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)		3.3			3.3			6.6			6.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	Prot	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8				6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.5	31.0	
Total Split (s)				28.0	28.0	28.0	26.0	64.0		28.0	66.0	
Total Split (%)				23.3%	23.3%	23.3%	21.7%	53.3%		23.3%	55.0%	
Maximum Green (s)				20.0	20.0	20.0	23.0	56.0		25.0	58.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				19.3	19.3	19.3	14.5	79.2		83.7	74.2	
Actuated g/C Ratio				0.16	0.16	0.16	0.12	0.66		0.70	0.62	
v/c Ratio				0.54	0.49	0.19	0.71	0.47		0.50	0.36	
Control Delay				52.7	50.8	8.5	54.4	3.5		9.2	12.3	
Queue Delay				0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay				52.7	50.8	8.5	54.4	3.6		9.2	12.3	
LOS				D	D	A	D	A		A	B	
Approach Delay					44.4			14.2			11.7	
Approach LOS					D			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 17.3		Intersection LOS: B	
Intersection Capacity Utilization 61.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	150	150	62	288	1089	195	788
v/c Ratio	0.54	0.49	0.19	0.71	0.47	0.50	0.36
Control Delay	52.7	50.8	8.5	54.4	3.5	9.2	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	52.7	50.8	8.5	54.4	3.6	9.2	12.3
Queue Length 50th (m)	34.4	34.2	0.0	35.6	23.7	10.6	46.1
Queue Length 95th (m)	54.1	53.4	9.7	51.1	25.7	20.0	70.7
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	349	380	377	620	2329	584	2196
Starvation Cap Reductn	0	0	0	0	264	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.39	0.16	0.46	0.53	0.33	0.36

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	147	147	61	282	405	662	191	669	103
Future Volume (vph)	0	0	0	147	147	61	282	405	662	191	669	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.91		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	3385	3274		1745	3538	
Flt Permitted				0.95	1.00	1.00	0.95	1.00		0.22	1.00	
Satd. Flow (perm)				1745	1900	1597	3385	3274		412	3538	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	150	150	62	288	413	676	195	683	105
RTOR Reduction (vph)	0	0	0	0	0	52	0	168	0	0	8	0
Lane Group Flow (vph)	0	0	0	150	150	10	288	921	0	195	780	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	Prot	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8				6		
Actuated Green, G (s)				15.3	15.3	15.3	15.5	75.2		80.7	70.2	
Effective Green, g (s)				19.3	19.3	19.3	14.5	79.2		78.7	74.2	
Actuated g/C Ratio				0.16	0.16	0.16	0.12	0.66		0.66	0.62	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				280	305	256	409	2160		375	2187	
v/s Ratio Prot					0.08		c0.09	0.28		0.04	0.22	
v/s Ratio Perm				c0.09		0.01				c0.30		
v/c Ratio				0.54	0.49	0.04	0.70	0.43		0.52	0.36	
Uniform Delay, d1				46.2	45.9	42.5	50.7	9.7		8.7	11.2	
Progression Factor				1.00	1.00	1.00	0.90	0.52		1.00	1.00	
Incremental Delay, d2				2.0	1.2	0.1	5.0	0.6		1.3	0.5	
Delay (s)				48.2	47.1	42.6	50.7	5.6		10.0	11.7	
Level of Service				D	D	D	D	A		B	B	
Approach Delay (s)		0.0			46.8			15.0			11.3	
Approach LOS		A			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.52			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	61.2%	ICU Level of Service	B	
Analysis Period (min)	15			

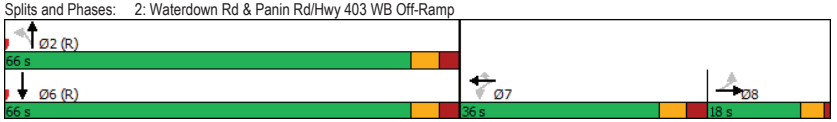
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	321	0	290	0	1048	0	0	795	0
Future Volume (vph)	7	0	1	321	0	290	0	1048	0	0	795	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.983				0.850						
Flt Protected		0.958		0.950	0.950							
Satd. Flow (prot)	0	1789	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.875	0.875							
Satd. Flow (perm)	0	1868	0	1527	1579	1597	0	3610	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		100				243						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	7	0	1	331	0	299	0	1080	0	0	820	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	165	166	299	0	1080	0	0	820	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)		3.3			3.3			6.6			6.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	18.0	18.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	18.0	18.0		36.0	36.0	36.0	66.0	66.0			66.0	
Total Split (%)	15.0%	15.0%		30.0%	30.0%	30.0%	55.0%	55.0%			55.0%	
Maximum Green (s)	13.5	13.5		29.0	29.0	29.0	59.0	59.0			59.0	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		21.7	21.7	21.7		88.3			88.3	
Actuated g/C Ratio		0.05		0.18	0.18	0.18		0.74			0.74	
v/c Ratio		0.04		0.60	0.58	0.61		0.41			0.31	
Control Delay		0.4		53.2	52.2	14.9		5.5			2.4	
Queue Delay		0.0		0.0	0.0	0.0		0.3			0.1	
Total Delay		0.4		53.2	52.2	14.9		5.7			2.6	
LOS		A		D	D	B		A			A	
Approach Delay		0.4			34.8			5.7			2.6	
Approach LOS		A			C			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 25 (21%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 61.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp





Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	8	165	166	299	1080	820
v/c Ratio	0.04	0.60	0.58	0.61	0.41	0.31
Control Delay	0.4	53.2	52.2	14.9	5.5	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.1
Total Delay	0.4	53.2	52.2	14.9	5.7	2.6
Queue Length 50th (m)	0.0	40.1	40.2	12.0	22.6	1.7
Queue Length 95th (m)	0.0	59.7	59.5	37.6	m49.8	76.5
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	306	407	421	604	2655	2655
Starvation Cap Reductn	0	0	0	0	781	769
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.41	0.39	0.50	0.58	0.43

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	1	321	0	290	0	1048	0	0	795	0
Future Volume (vph)	7	0	1	321	0	290	0	1048	0	0	795	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.98		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.96		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1790		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.88	0.88	1.00		1.00			1.00	
Satd. Flow (perm)		1868		1527	1579	1597		3610			3610	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	7	0	1	331	0	299	0	1080	0	0	820	0
RTOR Reduction (vph)	0	8	0	0	0	199	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	165	166	100	0	1080	0	0	820	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm		NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		18.7	18.7	18.7		81.7			81.7	
Effective Green, g (s)		1.6		21.7	21.7	21.7		84.7			84.7	
Actuated g/C Ratio		0.01		0.18	0.18	0.18		0.71			0.71	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		276	285	288		2548			2548	
v/s Ratio Prot								c0.30			0.23	
v/s Ratio Perm		c0.00		c0.11	0.11	0.06						
v/c Ratio		0.00		0.60	0.58	0.35		0.42			0.32	
Uniform Delay, d1		58.4		45.1	45.0	43.0		7.4			6.7	
Progression Factor		1.00		1.00	1.00	1.00		0.73			0.33	
Incremental Delay, d2		0.1		3.5	3.0	0.7		0.2			0.3	
Delay (s)		58.5		48.6	48.0	43.7		5.6			2.5	
Level of Service		E		D	D	D		A			A	
Approach Delay (s)		58.5			46.1			5.6			2.5	
Approach LOS		E			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.45			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	61.1%	ICU Level of Service	B	
Analysis Period (min)	15			

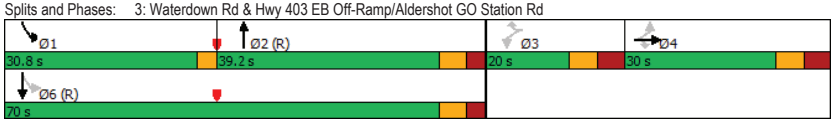
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	331	221	312	24	0	80	0	593	567	509	564	0
Future Volume (vph)	331	221	312	24	0	80	0	593	567	509	564	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.927				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3346	0	1805	3610	0
Flt Permitted	0.950			0.336						0.119		
Satd. Flow (perm)	1745	1900	1597	1197	0	1597	0	3346	0	226	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			332			136		203				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
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 (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	352	235	332	26	0	85	0	631	603	541	600	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	352	235	332	26	0	85	0	1234	0	541	600	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	30.0	30.0	30.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	30.0	30.0	30.0	20.0		20.0		39.2		30.8	70.0	
Total Split (%)	25.0%	25.0%	25.0%	16.7%		16.7%		32.7%		25.7%	58.3%	
Maximum Green (s)	22.0	22.0	22.0	12.0		12.0		32.2		27.8	63.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	28.0	28.0	28.0	13.5		13.5		35.2		69.6	69.6	
Actuated g/C Ratio	0.23	0.23	0.23	0.11		0.11		0.29		0.58	0.58	
v/c Ratio	0.86	0.53	0.53	0.19		0.28		1.10		1.02	0.29	
Control Delay	66.0	45.6	7.5	52.4		5.4		91.5		77.0	11.3	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	66.0	45.6	7.5	52.4		5.4		91.5		77.0	11.3	
LOS	E	D	A	D		A		F		E	B	
Approach Delay		39.6			16.4			91.5			42.4	
Approach LOS		D			B			F			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.10			
Intersection Signal Delay: 58.6		Intersection LOS: E	
Intersection Capacity Utilization 94.4%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	352	235	332	26	85	1234	541	600
v/c Ratio	0.86	0.53	0.53	0.19	0.28	1.10	1.02	0.29
Control Delay	66.0	45.6	7.5	52.4	5.4	91.5	77.0	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.0	45.6	7.5	52.4	5.4	91.5	77.0	11.3
Queue Length 50th (m)	83.2	50.6	0.0	3.1	0.0	~162.6	~129.0	20.6
Queue Length 95th (m)	#144.4	79.8	24.9	7.8	4.8	#207.3	#203.5	57.1
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	407	443	627	159	330	1124	531	2094
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.53	0.53	0.16	0.26	1.10	1.02	0.29

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	331	221	312	24	0	80	0	593	567	509	564	0
Future Volume (vph)	331	221	312	24	0	80	0	593	567	509	564	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.93		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3345		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.34		1.00		1.00		0.12	1.00	
Satd. Flow (perm)	1745	1900	1597	1198		1597		3345		226	3610	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	352	235	332	26	0	85	0	631	603	541	600	0
RTOR Reduction (vph)	0	0	255	0	0	77	0	146	0	0	0	0
Lane Group Flow (vph)	352	235	77	26	0	8	0	1088	0	541	600	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	24.0	24.0	24.0	7.9		7.9		30.7		65.1	65.1	
Effective Green, g (s)	28.0	28.0	28.0	11.9		11.9		33.7		64.1	68.1	
Actuated g/C Ratio	0.23	0.23	0.23	0.10		0.10		0.28		0.53	0.57	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	407	443	372	118		158		939		520	2048	
v/s Ratio Prot		0.12						c0.33		c0.26	0.17	
v/s Ratio Perm	c0.20		0.05	c0.02		0.01				0.29		
v/c Ratio	0.86	0.53	0.21	0.22		0.05		1.16		1.04	0.29	
Uniform Delay, d1	44.2	40.2	37.1	49.8		48.9		43.1		35.9	13.5	
Progression Factor	1.00	1.00	1.00	1.03		2.06		1.00		0.98	0.80	
Incremental Delay, d2	17.1	1.2	0.3	0.9		0.1		83.4		49.5	0.3	
Delay (s)	61.3	41.5	37.3	52.0		100.7		126.5		84.7	11.2	
Level of Service	E	D	D	D		F		F		F	B	
Approach Delay (s)		47.6			89.3			126.5			46.1	
Approach LOS		D			F			F			D	

Intersection Summary				
HCM 2000 Control Delay	77.0	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	94.4%	ICU Level of Service	F	
Analysis Period (min)	15			

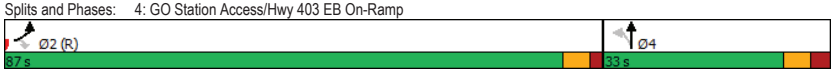
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	893	224	13	34	0	0
Future Volume (vph)	893	224	13	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.986		
Satd. Flow (prot)	1745	1597	0	1873	0	0
Flt Permitted	0.950			0.986		
Satd. Flow (perm)	1745	1597	0	1873	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		236				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	940	236	14	36	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	940	236	0	50	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	87.0	87.0	33.0	33.0		
Total Split (%)	72.5%	72.5%	27.5%	27.5%		
Maximum Green (s)	81.0	81.0	26.0	26.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	103.6	103.6		12.2		
Actuated g/C Ratio	0.86	0.86		0.10		
v/c Ratio	0.62	0.17		0.26		
Control Delay	0.8	0.1		52.9		
Queue Delay	0.0	0.0		0.0		
Total Delay	0.8	0.1		52.9		
LOS	A	A		D		
Approach Delay	0.6			52.9		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 106 (88%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 2.7		Intersection LOS: A	
Intersection Capacity Utilization 62.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp





Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	940	236	50
v/c Ratio	0.62	0.17	0.26
Control Delay	0.8	0.1	52.9
Queue Delay	0.0	0.0	0.0
Total Delay	0.8	0.1	52.9
Queue Length 50th (m)	2.4	0.0	11.7
Queue Length 95th (m)	m2.8	m0.0	24.1
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1506	1410	452
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.62	0.17	0.11

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	893	224	13	34	0	0
Future Volume (vph)	893	224	13	34	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.99		
Satd. Flow (prot)	1745	1597		1874		
Flt Permitted	0.95	1.00		0.99		
Satd. Flow (perm)	1745	1597		1874		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	940	236	14	36	0	0
RTOR Reduction (vph)	0	37	0	0	0	0
Lane Group Flow (vph)	940	199	0	50	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	99.4	99.4		7.6		
Effective Green, g (s)	101.4	101.4		10.6		
Actuated g/C Ratio	0.85	0.85		0.09		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1474	1349		165		
v/s Ratio Prot	c0.54					
v/s Ratio Perm		0.12		0.03		
v/c Ratio	0.64	0.15		0.30		
Uniform Delay, d1	3.1	1.6		51.2		
Progression Factor	0.05	0.00		1.00		
Incremental Delay, d2	0.6	0.1		1.0		
Delay (s)	0.8	0.1		52.3		
Level of Service	A	A		D		
Approach Delay (s)	0.6			52.3	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	34	819	321	0	0	34
Future Volume (vph)	34	819	321	0	0	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected		0.998				
Satd. Flow (prot)	0	1859	1863	0	1611	0
Flt Permitted		0.998				
Satd. Flow (perm)	0	1859	1863	0	1611	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		286.2	
Travel Time (s)		56.6	12.1		20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	890	349	0	0	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	927	349	0	37	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	34	819	321	0	0	34
Future Volume (Veh/h)	34	819	321	0	0	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	890	349	0	0	37
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	349				1313	349
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	349				1313	349
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	95
cM capacity (veh/h)	1210				169	694

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	927	349	37
Volume Left	37	0	0
Volume Right	0	0	37
cSH	1210	1700	694
Volume to Capacity	0.03	0.21	0.05
Queue Length 95th (m)	0.8	0.0	1.3
Control Delay (s)	0.8	0.0	10.5
Lane LOS	A		B
Approach Delay (s)	0.8	0.0	10.5
Approach LOS			B

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		75.2%	ICU Level of Service	D
Analysis Period (min)		15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	L	L	T	TR	L	T	TR	T
Maximum Queue (m)	59.3	65.5	17.2	48.1	53.4	53.2	70.7	70.4	103.8	76.2	15.5
Average Queue (m)	29.7	29.9	6.7	22.5	28.8	26.2	32.0	24.8	58.8	37.7	0.8
95th Queue (m)	50.8	53.6	13.9	41.3	44.3	46.6	57.1	51.4	93.3	74.3	7.0
Link Distance (m)		279.6				124.4	124.4		83.5		88.5
Upstream Blk Time (%)									1		
Queuing Penalty (veh)									0		
Storage Bay Dist (m)	150.0		130.0	90.0	90.0			70.0		70.0	
Storage Blk Time (%)								0	2	0	
Queuing Penalty (veh)								0	14	1	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	13.9	62.5	60.7	73.4	41.0	47.5	66.1	50.4
Average Queue (m)	2.7	34.0	31.7	26.8	18.2	20.3	18.1	10.8
95th Queue (m)	10.1	56.8	53.7	51.6	36.7	42.0	48.7	33.0
Link Distance (m)	89.7		170.9		168.5	168.5	124.4	124.4
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	110.7	143.3	63.4	19.0	6.8	20.8	401.1	401.2	37.4	172.4	164.2
Average Queue (m)	68.2	51.4	28.5	7.1	0.4	10.4	395.5	398.7	36.8	109.1	84.4
95th Queue (m)	107.6	118.3	49.1	16.2	3.2	18.1	430.9	416.4	40.1	183.3	161.6
Link Distance (m)		296.1	296.1	218.6	218.6		396.5	396.5		168.5	168.5
Upstream Blk Time (%)							64	86		4	0
Queuing Penalty (veh)							0	0		20	0
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)	5	0							63	2	
Queuing Penalty (veh)	11	0							177	9	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	66.8	19.4	25.9
Average Queue (m)	25.0	6.3	12.8
95th Queue (m)	56.8	15.6	24.6
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	24.2	13.6
Average Queue (m)	3.3	5.8
95th Queue (m)	15.1	13.1
Link Distance (m)	929.3	277.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

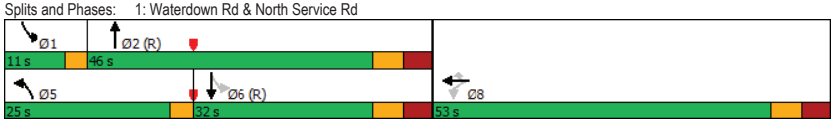
Network wide Queuing Penalty: 232

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	366	746	160	541	721	288	119	557	102
Future Volume (vph)	0	0	0	366	746	160	541	721	288	119	557	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	0.0		0.0	150.0		130.0	90.0		0.0	70.0		70.0
Storage Lanes	0		0	1		1	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95	0.95	1.00	0.95	0.95
Frt						0.850		0.957			0.977	
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	0	0	1745	1900	1597	3385	3455	0	1745	3527	0
Flt Permitted				0.950			0.950			0.172		
Satd. Flow (perm)	0	0	0	1745	1900	1597	3385	3455	0	316	3527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						176		63			18	
Link Speed (k/h)		60			50			50			50	
Link Distance (m)		93.5			304.8			148.7			104.9	
Travel Time (s)		5.6			21.9			10.7			7.6	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	402	820	176	595	792	316	131	612	112
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	402	820	176	595	1108	0	131	724	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)		3.3			3.3			6.6			6.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors				1	2	1	1	2		1	2	
Detector Template				Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)				2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)				2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type				Perm	NA	Perm	Prot	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8				6		
Detector Phase				8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)				8.0	8.0	8.0	7.0	8.0		7.0	8.0	
Minimum Split (s)				20.0	20.0	20.0	11.5	31.0		11.0	31.0	
Total Split (s)				53.0	53.0	53.0	25.0	46.0		11.0	32.0	
Total Split (%)				48.2%	48.2%	48.2%	22.7%	41.8%		10.0%	29.1%	
Maximum Green (s)				45.0	45.0	45.0	22.0	38.0		8.0	24.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				4.0	4.0	4.0	0.0	4.0		0.0	4.0	
Lost Time Adjust (s)				-4.0	-4.0	-4.0	1.0	-4.0		1.0	-4.0	
Total Lost Time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode				None	None	None	None	C-Max		None	C-Max	
Walk Time (s)				10.0	10.0	10.0		15.0			15.0	
Flash Dont Walk (s)				22.0	22.0	22.0		8.0			8.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)				49.0	49.0	49.0	20.7	42.1		35.2	28.3	
Actuated g/C Ratio				0.45	0.45	0.45	0.19	0.38		0.32	0.26	
v/c Ratio				0.52	0.97	0.22	0.94	0.81		0.69	0.79	
Control Delay				25.0	55.1	3.4	70.4	19.9		39.1	44.2	
Queue Delay				0.0	0.0	0.0	0.0	1.3		0.0	0.0	
Total Delay				25.0	55.1	3.4	70.4	21.2		39.1	44.2	
LOS				C	E	A	E	C		D	D	
Approach Delay					39.9			38.4			43.4	
Approach LOS					D			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 52 (47%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.97			
Intersection Signal Delay: 40.0		Intersection LOS: D	
Intersection Capacity Utilization 85.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 1: Waterdown Rd & North Service Rd





Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	402	820	176	595	1108	131	724
v/c Ratio	0.52	0.97	0.22	0.94	0.81	0.69	0.79
Control Delay	25.0	55.1	3.4	70.4	19.9	39.1	44.2
Queue Delay	0.0	0.0	0.0	0.0	1.3	0.0	0.0
Total Delay	25.0	55.1	3.4	70.4	21.2	39.1	44.2
Queue Length 50th (m)	63.8	176.5	0.0	56.4	84.1	16.1	78.8
Queue Length 95th (m)	93.6	#262.5	12.4	#99.4	88.8	#36.3	101.7
Internal Link Dist (m)		280.8			124.7		80.9
Turn Bay Length (m)	150.0		130.0	90.0		70.0	
Base Capacity (vph)	777	846	808	646	1362	192	922
Starvation Cap Reductn	0	0	0	0	104	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.97	0.22	0.92	0.88	0.68	0.79

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	366	746	160	541	721	288	119	557	102
Future Volume (vph)	0	0	0	366	746	160	541	721	288	119	557	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor				1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.98	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1745	1900	1597	3385	3456		1745	3526	
Flt Permitted				0.95	1.00	1.00	0.95	1.00		0.17	1.00	
Satd. Flow (perm)				1745	1900	1597	3385	3456		315	3526	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	402	820	176	595	792	316	131	612	112
RTOR Reduction (vph)	0	0	0	0	0	98	0	39	0	0	13	0
Lane Group Flow (vph)	0	0	0	402	820	78	595	1069	0	131	711	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type				Perm	NA	Perm	Prot	NA		pm+pt	NA	
Protected Phases					8		5	2		1	6	
Permitted Phases				8		8				6		
Actuated Green, G (s)				45.0	45.0	45.0	21.7	38.1		32.2	24.3	
Effective Green, g (s)				49.0	49.0	49.0	20.7	42.1		30.2	28.3	
Actuated g/C Ratio				0.45	0.45	0.45	0.19	0.38		0.27	0.26	
Clearance Time (s)				8.0	8.0	8.0	3.0	8.0		3.0	8.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)				777	846	711	636	1322		176	907	
v/s Ratio Prot					c0.43		c0.18	c0.31		0.05	0.20	
v/s Ratio Perm				0.23		0.05				0.16		
v/c Ratio				0.52	0.97	0.11	0.94	0.81		0.74	0.78	
Uniform Delay, d1				22.0	29.8	17.8	44.0	30.4		32.5	38.0	
Progression Factor				1.00	1.00	1.00	1.18	0.55		1.00	1.00	
Incremental Delay, d2				0.6	23.4	0.1	16.8	4.0		15.6	6.7	
Delay (s)				22.6	53.1	17.9	68.7	20.6		48.1	44.7	
Level of Service				C	D	B	E	C		D	D	
Approach Delay (s)		0.0			39.9			37.4			45.2	
Approach LOS		A			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	40.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.0%	ICU Level of Service	E	
Analysis Period (min)	15			

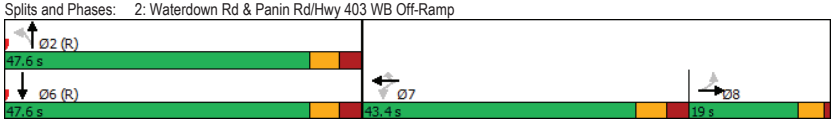
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	307	0	287	3	1253	0	0	921	0
Future Volume (vph)	1	0	3	307	0	287	3	1253	0	0	921	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	0.0		0.0	130.0		105.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Frt		0.899				0.850						
Flt Protected		0.988		0.950	0.950							
Satd. Flow (prot)	0	1688	0	1658	1715	1597	0	3610	0	0	3610	0
Flt Permitted				0.251	0.251			0.953				
Satd. Flow (perm)	0	1708	0	438	453	1597	0	3440	0	0	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109				291						
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		108.6			187.3			201.9			148.7	
Travel Time (s)		7.8			13.5			14.5			10.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	0	3	341	0	319	3	1392	0	0	1023	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	4	0	170	171	319	0	1395	0	0	1023	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)		3.3			3.3			6.6			6.6	
Link Offset(m)		10.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2			2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0			10.0	
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)	2.0	0.6		2.0	0.6	2.0	2.0	0.6			0.6	
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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Detector Phase	8	8		7	7	7	2	2			6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	8.0	8.0			8.0	
Minimum Split (s)	19.0	19.0		22.5	22.5	22.5	31.0	31.0			31.0	
Total Split (s)	19.0	19.0		43.4	43.4	43.4	47.6	47.6			47.6	
Total Split (%)	17.3%	17.3%		39.5%	39.5%	39.5%	43.3%	43.3%			43.3%	
Maximum Green (s)	14.5	14.5		36.4	36.4	36.4	40.6	40.6			40.6	
Yellow Time (s)	3.5	3.5		4.0	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)	1.0	1.0		3.0	3.0	3.0	3.0	3.0			3.0	
Lost Time Adjust (s)		-0.5		-3.0	-3.0	-3.0		-3.0			-3.0	
Total Lost Time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None	None		None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)							8.0	8.0			8.0	
Flash Dont Walk (s)							16.0	16.0			16.0	
Pedestrian Calls (#/hr)							0	0			0	
Act Effct Green (s)		6.0		39.4	39.4	39.4		60.6			60.6	
Actuated g/C Ratio		0.05		0.36	0.36	0.36		0.55			0.55	
v/c Ratio		0.02		1.09	1.06	0.42		0.74			0.51	
Control Delay		0.2		134.1	122.9	5.9		14.8			17.3	
Queue Delay		0.0		0.0	0.0	0.0		0.1			0.3	
Total Delay		0.2		134.1	122.9	5.9		14.9			17.7	
LOS		A		F	F	A		B			B	
Approach Delay		0.3			69.2			14.9			17.7	
Approach LOS		A			E			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 40 (36%), Referenced to phase 2:NBTL and 6:SBT, Start of Green			
Natural Cycle: 130			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.09			
Intersection Signal Delay: 27.4		Intersection LOS: C	
Intersection Capacity Utilization 66.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp



Lane Group	EBT	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	4	170	171	319	1395	1023
v/c Ratio	0.02	1.09	1.06	0.42	0.74	0.51
Control Delay	0.2	134.1	122.9	5.9	14.8	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.3
Total Delay	0.2	134.1	122.9	5.9	14.9	17.7
Queue Length 50th (m)	0.0	~45.4	~44.6	4.1	112.3	55.6
Queue Length 95th (m)	0.0	#92.1	#91.2	23.8	m144.2	84.9
Internal Link Dist (m)	84.6		163.3		177.9	124.7
Turn Bay Length (m)		130.0		105.0		
Base Capacity (vph)	327	156	162	758	1894	1988
Starvation Cap Reductn	0	0	0	0	0	400
Spillback Cap Reductn	0	0	0	3	41	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.09	1.06	0.42	0.75	0.64

Intersection Summary

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

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	307	0	287	3	1253	0	0	921	0
Future Volume (vph)	1	0	3	307	0	287	3	1253	0	0	921	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)		4.0		4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95			0.95	
Frt		0.90		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.99		0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)		1687		1658	1715	1597		3610			3610	
Flt Permitted		1.00		0.25	0.25	1.00		0.95			1.00	
Satd. Flow (perm)		1708		438	453	1597		3441			3610	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1	0	3	341	0	319	3	1392	0	0	1023	0
RTOR Reduction (vph)	0	4	0	0	0	187	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	170	171	132	0	1395	0	0	1023	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		8			7			2			6	
Permitted Phases	8			7		7	2					
Actuated Green, G (s)		1.1		36.4	36.4	36.4		54.0			54.0	
Effective Green, g (s)		1.6		39.4	39.4	39.4		57.0			57.0	
Actuated g/C Ratio		0.01		0.36	0.36	0.36		0.52			0.52	
Clearance Time (s)		4.5		7.0	7.0	7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		24		156	162	572		1783			1870	
v/s Ratio Prot											0.28	
v/s Ratio Perm		c0.00		c0.39	0.38	0.08		c0.41				
v/c Ratio		0.00		1.09	1.06	0.23		0.78			0.55	
Uniform Delay, d1		53.4		35.3	35.3	24.7		21.5			17.8	
Progression Factor		1.00		1.00	1.00	1.00		0.69			1.02	
Incremental Delay, d2		0.0		98.1	86.2	0.2		1.5			0.8	
Delay (s)		53.5		133.4	121.5	24.9		16.3			19.1	
Level of Service		D		F	F	C		B			B	
Approach Delay (s)		53.5			77.9			16.3			19.1	
Approach LOS		D			E			B			B	

Intersection Summary				
HCM 2000 Control Delay	30.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	66.7%	ICU Level of Service	C	
Analysis Period (min)	15			

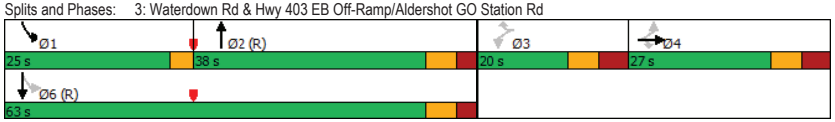
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	85	287	96	0	401	0	621	463	391	803	0
Future Volume (vph)	211	85	287	96	0	401	0	621	463	391	803	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Storage Length (m)	110.0		0.0	0.0		60.0	0.0		0.0	30.0		0.0
Storage Lanes	1		1	2		1	0		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850			0.850		0.936				
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1745	1900	1597	3385	0	1597	0	3379	0	1805	3610	0
Flt Permitted	0.950			0.250						0.118		
Satd. Flow (perm)	1745	1900	1597	891	0	1597	0	3379	0	224	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			170			419		177				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		310.2			241.1			412.1			201.9	
Travel Time (s)		22.3			17.4			29.7			14.5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	240	97	326	109	0	456	0	706	526	444	913	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	240	97	326	109	0	456	0	1232	0	444	913	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)		6.6			6.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1		1		2		1	2	
Detector Template	Left	Thru	Right	Left		Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0		10.0		2.0	10.0	
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)	2.0	0.6	2.0	2.0		2.0		0.6		2.0	0.6	
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)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Detector Phase	4	4	4	3		3		2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0		8.0		8.0		6.0	8.0	
Minimum Split (s)	27.0	27.0	27.0	20.0		20.0		29.0		10.5	29.0	
Total Split (s)	27.0	27.0	27.0	20.0		20.0		38.0		25.0	63.0	
Total Split (%)	24.5%	24.5%	24.5%	18.2%		18.2%		34.5%		22.7%	57.3%	
Maximum Green (s)	19.0	19.0	19.0	12.0		12.0		31.0		22.0	56.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		3.0	4.0	
All-Red Time (s)	4.0	4.0	4.0	4.0		4.0		3.0		0.0	3.0	
Lost Time Adjust (s)	-4.0	-4.0	-4.0	-4.0		-4.0		-3.0		1.0	-3.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead		Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Recall Mode	None	None	None	None		None		C-Max		None	C-Max	
Walk Time (s)	8.0	8.0	8.0					8.0			8.0	
Flash Dont Walk (s)	14.0	14.0	14.0					14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	
Act Effct Green (s)	21.5	21.5	21.5	16.0		16.0		34.0		60.5	60.5	
Actuated g/C Ratio	0.20	0.20	0.20	0.15		0.15		0.31		0.55	0.55	
v/c Ratio	0.71	0.26	0.73	0.84		0.77		1.06		1.00	0.46	
Control Delay	53.1	38.9	29.4	83.6		27.4		74.9		60.7	16.5	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	53.1	38.9	29.4	83.6		27.4		74.9		60.7	16.5	
LOS	D	D	C	F		C		E		E	B	
Approach Delay		39.4			38.2			74.9			30.9	
Approach LOS		D			D			E			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 100 (91%), Referenced to phase 2:NBT and 6:SBTL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 47.7		Intersection LOS: D	
Intersection Capacity Utilization 80.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	240	97	326	109	456	1232	444	913
v/c Ratio	0.71	0.26	0.73	0.84	0.77	1.06	1.00	0.46
Control Delay	53.1	38.9	29.4	83.6	27.4	74.9	60.7	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	38.9	29.4	83.6	27.4	74.9	60.7	16.5
Queue Length 50th (m)	50.1	18.4	32.5	13.3	56.5	~145.4	~86.8	58.6
Queue Length 95th (m)	76.1	32.9	62.8	m#23.1	83.0	#181.6	m#128.4	m84.0
Internal Link Dist (m)		286.2				388.1		177.9
Turn Bay Length (m)	110.0				60.0		30.0	
Base Capacity (vph)	364	397	468	129	590	1166	446	1985
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.24	0.70	0.84	0.77	1.06	1.00	0.46

Intersection Summary

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

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

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	85	287	96	0	401	0	621	463	391	803	0
Future Volume (vph)	211	85	287	96	0	401	0	621	463	391	803	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1597	3385		1597		3379		1805	3610	
Flt Permitted	0.95	1.00	1.00	0.25		1.00		1.00		0.12	1.00	
Satd. Flow (perm)	1745	1900	1597	891		1597		3379		224	3610	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	240	97	326	109	0	456	0	706	526	444	912	0
RTOR Reduction (vph)	0	0	137	0	0	358	0	122	0	0	0	0
Lane Group Flow (vph)	240	97	189	109	0	98	0	1110	0	444	913	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm		Perm		NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4	3		3				6		
Actuated Green, G (s)	17.5	17.5	17.5	12.0		12.0		31.0		57.5	57.5	
Effective Green, g (s)	21.5	21.5	21.5	16.0		16.0		34.0		56.5	60.5	
Actuated g/C Ratio	0.20	0.20	0.20	0.15		0.15		0.31		0.51	0.55	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0		3.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	341	371	312	129		232		1044		438	1985	
v/s Ratio Prot		0.05						c0.33		c0.21	0.25	
v/s Ratio Perm	c0.14		0.12	c0.12		0.06				0.31		
v/c Ratio	0.70	0.26	0.61	0.84		0.42		1.06		1.01	0.46	
Uniform Delay, d1	41.3	37.5	40.4	45.8		42.8		38.0		33.2	14.9	
Progression Factor	1.00	1.00	1.00	0.85		2.97		1.00		0.72	1.03	
Incremental Delay, d2	6.5	0.4	3.3	33.8		1.1		46.2		40.8	0.6	
Delay (s)	47.7	37.9	43.7	72.7		128.4		84.2		64.6	16.0	
Level of Service	D	D	D	E		F		F		E	B	
Approach Delay (s)		44.3			117.7			84.2			31.9	
Approach LOS		D			F			F			C	

Intersection Summary				
HCM 2000 Control Delay	63.6	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	80.3%	ICU Level of Service	D	
Analysis Period (min)	15			

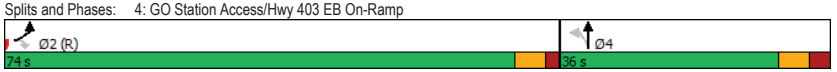
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	725	19	279	37	0	0
Future Volume (vph)	725	19	279	37	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.5	3.6	3.6	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950			0.958		
Satd. Flow (prot)	1745	1597	0	1820	0	0
Flt Permitted	0.950			0.958		
Satd. Flow (perm)	1745	1597	0	1820	0	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		24				
Link Speed (k/h)	50			50	50	
Link Distance (m)	212.4			53.5	122.2	
Travel Time (s)	15.3			3.9	8.8	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	929	24	358	47	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	929	24	0	405	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.3			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.04	1.01	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2		
Detector Template	Left	Right	Left	Thru		
Leading Detector (m)	2.0	2.0	2.0	10.0		
Trailing Detector (m)	0.0	0.0	0.0	0.0		
Detector 1 Position(m)	0.0	0.0	0.0	0.0		
Detector 1 Size(m)	2.0	2.0	2.0	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(m)				9.4		
Detector 2 Size(m)				0.6		
Detector 2 Type				Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)				0.0		
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Detector Phase	2	2	4	4		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0		
Minimum Split (s)	30.0	30.0	33.0	33.0		
Total Split (s)	74.0	74.0	36.0	36.0		
Total Split (%)	67.3%	67.3%	32.7%	32.7%		
Maximum Green (s)	68.0	68.0	29.0	29.0		
Yellow Time (s)	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	3.0	3.0		
Lost Time Adjust (s)	-2.0	-2.0		-3.0		
Total Lost Time (s)	4.0	4.0		4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Recall Mode	C-Max	C-Max	None	None		
Walk Time (s)	15.0	15.0	15.0	15.0		
Flash Dont Walk (s)	8.0	8.0	8.0	8.0		
Pedestrian Calls (#/hr)	0	0	0	0		
Act Effct Green (s)	72.1	72.1		29.9		
Actuated g/C Ratio	0.66	0.66		0.27		
v/c Ratio	0.81	0.02		0.82		
Control Delay	5.4	0.5		51.9		
Queue Delay	0.0	0.0		0.0		
Total Delay	5.4	0.5		51.9		
LOS	A	A		D		
Approach Delay	5.3			51.9		
Approach LOS	A			D		

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 100 (91%), Referenced to phase 2:EBL and 6:, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 19.2		Intersection LOS: B	
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 4: GO Station Access/Hwy 403 EB On-Ramp





Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	929	24	405
v/c Ratio	0.81	0.02	0.82
Control Delay	5.4	0.5	51.9
Queue Delay	0.0	0.0	0.0
Total Delay	5.4	0.5	51.9
Queue Length 50th (m)	26.6	0.2	83.4
Queue Length 95th (m)	m25.9	m0.1	99.4
Internal Link Dist (m)	188.4		29.5
Turn Bay Length (m)			
Base Capacity (vph)	1144	1055	529
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.81	0.02	0.77

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	725	19	279	37	0	0
Future Volume (vph)	725	19	279	37	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.6	3.6	3.6
Total Lost time (s)	4.0	4.0		4.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.96		
Satd. Flow (prot)	1745	1597		1820		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1745	1597		1820		
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	929	24	358	47	0	0
RTOR Reduction (vph)	0	8	0	0	0	0
Lane Group Flow (vph)	929	16	0	405	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Perm	NA		
Protected Phases	2			4		
Permitted Phases		2	4			
Actuated Green, G (s)	70.1	70.1		26.9		
Effective Green, g (s)	72.1	72.1		29.9		
Actuated g/C Ratio	0.66	0.66		0.27		
Clearance Time (s)	6.0	6.0		7.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	1143	1046		494		
v/s Ratio Prot	c0.53					
v/s Ratio Perm		0.01		0.22		
v/c Ratio	0.81	0.02		0.82		
Uniform Delay, d1	14.0	6.6		37.5		
Progression Factor	0.18	0.16		1.00		
Incremental Delay, d2	2.1	0.0		10.2		
Delay (s)	4.6	1.1		47.8		
Level of Service	A	A		D		
Approach Delay (s)	4.6			47.8	0.0	
Approach LOS	A			D	A	

Intersection Summary				
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	64.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	22	385	1250	0	0	22
Future Volume (vph)	22	385	1250	0	0	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected		0.997				
Satd. Flow (prot)	0	1857	1863	0	1611	0
Flt Permitted		0.997				
Satd. Flow (perm)	0	1857	1863	0	1611	0
Link Speed (k/h)		60	60		50	
Link Distance (m)		944.1	201.6		228.3	
Travel Time (s)		56.6	12.1		16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	418	1359	0	0	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	442	1359	0	24	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	385	1250	0	0	22
Future Volume (Veh/h)	22	385	1250	0	0	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	418	1359	0	0	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1359				1825	1359
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1359				1825	1359
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				100	87
cM capacity (veh/h)	506				81	182

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	442	1359	24
Volume Left	24	0	0
Volume Right	0	0	24
cSH	506	1700	182
Volume to Capacity	0.05	0.80	0.13
Queue Length 95th (m)	1.2	0.0	3.6
Control Delay (s)	1.4	0.0	27.8
Lane LOS	A		D
Approach Delay (s)	1.4	0.0	27.8
Approach LOS			D

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

Intersection: 1: Waterdown Rd & North Service Rd

Movement	WB	WB	WB	B16	NB	NB	NB	NB	SB	SB	SB	B20
Directions Served	L	T	R	T	L	L	T	TR	L	T	TR	T
Maximum Queue (m)	157.5	311.0	137.5	306.3	79.3	97.5	140.1	138.7	77.2	104.4	77.4	33.3
Average Queue (m)	120.6	248.3	99.3	105.0	45.1	97.2	128.4	126.1	36.7	72.3	57.0	2.3
95th Queue (m)	204.6	367.6	194.9	328.4	67.2	98.7	139.7	136.1	78.2	99.9	82.8	17.8
Link Distance (m)		279.6		929.4			124.4	124.4		83.5		88.5
Upstream Blk Time (%)		17					24	13		3		
Queuing Penalty (veh)		216					187	104		0		
Storage Bay Dist (m)	150.0		130.0		90.0	90.0			70.0		70.0	
Storage Blk Time (%)	0	34	0		0	0	45		0	8	1	
Queuing Penalty (veh)	2	177	1		0	1	244		0	39	2	

Intersection: 2: Waterdown Rd & Panin Rd/Hwy 403 WB Off-Ramp

Movement	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	LT	R	LT	T	T	TR
Maximum Queue (m)	8.1	49.2	58.7	89.7	179.2	183.9	70.3	61.6
Average Queue (m)	0.8	24.7	32.7	45.5	172.5	163.3	35.4	28.7
95th Queue (m)	4.6	46.4	54.1	77.0	182.6	196.1	59.2	53.9
Link Distance (m)	89.7		170.9		168.5	168.5	124.4	124.4
Upstream Blk Time (%)					29	6		
Queuing Penalty (veh)					180	40		
Storage Bay Dist (m)		130.0		105.0				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 3: Waterdown Rd & Hwy 403 EB Off-Ramp/Aldershot GO Station Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	L	R	T	TR	L	T	T
Maximum Queue (m)	117.4	286.4	174.8	74.8	162.4	67.5	401.3	401.1	37.4	117.4	89.4
Average Queue (m)	99.2	158.6	95.0	18.8	99.2	62.0	383.6	386.0	34.6	53.6	41.3
95th Queue (m)	142.3	360.9	288.6	57.5	210.3	80.8	456.9	452.9	42.6	99.0	76.6
Link Distance (m)		296.1	296.1	218.6	218.6		396.5	396.5		168.5	168.5
Upstream Blk Time (%)		25	9				74	77			
Queuing Penalty (veh)		0	0				0	0			
Storage Bay Dist (m)	110.0					60.0			30.0		
Storage Blk Time (%)	56					63			41	8	
Queuing Penalty (veh)	48					30			165	30	

Intersection: 4: GO Station Access/Hwy 403 EB On-Ramp

Movement	EB	EB	NB
Directions Served	L	R	LT
Maximum Queue (m)	77.9	8.2	48.3
Average Queue (m)	31.1	1.0	43.9
95th Queue (m)	63.4	5.4	56.7
Link Distance (m)	195.8	195.8	43.7
Upstream Blk Time (%)			19
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: North Service Rd & Hickory Lane

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	60.8	11.5
Average Queue (m)	10.0	4.2
95th Queue (m)	35.3	11.1
Link Distance (m)	929.4	219.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1466