1120 Cooke Boulevard (Phase 2) Proposed Mixed-Use Development Traffic Impact Study

City of Burlington

Official Plan Amendment (OPA) / Zoning By-law Amendment (ZBA)

Prepared For: Adi Developments (Masonry) Inc.

July 2023



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1.0 INTRODUCTION

BA Group has been retained by Adi Developments (Masonry) Inc. (the "client") to provide transportation consulting services in relation to an Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) applications for the lands located at 1120 Cooke Boulevard (the "site") in the City of Burlington, formerly identified as Phase 2 of 101 Masonry Court lands. Phase 1 consisted of 425 units (140 stacked townhouses, 58 back-to-back townhouses, 35 regular townhouses, 172 apartment units and 20 rear lane townhouses) is registered, closed, and occupied.

The site is located on the north-east corner of the Waterdown Road and Masonry Court intersection. The site is approximately 9,537 m^2 / 102,655 ft^2 in size and is bounded by Waterdown Road to the west, Masonry Court to the south, Cooke Boulevard to the east and the CN rail corridor to the north. The site is located immediately adjacent (southwest of) the Aldershot GO Station with frequent service between Aldershot and Union Station in downtown Toronto operated by Metrolinx.

The site location and context are illustrated in **Figure 1** and **Figure 2**, respectively.

The site is currently vacant with vehicle access located on Masonry Court. Pedestrian sidewalks are available along the southern and eastern boundaries of the site. The City of Burlington Zoning By-law 2020 designates the site as a Mixed-Use Corridor Zone-commercial oriented (MXC-26), bordered by general employment (GE1 and GE2) zones immediately to the north, east and west and Mixed-Use Corridor Zone-employment oriented (MXE) to the south.

1.1 THIS STUDY

This study report forms part of the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) applications to permit redevelopment of the site as proposed. This study is an update to a former traffic impact study prepared by BA Group in November 2021 ("November 2021 TIS") for the site.

This report provides an assessment of the transportation related aspects of the site, including:

- A description of the existing transportation context of the site including vehicular, transit, cycling and pedestrian accessibility;
- A review of vehicle parking, bicycle parking and loading requirements specified by the applicable Zoning By-law;
- A review of the functionality and appropriateness of the proposed driveways in regard to the accommodation of service vehicles, and refuse collection vehicles;
- A Transportation Demand Management (TDM) framework plan that is focused on reducing single occupancy travel and promoting more sustainable modes of travel;
- An assessment of existing traffic volumes on the area road system surrounding the proposed development;
- A comprehensive review of traffic changes that may occur due to background and corridor traffic growth in the area;
- An assessment of the trip generation characteristics of the proposed development;
- A review of weekday peak hour traffic operations under existing, background, and future total conditions;
- An assessment of the operational impacts of the proposed development at the study area intersections;
- Recommended short and long-term intersection road network improvements.

A response to agency comments made on the November 2021 TIS has also been provided in Section 12.0 of this report.

1.2 BACKGROUND

1.2.1 Area Background Studies

1.2.1.1 Draft Aldershot GO Major Transit Station Area

The City of Burlington initiated the Burlington GO Mobility Hub Study in 2017. In early 2019, the Mobility Hubs Study was paused in order to advance other initiatives that would impact its outcome including updates to the Burlington Official Plan and the Halton Regional Municipal Comprehensive Review ("MCR"). As an outcome of the Region of Halton's MCR, the Region formally delineated boundaries for Major Transit Station Areas and minimum density targets for all Halton Region Major Transit Station Areas (MTSAs) including Aldershot GO. The subject site is part of the Draft Aldershot GO Mobility Hub study area (now referred to as the Aldershot Major Transit Station Area), which sets forth the vision for future development in this area of Burlington.

A road network and associated policies, as envisioned by the City of Burlington, are provided within the *June 2022 Major Transit Station Area – Area-Specific Planning Study*, which identifies the City's future area road network system within the Aldershot MTSA. In 2023, the City has been receiving feedback on their 2022 MTSA Area Specific Planning Study and has been advancing technical studies in preparation for finalizing policies and schedules. As of July 2023, the City has provided an update on the Aldershot GO MTSA that the following studies are in progress but have yet to be finalized:

- Transportation Assessment
- Functional Servicing Study
- Fiscal Impact Study

The site is located within the area that is identified as the Aldershot GO Central Precinct and will accommodate the most significant concentration of residential, retail and commercial uses which will contribute towards the creation of a complete transit-oriented community and achieve a high degree of compatibility with adjacent lands uses and transportation infrastructure.

The context of the Aldershot GO MTSA study area is shown in **Figure 3** and **Figure 4**.

Figures from the *2022 MTSA – Area-Specific Planning Study* are provided in **Appendix A**.

1.2.1.2 QEW and Highway 403 Freeman Interchange Preliminary Design Study and Class Environmental Assessment

The MTO undertook a Preliminary Design and Class Environmental Assessment (EA) Study for the Queen Elizabeth Way (QEW). The site is located within the study limit for the Highway 403 improvement area. The context of that study area is shown in **Figure 5**. The five (5) arterial road interchanges studied are Guelph line, Brant Street, Plains Road / Fairview Street, North Shore Boulevard East and Waterdown Road. While the EA study looked at increasing the number of lanes on Highway 403, it did not review the interchange design specific to Waterdown Road as part of the study's scope.

1.2.1.3 Burlington Investment Profile: 403 West Corridor and QEW Prosperity Corridor Study

In the Burlington Investment Profile document, 403 West Corridor and QEW Prosperity Corridor are two (2) of the investment districts listed. The site is located within the study boundary of the Highway 403 West Corridor Investment district as shown in **Figure 6**.

The City of Burlington, Region of Halton and the Ministry of Transportation are jointly undertaking the QEW Prosperity Corridor Block Planning and Implementation Study that will identify infrastructure needs within development corridors to facilitate and expedite the development review process.

1.2.1.4 Operating and Capital Budget

The Burlington 2020 Operating and Capital Budget identifies the widening of the Waterdown Road bridge over Highway 403 to accommodate a 5-lane cross-section with on-road bike lanes and improved pedestrian facilities and has included this widening in its forecast for the last 10+ years. The City identifies this widening as a joint project to address existing capacity limitation along the bridge section and expected increases to vehicle, bus, cyclist and pedestrian activity around the Aldershot Mobility Hub. The City has constructed a widened Waterdown Road on either side of the highway and CN rail bridges, including constructing bike lanes along Waterdown Road north and south of Highway 403.

Engineering Services at the City of Burlington confirmed in 2023 that the City removed the Waterdown Road Bridge Widening project from the 10 year forecast in 2020 for the 2021 forecast, and the City and MTO no longer have plans to widen the structure. The MTO has confirmed that the overpass has 20+ years of service life remaining and once their structural assessments support replacement they will replace in the current configuration because the existing structure can accommodate the proposed 8 lane highway widening without any impact to the current configuration. The summary below is the budget and timing of the Waterdown Road bridge widening in the three former Development Charges (DC) Background Study Updates:

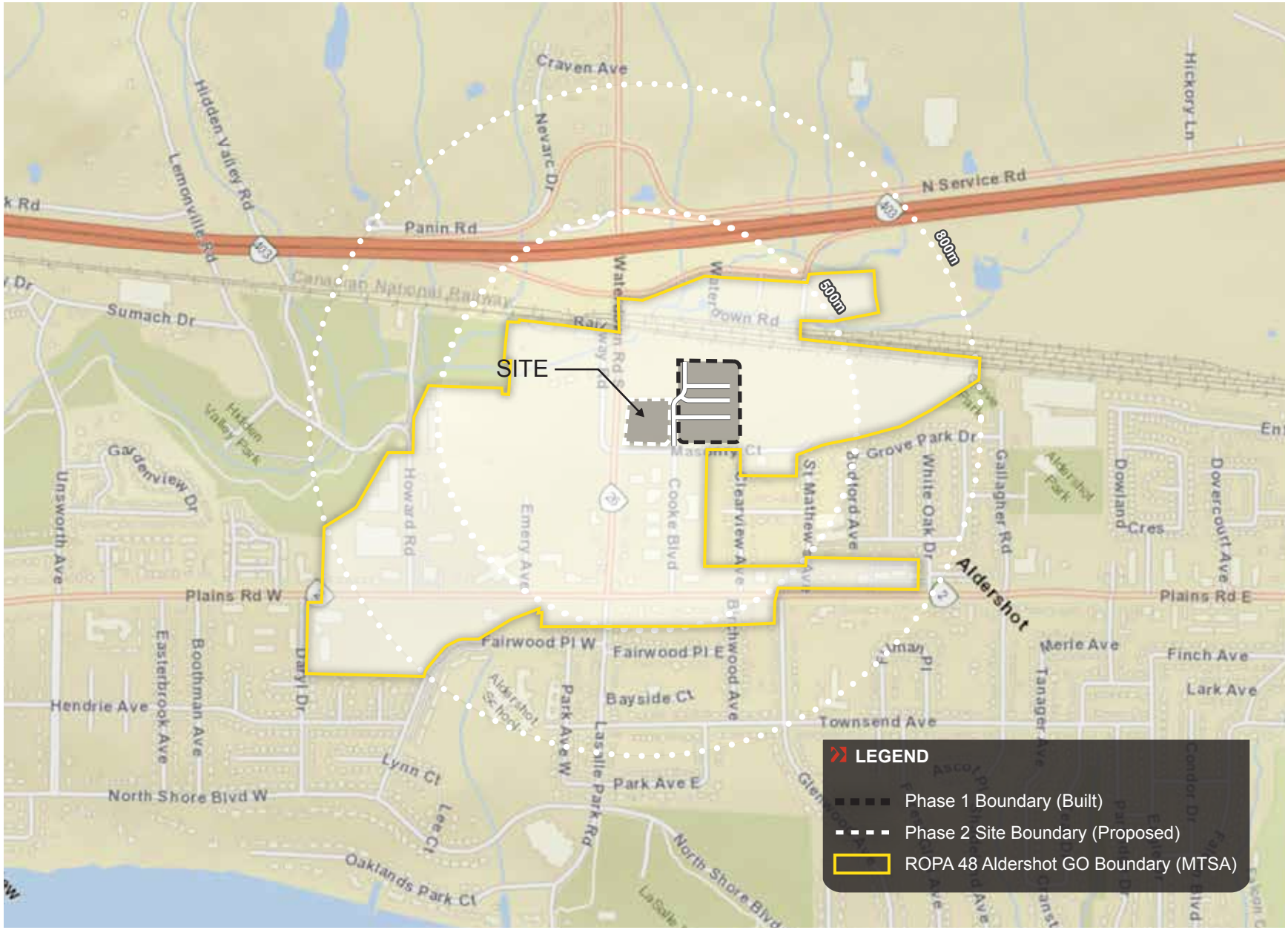
- 2014 DC Background Study; Timing = 2016; $9,000,000 Gross Cost
- 2019 DC Background Study; Timing = 2028; $9,000,000 Gross Cost
- 2022 DC Background Study Update; Timing = 2036; $9,000,000 Gross Cost

We anticipate the forthcoming Transportation Assessment for the Aldershot MTSA will identify whether there continues to be a need for advancing this widening and other area infrastructure improvements as it relates to MTSA growth, the purpose for which the widening was initially identified. We also anticipate that any growth related infrastructure identified will be captured by the City's next Development Charges By-law update, consistent with the City's Phasing and Financial Tools identified in the *2022 MTSA – Area-Specific Planning Study.* The widening remains within the 15-year study horizon assessed as part of this TIS.

1.2.2 Site Background Studies

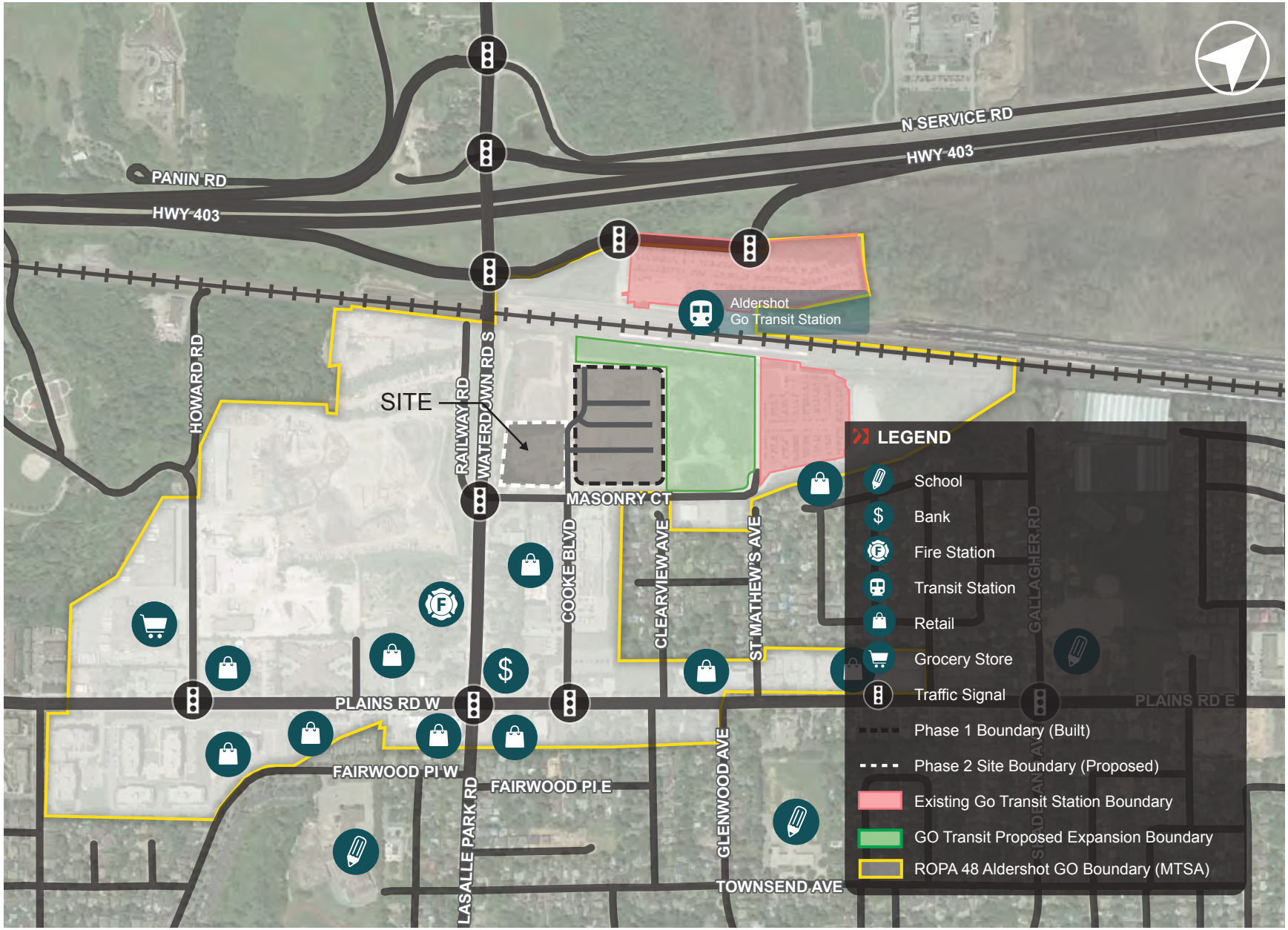
1.2.2.1 1120 Cooke Boulevard - Phase 2 Terms of Reference

BA Group has previously submitted a Terms of Reference (TOR) letter to the City of Burlington titled “Traffic Impact Study Scope for OPA/ZBA -1120 Cooke Boulevard” dated October 14, 2020. The letter described the proposed scope for this report. Following this submission, comments from the City of Burlington and Ministry of Transportation (MTO) were received and taken into account for this report. The terms of reference and comments from each agency are provided in **Appendix B.**



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FIGURE 1 SITE LOCATION



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FIGURE 2 SITE CONTEXT

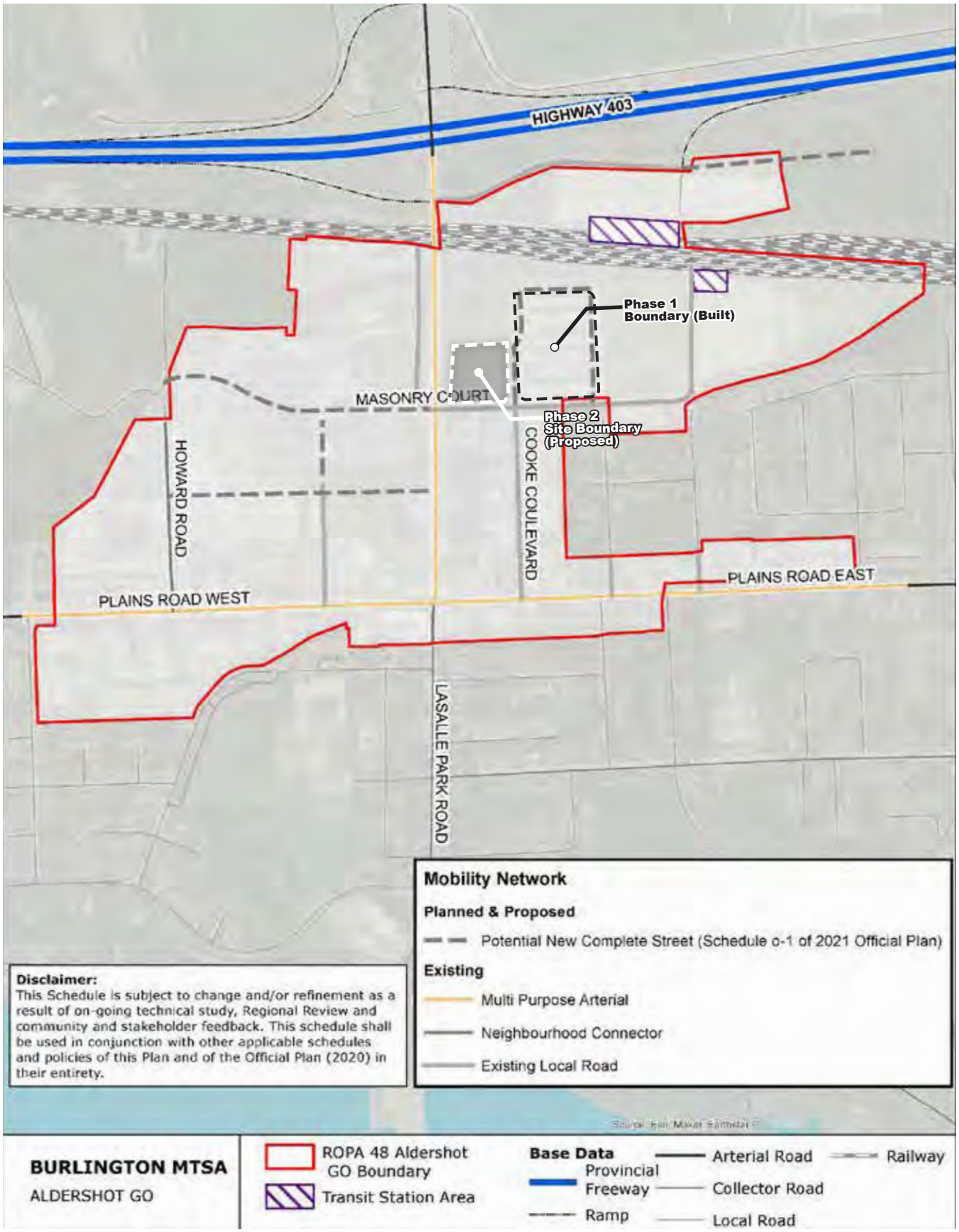
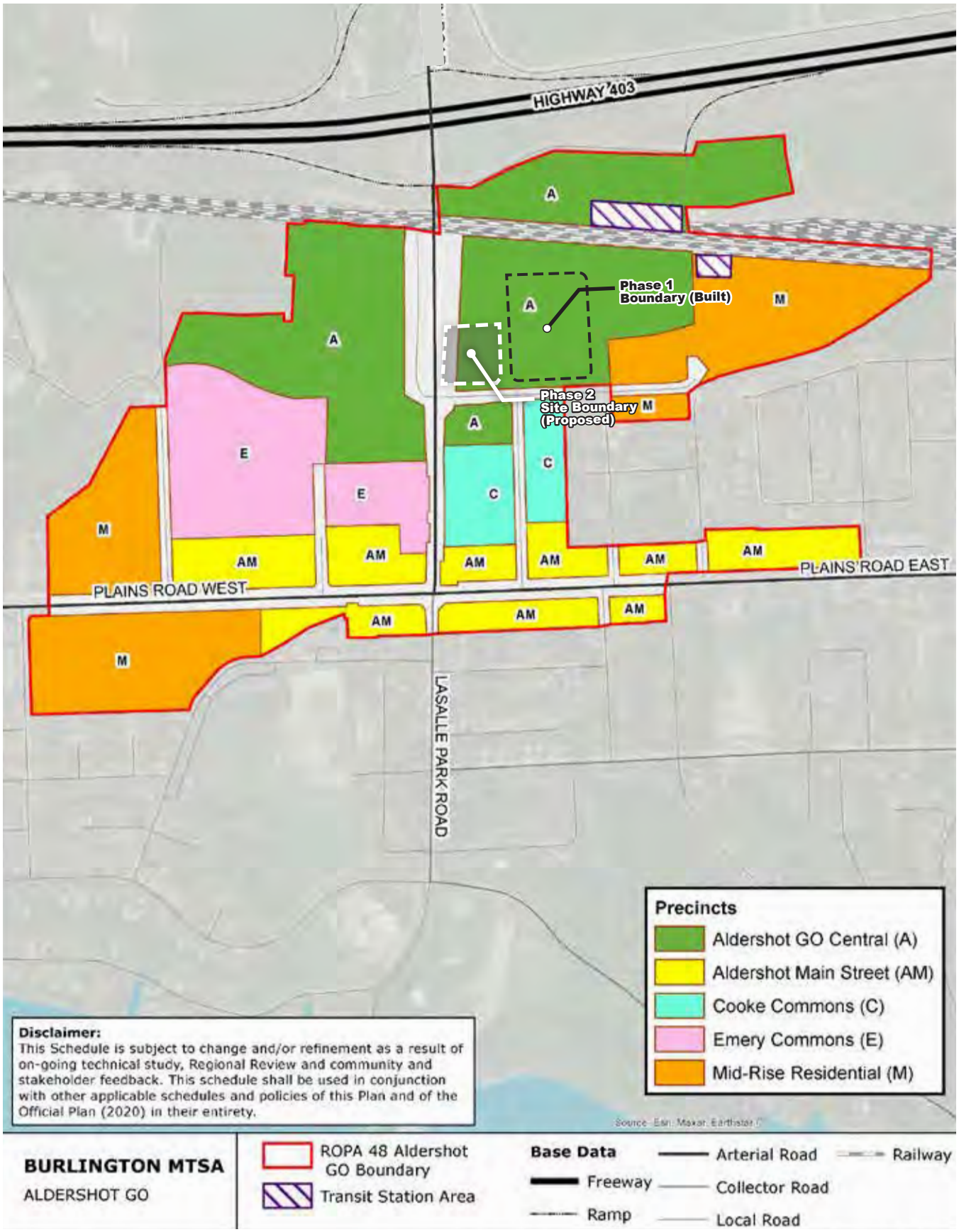


FIGURE 3 DRAFT ALDERSHOT MTSA MOBILITY NETWORK



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Aerial maps provided courtesy of: Esri, DigitalGlobe, GeoEye, Earthstar Geographies, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, the GIS User Community and/or Google Earth/Maps.

FIGURE 4 DRAFT ALDERSHOT MTSA PRECINCTS

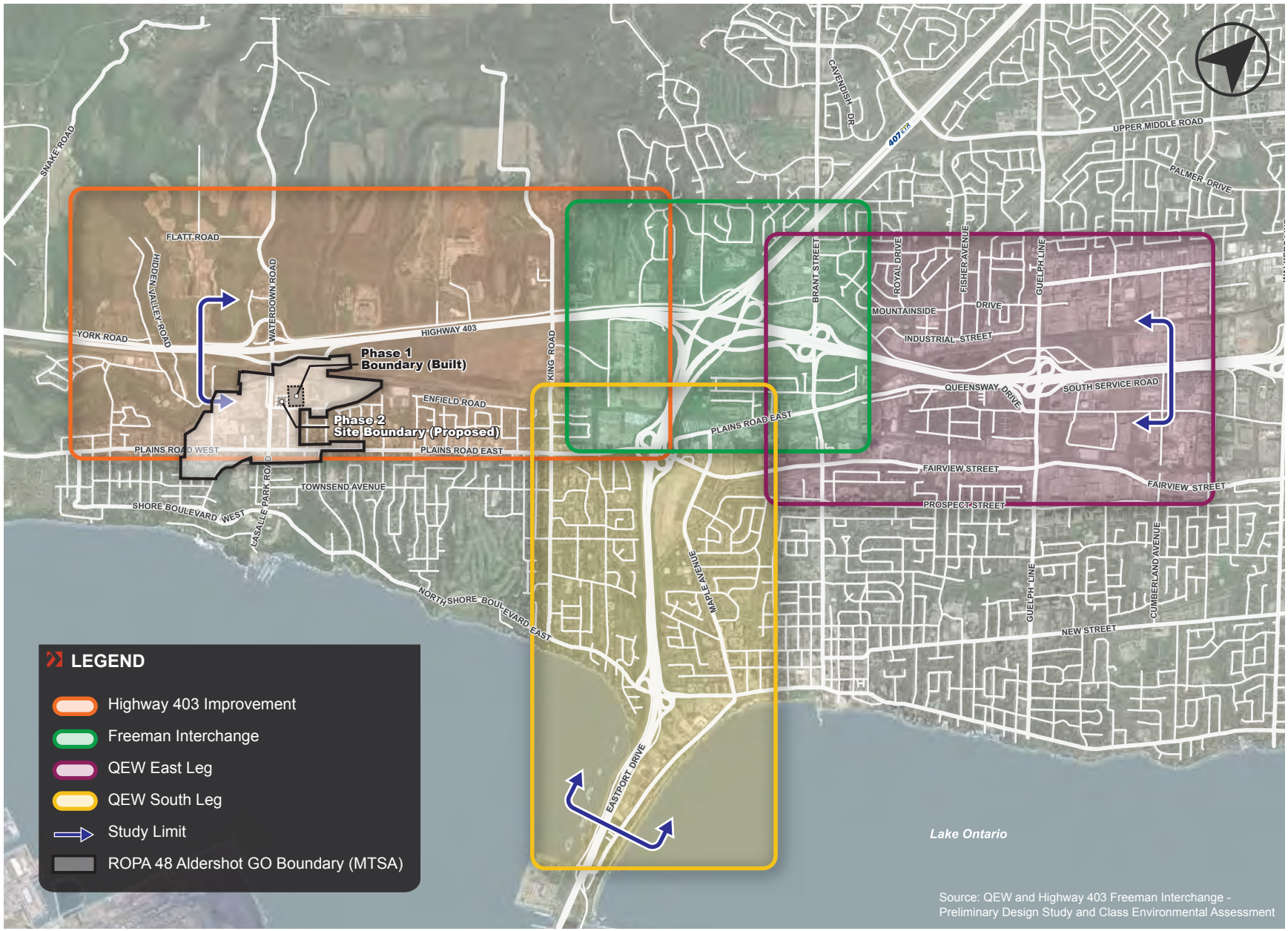
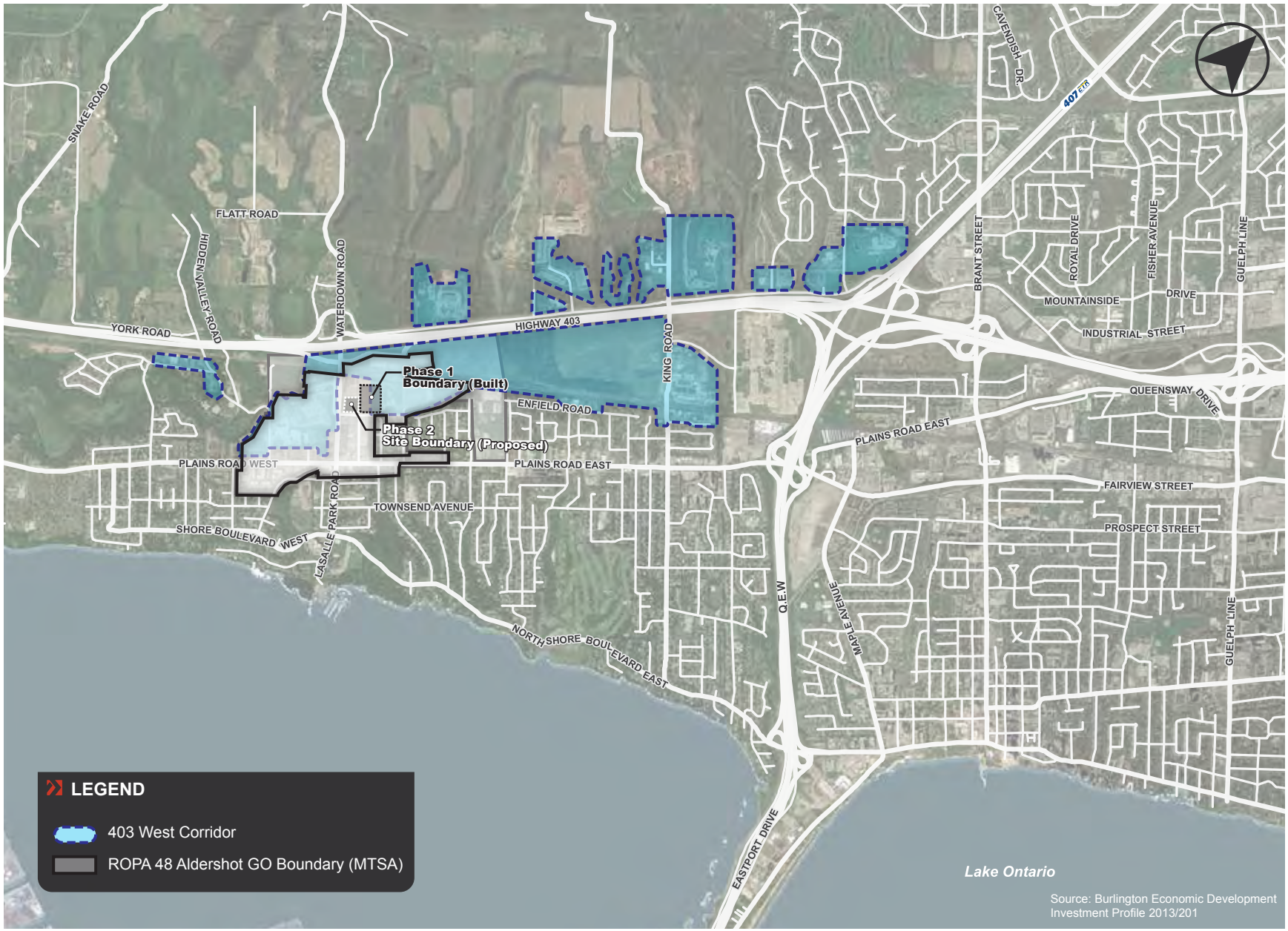


FIGURE 5 ENVIRONMENTAL ASSESSMENT STUDY LIMITS



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FIGURE 6 HIGHWAY 403 WEST CORRIDOR STUDY AREA

2.0 DEVELOPMENT PROGRAM

2.1 CHANGES TO THE DEVELOPMENT PROGRAM

Since the initial submission in November 2021, the development program has undergone minor changes. Building B and C were originally connected with a podium. The current submission now contemplates Buildings B and C as separate towers with an at-grade retail plaza.

The proposed site plan is illustrated in **Figure 7** and the proposed road network is illustrated in **Figure 8**. A summary of the previous and current development program and the transportation-related site elements are provided in **Table 1**. Site access, via Waterdown Road and Cooke Boulevard remains consistent with the initial application for the site.

A reduced set of architectural plans (not to scale) illustrating the ground floor and the parking level plans are provided in **Appendix C**.

A summary of the key changes to the proposed development (from November 2021 to the current submission) are listed below:

- **Residential Units**: Increase of 26 units (new total of 1,165 units);
- **Retail Floor Area:** Increase of 264 m^2 (new total of 495 m^2);
- **Vehicular Parking:** Increase of 106 parking spaces (new supply of 1,137 parking spaces);
- **Bicycle Parking**: Increase of 48 bicycle parking spaces (new supply of 676 bicycle parking spaces); and
- **Loading Supply:** Addition of two new loading areas to service the development.

TABLE 1 DETAILED DEVELOPMENT PROPOSAL COMPARISON SUMMARY

Use		November 2021 Submission[1]	Current Submission[2]	Difference
	Residential Units	Bach: 0 units 1 bd: 424 units 1 bd+den: 424 units 2bd: 277 units 2bd+den: 13 units 3bd: 1 unit	Bach: 6 units 1 bd: 312 units 1 bd+den: 459 units 2bd: 337 units 2bd+den: 51 units 3bd: 0 units	Bach: +6 units 1 bd: -112 units 1 bd+den: +35 units 2bd: +60 units 2bd+den: +38 units 3bd: -1 unit
		Total: 1,139 units	Total: 1,165 units	+26 units
	Commercial-Retail GFA	Total: 231 m^2	Total: 495 m^2	+264 m^2
	Vehicular Parking	Residential: 924 spaces Non-Residential: 107 spaces	Residential: 1,037 spaces Non-Residential: 100 spaces	Residential: +113 spaces Non-Residential: -7 space
		Total: 1,031 spaces (0.90 spaces / unit)	Total: 1,137 spaces (0.98 spaces / unit)	+106 spaces
	Bicycle Parking	Long-term: 567 spaces (P1-P4, at-grade) Short-term: 56 spaces (at-grade) Commercial: 5 spaces (at-grade)	Long-term: 596 spaces (P1-P2, and at-grade) Short-term: 62 spaces (at-grade) Commercial: 18 spaces (at-grade)	Long-term: +29 spaces Short-term: +6 spaces Commercial: +13 spaces
		Total: 628 spaces (0.55 spaces/ unit)	Total: 676 spaces (0.6 spaces / unit)	+48 spaces
	Loading	3 formal spaces	2 formal loading spaces 3 informal moving spaces	-1 formal space +3 informal moving spaces
		Total: 3 loading spaces	Total: 5 loading spaces	+2 loading spaces
	Vehicular Access	New unsignalized right-turns only access via Waterdown Road. New unsignalized all-moves access via Cooke Boulevard Extension. STOP-controlled intersection with full manoeuvres.	New unsignalized right-turns only access via Waterdown Road. New unsignalized all-moves access via Cooke Boulevard Extension. STOP-controlled intersection with full manoeuvres.	No change.

Notes:
1. Based upon site statistics provided by Core Architects Inc. dated October 7, 2021.
2. Based upon site statistics provided by Core Architects Inc. dated June 23, 2023.

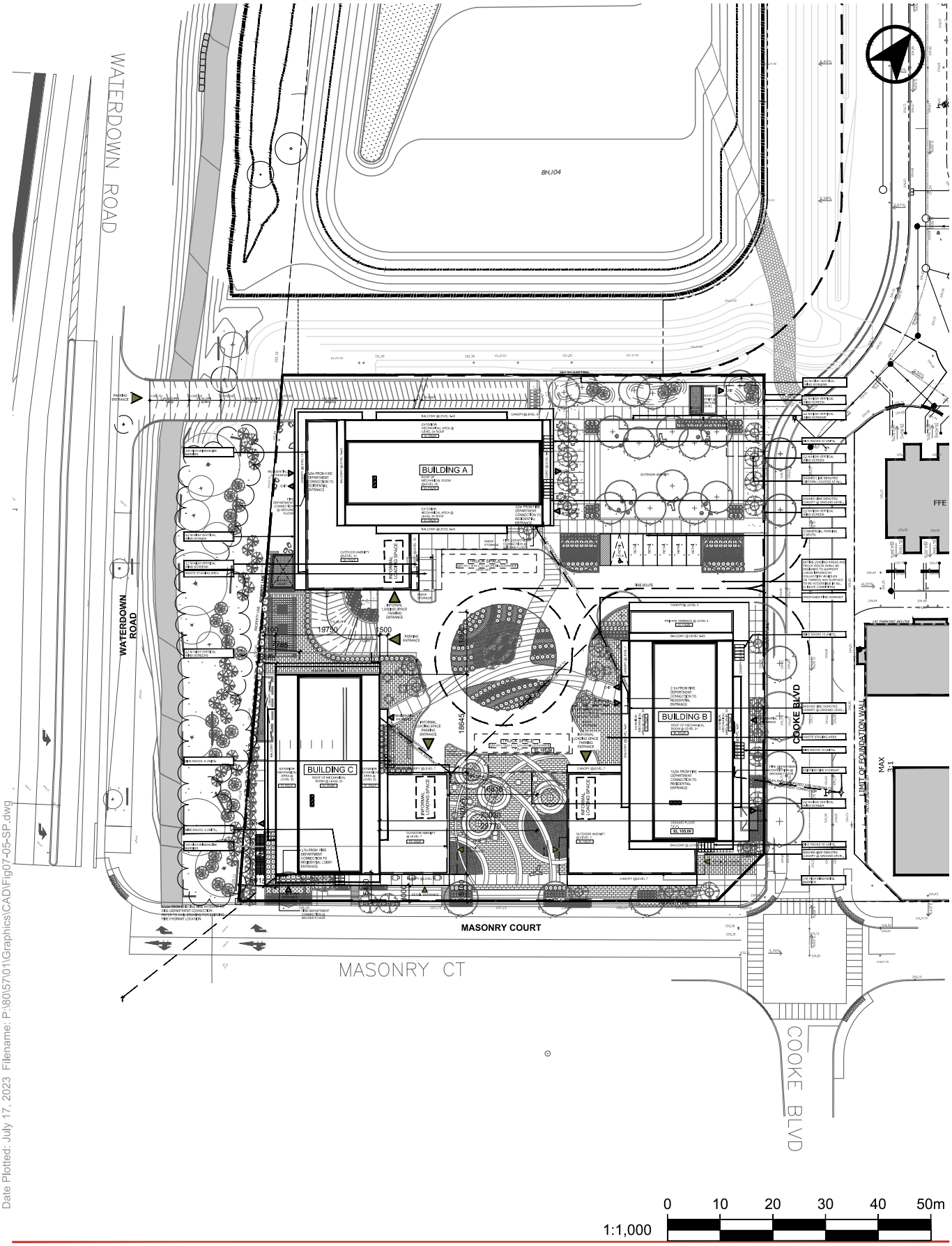
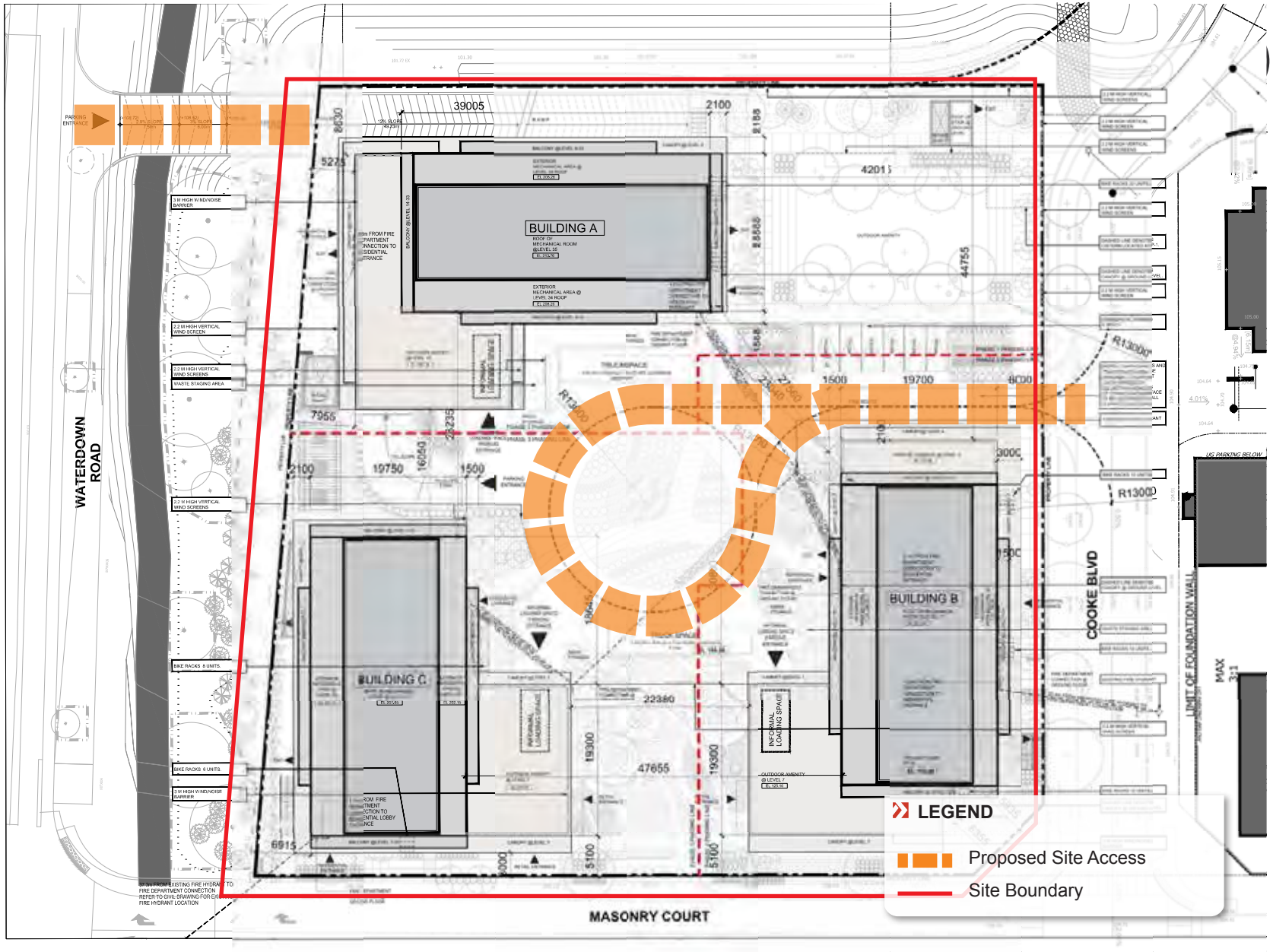


FIGURE 7 SITE PLAN



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FIGURE 8 PROPOSED STREET NETWORK

3.0 TRANSPORTATION CONTEXT

3.1 ROAD NETWORK

3.1.1 Existing Area Road Network

A brief description of the existing roads within the vicinity of the site is provided in **Table 2**. Located in close proximity to a provincial highway and three arterial roads, the site is well-connected from a vehicular accessibility perspective.

Existing lane configurations in the vicinity of the site are shown in **Figure 9**.

TABLE 2 EXISTING AREA ROAD NETWORK

Street Name	Road Cross Section (Proximate to Site)	Parking/Traffic Regulations	Posted Speed	Description
Provincial Highway				
Highway 403	Three traffic lanes in each direction separated by a grass median strip.	--	100 km/h	Highway 403 is a provincial Highway aligned in an east-west direction. HWY 403 extends from the HWY 401/410/403 interchange in Mississauga in the east to HWY 401/403 interchange in Woodstock in the west. A full interchange is provide at Waterdown Road with all on-ramp and off-ramp intersections signalized.
Multi-Purpose Arterial				
Plains Road	Two traffic lanes in each direction with a centre two-way left-turn lane.	Parking prohibited at all times, except in designated lay-by areas.	60 km/h	Plains Road is a multi-purpose arterial generally aligned in an east-west direction. Plains Road East extends from Waterdown Road in the west to Queen Elizabeth Way in the east and Plains Road West extends from Waterdown Road in the east to York Road in the West.
Minor Arterial Roads				
Waterdown Road	Two traffic lanes in each direction with localized widening provided at intersections for turn lanes. On-street bicycle lanes provided in each direction.	Parking prohibited at all times.	50 km/h	Waterdown Road is a minor arterial road aligned in a north-south. Waterdown Road extends from Plains Road in the south to Mountain Brow Road in the north. South of Plains Road, Waterdown Road continues as Lasalle Park Road and north of Mountain Brow Road, Waterdown Road continues as Mill Street S.
North Service Rd	One traffic lane in each direction with localized widening provided at intersections for turn lanes. Paved shoulder provided in each direction.	--	60 km/h	North Service Road is a minor arterial road aligned in an east-west direction. North Service Road extends from Waterdown Road in the west to Burloak Drive in the east.
Collector Road				
South Service Road (Alan Bryk Way)	Two traffic lanes in each direction	Parking prohibited at all times.	50 km/h	Alan Bryk Way is a collector road aligned in an east-west direction. Alan Bryk Way extends from Waterdown Road in the west to the Highway 403 EB on-ramp in the east.

Street Name	Road Cross Section (Proximate to Site)	Parking/Traffic Regulations	Posted Speed	Description
Local Roads				
Masonry Court	Single traffic lane in each direction with curbside parking lane on south side. Bicycle shared lane ('sharrow') markings on north side of road.	Parking permitted on south side of the road.	50 km/hr (unposted assumed)	Masonry Court is a local road aligned in an east-west direction. Masonry Court extends from Waterdown Road in the west to the Aldershot Station South Parking Lot in the east. West of Waterdown Road, Masonry Court continues as Railway Road.
Cooke Boulevard	Single traffic lane in each direction	Parking prohibited at all times, south of Masonry Court. Lay-by parking north of Masonry Court.-	50 km/hr (unposted assumed)	Cooke Boulevard is a local road aligned in a north-south direction. Cooke Boulevard extends from Plains Road East in the south to north of Masonry Court.
Emery Avenue	Single traffic lane in each direction	--	50 km/hr (unposted assumed)	Emery Avenue is a local road aligned in a north-south direction. Emery Avenue extends from Plains Road West in the south and terminates 100 m to the north.

3.1.2 Future Road Network

Numerous planning studies (completed and ongoing) set the framework for future road improvements within the area surrounding the site to address future roadway capacity constraints when considering the area growth in Burlington and to improve facilities for transit and active transportation. It is important to note that the proposed development is not the source of any of the planned road improvements within the area road network.

A description of the planned future road network within the vicinity of the site is provided in **Table 3**.

The planned improvements on Highway 403 are shown in **Figure 10**.

The planned improvements on Masonry Court and Emery Avenue within the Aldershot GO Mobility hub are shown in **Figure 3** and **Figure 4**.

TABLE 3 FUTURE AREA ROAD NETWORK

Street Name	Proposed Improvements	Source
Provincial Highway		
Highway 403	1 additional general purpose lane to be added in each direction by widening into the existing grass median. In addition, as there are presently capacity limitations along the bridge section over Highway 403, improvements are being considered by ongoing Prosperity Study and/or Aldershot GO MTSA Transportation Assessment. Prior published improvements include providing a five-lane cross section with on-road bike lanes and improved pedestrian facilities.	Highway 403 Freeman Interchange Preliminary Design Study City of Burlington Capital Budget and Development Charges (DC) By-law.
Multi-Purpose Arterial		
Plains Road	Widening of road cross-section for future active transportation.	2022 MTSA – Area-Specific Planning Study and supporting studies
Waterdown Road	Widening of the Waterdown bridge over Highway 403 to accommodate a 5-lane cross-section with on-road bike lanes and improved pedestrian facilities as a joint project with the MTO. The City has completed the widening north of and south of the highway and rail bridges. The timing of the bridge widening was originally planned for 2016, deferred to 2028, and most recently deferred to 2036. The City identifies this widening in their Capital Budget as a joint project with the MTO to address existing capacity limitation along the bridge section and significant increases expected to vehicle, bus, cyclist and pedestrian activity around the Aldershot Mobility Hub. Specific improvements for this corridor are also under review as part of the ongoing Prosperity Corridor Study and Draft Aldershot MTSA.	City of Burlington Capital Budget and Development Charges (DC) By-law and 1120 Cooke Terms of Reference
Collector Road		
Alan Bryk Way	Alan Bryk Way (South Service Road) extension eastward from the Aldershot GO Station to King Road. The City notes in the *2022 MTSA – Area-Specific Planning Study* that this connection will provide potential benefits but is cannot be assumed in the system until a future EA study is completed.	Burlington Integrated Mobility Plan and 2022 MTSA – Area-Specific Planning Study
Local Roads		
Masonry Court	Proposed to be extended east past the Aldershot Station South Parking Lot to Grove park and extended west past Waterdown Road to connect to the Emery Avenue extension and connect to existing Howard Road with a potential active transportation connection.	2022 MTSA – Area-Specific Planning Study and supporting studies
Emery Avenue	Proposed to be extended north up to the Masonry Court extension with a potential active transportation connection.	2022 MTSA – Area-Specific Planning Study and supporting studies

3.2 TRANSIT NETWORK

3.2.1 Existing Transit Network

The existing transit facilities provide reliable connections to the Downtown Burlington area, across the city, and connections to other cities as outlined in **Table 4**. As such, the level of transit accessibility provides a viable, non-automobile dependent travel mode choice for the tenants and visitors of the proposed building. This will serve to reduce private automobile usage for day-to-day travel and reduce parking demands. **Table 4** lists the transportation options available near the site.

The existing transit network in the vicinity of the site is shown in **Figure 11**.

TABLE 4 EXISTING AREA TRANSIT NETWORK

Route	Closest Stop	Headways[1]	Route Description
BUS			
1 – Plains	Waterdown Road / Plains Road intersection (~ 400 m)	10 minute intervals during the AM and PM peak hours	The 1 Plains bus route operates between the Central Hamilton area to Appleby GO Station, generally in an east – west direction by Burlington Transit. The route also connects to Burlington GO station.
4 – Central	Masonry Court / Waterdown Road intersection (~ 150 m)	30 minute intervals during the AM and PM peak hours.	The 4 Central bus route operates between Aldershot GO Station to Appleby GO Station, generally in an east-west direction by Burlington Transit. The route also connects to the Downtown Burlington Terminal providing numerous subsequent connections.
87 North Service - Aldershot	Aldershot GO station North Parking Lot North Lot (~ 900 m)	45 minute intervals during the AM and PM peak hours.	The 87 North Service – Aldershot route operates between Aldershot GO Station to Burlington GO Station generally in an east-west direction by Burlington Transit.
18 – Waterdown	Masonry Court / Railway Road / Waterdown Road intersection (~ 150 m)	30 minute intervals during the AM and PM peak hours.	The 18 Waterdown route operates between Aldershot GO Station and the Waterdown area, by Hamilton Street Railway. The route runs generally in a north-south direction along Waterdown Rd, with multiple stops in the Waterdown area for transfers to the myRide on-demand area of Waterdown.
TRAIN			
Lakeshore West	Aldershot GO Station South Parking Lot (~600 m)	15 to 30 minute intervals for eastbound direction during AM and westbound direction for PM peak hours. 30 minute to hourly service outside of peak / weekends.	The Lakeshore West GO Train line operates from either Niagara Falls GO, West Harbour GO or Hamilton GO Centre to Union Station in Downtown Toronto. The Lakeshore West line provides connections to Niagara, Hamilton, Oakville, Mississauga, and Toronto. Trains run express from Clarkson GO to Union Station for EB direction during AM and WB direction for PM peak hours.
VIA Rail	Aldershot GO station North Parking Lot (900 m)	4 Eastbound and 4 Westbound trains daily	The VIA Rail line operates from Windsor to Union Station in Downtown Toronto. This train provides connections to Oakville, Brantford, Woodstock, London, and Chatham.
STATION			
Aldershot GO Station	South Lot (~ 600 m) North Lot (~ 900 m)	--	Further to the above-mentioned transit services, Aldershot GO Station provides service to GO Bus 15 to Brantford Bus Terminal, GO Bus 17 to University of Waterloo via Guelph and Kitchener. Go Bus routes 18K provides service to Brock University via Hamilton and St Catherines. GO Bus routes 18, 18A, 18B, 18C, 18F, 18G, and 18J provides connections between Hamilton GO Centre or West Harbour GO to union Station in Toronto to supplement train service.

Notes:
1. Based on most recent schedules available on transit websites.

3.2.2 Future Transit Network

The Halton Region Transportation Master Plan (TMP) establishes plans for its future transit system in order to support population and employment forecasts to increase by 7% and 10% respectively from 2011 to 2031 in the City of Burlington, meet future transit mode share targets of 20% transit trips by 2031, and enhance the conventional transit system.

The focus of the improvements is both on external transit demand, making up transit trips going outside of the City as well as internal transit demand making up trips remaining within the City. Further to the enhancement of transit services, the Region acknowledges that a commitment to transit-supportive developments, policies and implementation of a transit supportive road network will help both accommodate and facilitate the forecasted future transit demands.

3.2.2.1 External Transit Network Improvements

Metrolinx is proposing to improve GO Transit train services along the Lakeshore West line with 15-minute service throughout the day between Toronto and Aldershot GO Station, and with hourly service between Hamilton and Toronto seven days a week.

Aldershot GO Station south parking lot expansion is expected to take place in two phases. Phase 1 will add 569 spaces by 2023 and Phase 2 will add 369 spaces by 2033 (if needed).

3.2.2.2 Internal Transit Network Improvements

According to the City of Burlington Official Plan, Plains Road at Waterdown Road up to the CN rail bridge is identified as a frequent transit corridor and mobility hub connector. As a result, the City envisions there will be enhanced levels of transit service and complete streets to help provide a seamless integration between all modes of transportation.

Furthermore, the site is located within the primary growth area making the roads in the vicinity of the site priority on providing the most convenient and reliable transit service in the City. Municipal transit services and facilities growth will be focused on these areas.

3.3 ACTIVE TRANSPORTATION NETWORK

3.3.1 Existing Active Transportation Network

The existing active transportation network and sidewalks support travelling to and from the site by walking or cycling. All bus stops within the vicinity of the site previously mentioned in **Table 4** are accessible via walking or cycling with the exception of the North Aldershot Lot which is currently only accessible via walking. The cycling accessibility to the Aldershot GO station is proposed to be resolved in the future with the extension of bike lanes along Waterdown Road.

In the vicinity of the site, sidewalks are provided along most of the road corridors. Sidewalks are provided on both sides of Plains Road and Waterdown Road up to Masonry Court. Sidewalks are provided on one side of Masonry Court, Cooke Boulevard, Emery Avenue, Alan Bryk Way, and one side of Waterdown Road north of Masonry Court.

The existing cycling network in the City is illustrated in **Figure 12**.

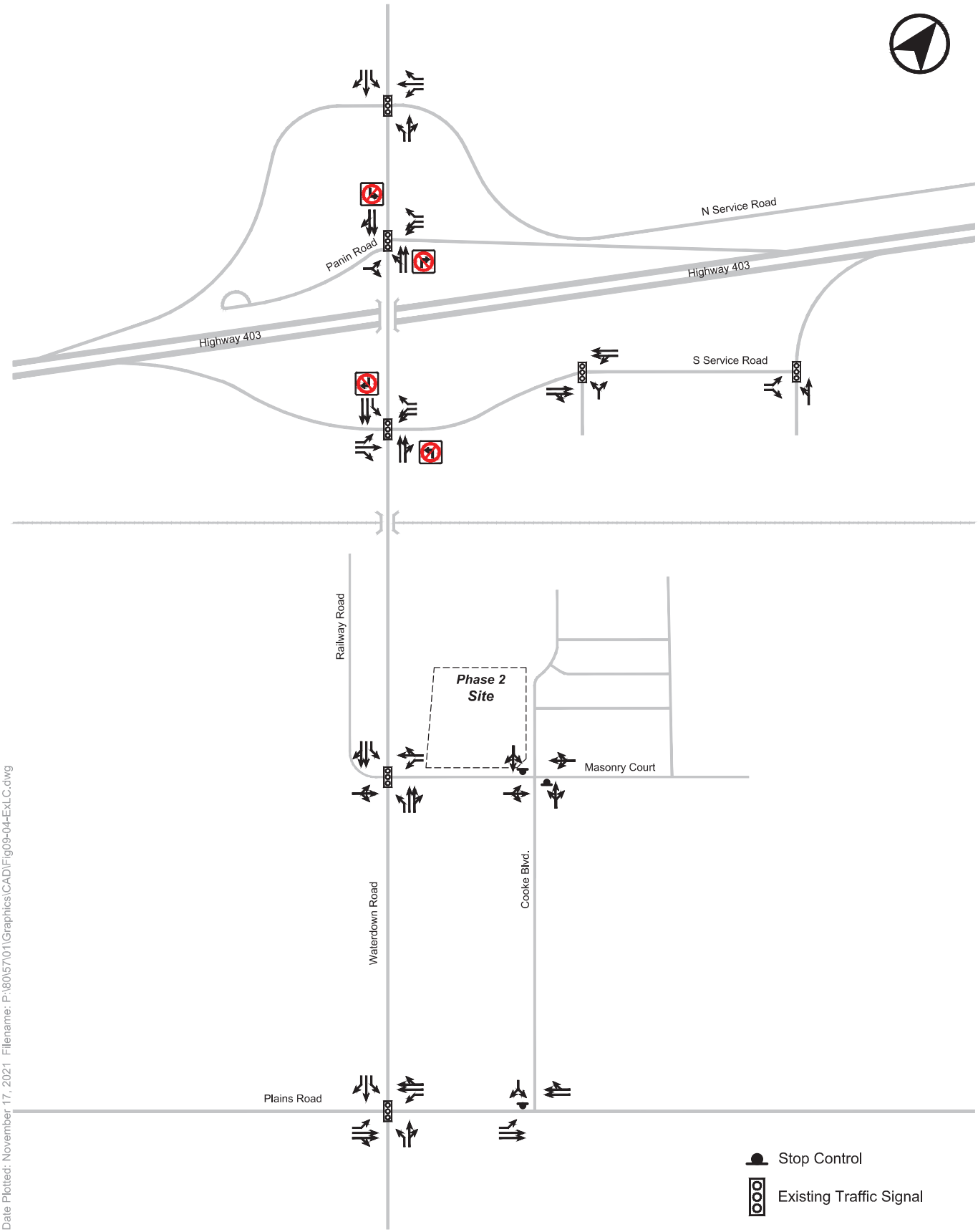
3.3.2 Future Active Transportation Network

The City of Burlington Cycling Plan proposes the expansion of the existing cycling network to provide options to encourage residents and visitors to use active transportation for a range of trip types and purposes. The proposed cycling network is illustrated in **Figure 13**.

The proposed improvements outlined in the cycling plan in close proximity to the site include:

- Protected bikeways along Plains Road, Alan Bryk Way and Waterdown Road up to the CN rail bridge;
- Multi-use trail along CN rail from Gallagher Rd to Howard Road;
- Highway interchange crossing along Waterdown from the CN rail bridge to North Service Rd;
- Local street ‘bikeway’ facility along Masonry Court, Cooke Boulevard (conceptual);
- Multi-use path along Waterdown Road north of North Service Road; and
- Painted bike lane along North Service Road.

The Draft Aldershot MTSA studies show there will be numerous recreational, retail, commercial, and employment uses within walking or cycling distance from the site. The high level of proposed active transportation route integration surrounding the site, will offer an attractive and viable travel alternative for tenants and visitors of the proposed building. As such, reducing their need to use a private vehicle on a day-to-day basis.

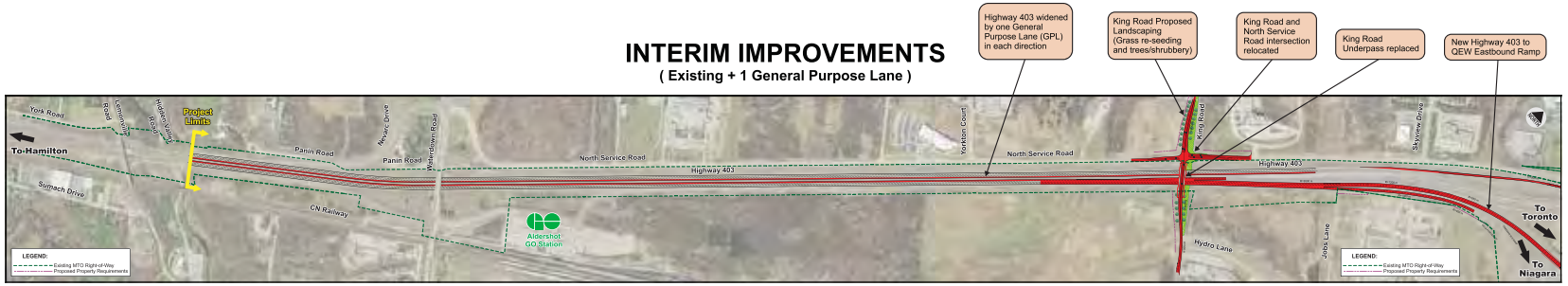


Date Plotted: November 17, 2021 Filename: P:\80\57\01\Graphics\CAD\Fig09-04-ExLC.dwg

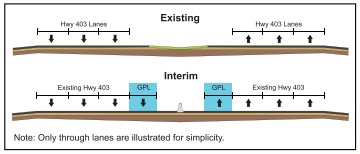
FIGURE 9 EXISTING LANE CONFIGURATION & TRAFFIC CONTROL

RECOMMENDED PLAN: HIGHWAY 403

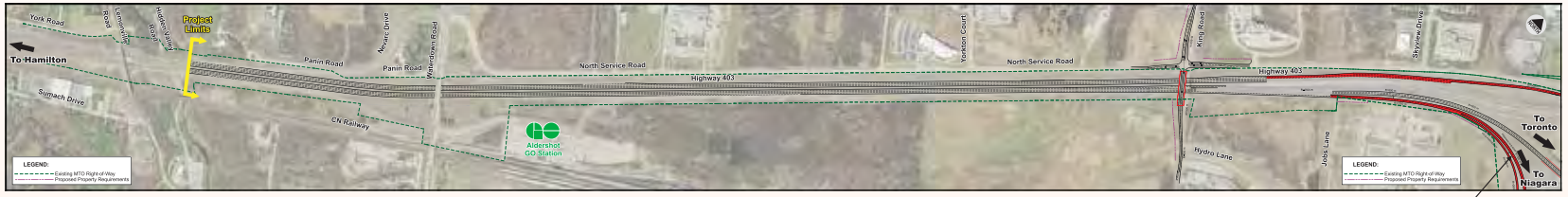
INTERIM IMPROVEMENTS
(Existing + 1 General Purpose Lane)



- Provide additional general purpose lane (GPL) in each direction on Highway 403 to Study Limits by widening into the median.
- Provide new ramp for Highway 403 to QEW eastbound movement to accommodate three lanes.
- Replace King Road Underpass to accommodate wider Highway 403. The existing bridge does not have adequate space for the widening.
- Existing partial illumination at Waterdown Road Interchange will be improved to full illumination (using typical light poles).



ULTIMATE IMPROVEMENTS
(Interim + Ramp Widening at Freeman Interchange)

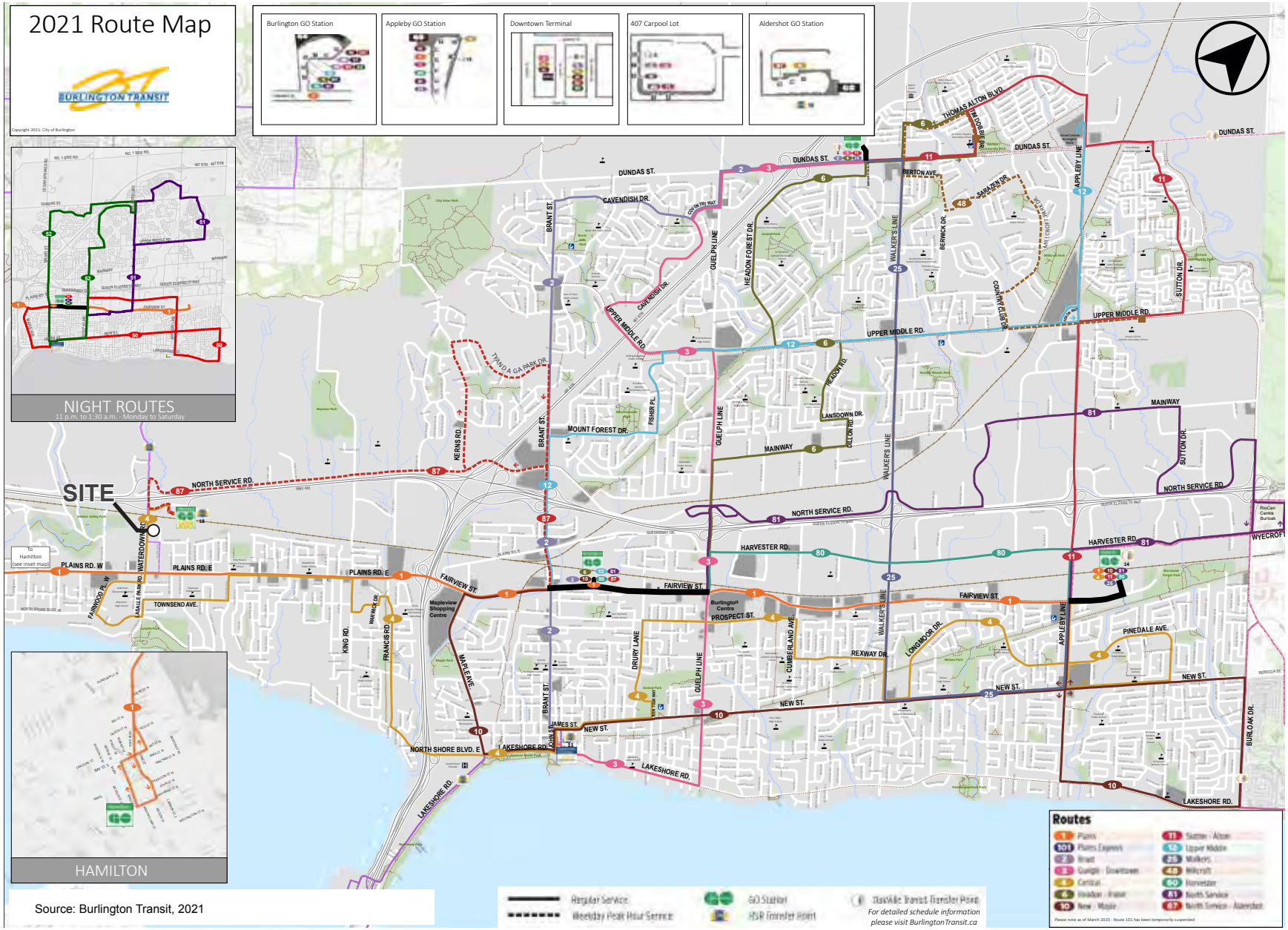


- Highway 403 does not need to be widened again in the ultimate condition. The additional general purpose lane in each direction is anticipated to accommodate traffic capacity needs until project horizon.
- Widen the Highway 403 to QEW Southbound ramp to two lanes.

Source: QEW and Highway 403 Freeman Interchange: Preliminary Design Study and Class Environmental Assessment PIC #2, WSP
Date: September 10, 2019

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FIGURE 10 HIGHWAY 403 RECOMMENDED IMPROVEMENTS



Source: Burlington Transit, 2021

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FIGURE 11 EXISTING AREA TRANSIT NETWORK



FIGURE 12 EXISTING CYCLING NETWORK



The development of trails (outside of the road right-of-way) are typically the responsibility of the Parks and Open Space, Capital Works department. The Cycling Plan identified these corridors as beneficial for connectivity and improved mobility for people cycling in Burlington. The feasibility, facility recommendations, including the surface type and implementation for these projects will be determined in consultation with the Transportation department to help advance cycling initiatives

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FIGURE 13 PROPOSED CYCLING NETWORK

4.0 VEHICLE PARKING CONSIDERATIONS

4.1 ZONING BY-LAW 2020 REQUIREMENTS

A zoning amendment is proposed to reduce the in-force parking requirements for the site, recognizing the location of the site within an MTSA, direct access to the Aldershot GO Station, and a comprehensive TDM program outlined in **Section 7.0**.

The following sections outline the in-force zoning bylaw and proposed amendment.

4.2 ZONING BY-LAW 2020 VEHICLE PARKING REQUIREMENTS

The site is currently zoned as a Mixed-Use Corridor Zone (MXC-26) in the City of Burlington Zoning By-law 2020. The in-force parking standards for apartment buildings are based on the site's location as a primary growth area in the Growth Framework (Schedule B-1) of the City Official Plan (2020).

The applicable minimum off-street vehicle parking rates to the site as outlined in Zoning By-law 2020 (amended) are summarized in **Table 5**.

TABLE 5 ZONING BY-LAW 2020 (AMENDED) MINIMUM VEHICLE PARKING REQUIREMENTS

Land Use / Unit Type	# of Units / GFA[1]	Minimum Parking Rate	Minimum Number of Parking Spaces
Residential			
Resident Units	1,165 units	1.25 spaces / unit	1,456 spaces
Resident Sub-Total	**1,165 units**		**1,456 spaces**
Non-Resident			
Residential Visitors	1,165 units	n/a[2]	-
Commercial-Retail[2]	495 m^2 GFA	3.5 spaces / 100 m^2 GFA	17 spaces
Non-Resident Sub-Total			**17 spaces**
SITE TOTAL (inclusive of resident visitor parking)			**1,473 spaces**

Notes:
1. Parking calculations are based upon site statistics provided by Core Architects Inc. dated June 23, 2023.
2. Resident visitor spaces are included in the resident parking requirement as noted in Table 1.2.6 for an apartment building use in Part 1 of the Zoning By-law.
3. Maintenance spaces are not required as per Section 2.25 - Off-Street Parking and Loading Requirements of Zoning By-law 2020 within the primary growth area requirements.

Based on the foregoing, the minimum off-street vehicle parking requirements applicable to the site as per City's latest Zoning By-law 2020 requires the provision of 1,456 resident parking spaces (inclusive of visitor parking) and 17 commercial-retail related parking spaces, resulting in a total required parking supply of 1,473 parking spaces.

4.3 PROPOSED PARKING SUPPLY

The parking supply standards of Zoning By-law 2020 are considered to overstate the parking requirements of the proposed development, given:

- the site's location within an MTSA,
- the direct adjacency of the site to the Aldershot GO Station higher-order transit service,
- the City's ongoing review of parking that is expected to establish new rates for the MTSA,
- transportation planning principles and policies supporting a reduced parking supply to change travel behaviour; and
- a series of Transportation Demand Management (TDM) measures incorporated in the development, designed to support the use of non-automobile travel modes.

The site is proposed to be supplied with 1,037 residential spaces (0.89 per unit) and 100 non-residential spaces (0.09 spaces / unit) to be shared between the commercial-retail users and the residential visitors, resulting in a total of 1,137 parking spaces (0.97 spaces / unit overall) as summarized in **Table 6**.

Approximately six (6) spaces will be provided at grade with a direct relationship to the retail uses on the site, and the remaining 1,131 spaces will be located below-grade within the underground parking structure of six (6) levels.

TABLE 6 PROPOSED PARKING SUPPLY

Land Use / Unit Type	# of Units / GFA[1]	Parking Supply	Parking Location
Residential			
Residential	1,165 units	1,037 spaces *Effective Rate: (0.89 spaces / unit)*	1037 spaces below grade
Resident Sub-Total	**1,165 units**	**1,037 spaces**	
Non-Resident			
Non-Residential (*Shared between commercial-retail and visitors)* [2]	1,165 units	100 spaces *Effective Rate: (0.09 spaces /unit)*	94 spaces below-grade 6 spaces at-grade
Non-Resident Sub-Total	**1,165 units**	**100 spaces**	
SITE TOTAL		**1,137 spaces (0.98 spaces / unit)**	

Notes:
1. Parking calculations are based upon site statistics provided by Core Architects Inc. dated June 23, 2023.
2. Maintenance vehicles can be accommodated in the non-residential parking supply as the demand patterns for maintenance vehicles and visitor parking are different.

A rate of 0.97 spaces per unit adopted for the site is understood to be supported by City staff (if accompanied by a robust TDM plan) per ongoing discussions with City staff (see **Appendix D**).

The proposed parking supply is less than the required parking supply of 1,473 spaces as outlined in Zoning By-law 2020 (amended), and exceeds the City supported (with robust TDM) parking standard of 0.97 spaces / unit.

5.0 LOADING CONSIDERATIONS

5.1 ZONING BY-LAW 2020 LOADING REQUIREMENTS

The prevailing City of Burlington Zoning By-law 2020 requires that *at least one off-street loading space shall be provided in conjunction with every principal building*. As a result, the proposed development requires three (3) loading spaces.

5.2 PROPOSED LOADING SUPPLY & FACILITIES

Five (5) loading areas are proposed to service the needs of the proposed development. From the five (5) loading areas, (2) formal lay-by waste collection spaces are proposed to support the typical loading / garbage activities and three (3) informal moving spaces are proposed to support the deliveries and moving activities associated to the development. The two (2) lay-by waste collection spaces are located within the site's turning circle, one (1) located in front of Building A and the second space located in front of Building B and C. The three (3) informal moving spaces are proposed within each building's envelope to service the loading needs of each residential building. To summarize, Building A will be served by one (1) formal loading space and one (1) informal space, Buildings B and C will be each served by one (1) informal space and have a shared formal space to support the commercial and residential functions of the buildings.

Access to the loading spaces is provided from the new east-west internal driveway off the Cooke Boulevard extension.

Although the proposed loading supply does not meet the required three (3) loading spaces, two (2) of the proposed loading spaces contribute towards the minimum requirement while the three (3) moving spaces will complement the supply. Thus, it is BA Group's opinion that the proposed loading scheme will be able to support the commercial and residential functions of the proposed development as each building will be equipped with an informal moving space and be supported by a formal waste collection space. A Waste Management Planning Review memorandum, dated February 15, 2023, has been provided by Dillon Consulting Ltd., and provides details on the waste collection scheme, which has been reviewed by the Region of Halton and City of Burlington and has been supported in principle. The draft zoning by-law amendment will facilitate the provision of two formal loading spaces for the proposed development.

A series of vehicle manoeuvring diagrams (VMDs) are provided in **Appendix E**, illustrating the manoeuvring requirements of a Halton Region garbage truck, single unit truck, and Ford 350 Cube Van.

A detailed operation and layout of each loading area will also be further refined as part of subsequent site plan applications for the site.

6.0 BICYCLE PARKING CONSIDERATIONS

6.1 BICYCLE PARKING STANDARDS

The City of Burlington Zoning By-law 2020 does not contain bicycle parking requirements for residential apartment buildings. Given that there is no provision of bicycle parking for residential buildings, various planning documents, including the *Halton Region Active Transportation Master Plan* (May 2015) recognizes the benefits to including bicycle parking in order to provide residents with greater transportation options and reduce auto dependency. Additionally, the *Burlington City-Wide Parking Standards Review*, a report prepared by IBI Group in July 2017 recommends the provision of bicycle parking for residential buildings and retail stores.

As per Section 4.2.2. of the *Burlington City-Wide Parking Standards Review*, it states that "for the purpose of this document, the expanded Mixed-Use Activity Area will be referred to "Intensification Areas". As per the report's *Exhibit 4.1: Mixed Use Activity Areas*, the site falls within the Mixed Use Activity Area, which is classified as an "Intensification Areas" for the purpose of determining the applicable bicycle parking standards to the site.

The bicycle parking rates as outlined in the Burlington City-Wide Parking Standards Review (2017) and applied to the site are summarized in **Table 7**.

TABLE 7 CITY RECOMMENDED BICYCLE PARKING STANDARDS (INTENSIFICATION AREAS)

	Units / GFA[1]	Minimum Rate	Minimum Requirement
Apartment Units	1,165 units	Long-Term: 0.5 spaces / unit	583 spaces
		Short-Term: 0.05 spaces / unit	58 spaces
Retail	495 m^2	Long-Term: 2 spaces +1 space / 1000 m^2 GFA	3 spaces
		Short-Term: 3 spaces +1 space / 1000 m^2 GFA	4 spaces
Total		Long-Term	586 spaces
		Short-Term	62 spaces
		Total	**648 spaces**

Notes:
1. Based upon site statistics provided by Core Architects Inc. dated June 23, 2023.

Based on the foregoing, the City's minimum recommended bicycle parking requirements applicable to the site as per the Burlington City-Wide Parking Standards Review requires the provision of 586 long-term bicycle parking spaces and 62 short-term bicycle parking spaces, resulting in a total of 648 bicycle parking spaces.

6.2 PROPOSED BICYCLE PARKING SUPPLY

A total of 676 bicycle parking spaces are proposed, including 596 residential long-term, 62 short-term and 18 commercial bicycle parking spaces to serve the proposed development across three buildings.

Each building contains at least one (1) bicycle room below-grade (P1-P2) that contains residential long-term bicycle parking spaces. Five (5) long-term bicycle rooms are located in the P1 level of the underground parking garage. Six (6) bicycle parking lockers are located in the P2 level of the underground parking garage.

In addition to the below-grade bicycle parking, one (1) bicycle room at-grade that contains the remaining of the long-term bicycle parking spaces is provided in each building. One (1) residential short term bicycle room is located at-grade in Building C, with the remaining of the short-term spaces located outdoors at each building. 10 commercial bicycle parking spaces are located at-grade by the western retail entrance and eight (8) commercial bicycle parking spaces are located at-grade by the retail loading space.

The proposed bicycle parking supply of 676 bicycle parking spaces meets and exceeds the recommended bicycle parking standards applicable to the site as per the Burlington City-Wide Parking Standards Review.

7.0 TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) strategies encompass a range of policies, programs, services, and infrastructure to promote and facilitate the use of walking, cycling, public transit, telecommuting and carpooling as an alternative to single passenger vehicle travel.

A central element of the transportation mobility goals of the 1120 Cooke Blvd site and surrounding Major Transit Station Area (MTSA) will be the adoption of a comprehensive TDM plan that supports growth around the Aldershot GO station within the Aldershot MTSA. The City of Burlington, Halton Region, and Province of Ontario embrace a range of enhanced TDM measures in MTSAs.

7.1 EXISTING AREA TRAVEL CHARACTERISTICS

The Transportation Tomorrow Survey (TTS) is a comprehensive travel survey that is conducted in the Greater Toronto and Hamilton Area (GTHA) once every five years. The survey collects information on how members of a household use the transportation system and categorizes data by geographical zone.

A review of the 2016 TTS for the area surrounding the site revealed that while the majority of travel is conducted using an automobile, a considerable amount of home-based travel is conducted using transit and active transportation during the morning and afternoon peak periods. TTS Zones 4050, 4051, 4052, 4053, 4054, and 4055 were analyzed in order to determine peak period travel modes for residents in the area. The data is summarized in **Table 8**.

TABLE 8 AREA PEAK PERIOD TRAVEL MODE DISTRIBUTION

Weekday Peak Period	Auto Driver	Auto Passenger	Transit	Walk	Cycle	Total
AM	80%	11%	4%	1%	4%	100%
PM	76%	13%	5%	1%	4%	100%

Notes:
1. Travel mode split calculated for home-based trips within TTS 2001 Zones 4050, 4051, 4052, 4053, 4054, and 4055.
2. Based on 2016 TTS results for morning (6:00am – 8:59am) and evening (3:00pm – 5:59pm) peak periods.
3. “Home based trip” purposes considered.
4. Auto passenger trips include auto passenger, taxi passenger, and paid rideshare trips.

Based on the most recent 2016 Transportation Tomorrow Survey data, approximately 76-80% of all home-based trips taken during the weekday peak periods in the site’s vicinity were undertaken by auto drivers.

7.2 TDM PLAN OBJECTIVES

The key objective of this TDM Plan is to reduce peak hour single occupant automobile traffic by focusing on three specific areas:

1. Encourage and improve pedestrian/cycling convenience and promote use of non-automobile and low-carbon travel modes (transit, cycling, walking, car-share);
2. Reduce car dependence and the need for everyday single-occupant vehicle travel; and,
3. Provide strategies that align with the enhanced transportation policies for MTSA's

Existing Area Travel Characteristics

7.2.1 Major Transit Station Area (MTSA)

The future site context will be served by a strong network of public transit services as well as pedestrian and cycling connections. The site is located within the Aldershot MTSA that is subject to a number of enhanced provincial, regional, and city policies that align with the TDM measures proposed. The location of the site is, in and of itself, highly supportive of encouraging non-auto travel and reducing car-dependence given its direct proximity and direct pedestrian connection to the Aldershot GO station.

The Aldershot GO station area currently benefits from frequent two-way all-day service 7 days a week along the Lakeshore West line and has planned improvements to both the frequency and speed of its service in the future, which will only increase the convenience for local area residents accessing regional transportation via non-auto modes over time. The quality of existing and future service will be an immediate draw to future residents of the buildings planned on site to consider alternatives to single-occupant vehicle travel. The Site is also uniquely positioned within the Aldershot MTSA to have direct pedestrian connections to the Aldershot GO station expansion lands, meaning residents are uniquely suited to step out their front doors and onto transit without crossing any public roads.

The Aldershot GO MTSA is attached in **Appendix A** for reference.

7.3 TDM PLAN STRATEGIES

TDM strategies, above and beyond the site's direct connection to the Aldershot GO station, have been developed to further support and encourage the use of non-auto modes of travel.

TDM strategies have been selected based upon the site context and proposed land uses. These measures are summarized in **Table 9**.

The table outlines which of the three general TDM plan objectives the strategy is targeting.

TABLE 9 RECOMMENDED SITE TDM MEASURES

Measure	Description	TDM Plan Objective
Reduced Vehicular Parking Supply	Reduced automobile parking supply (relative to the in-force bylaw) is proposed for the site given the Site's location within an MTSA, direct adjacency and connection to Aldershot GO Station and related surface transit routes. While not considered a TDM measure by the City's OP, the City's OP policies note they will consider reduced parking requirements where a comprehensive TDM plan is submitted and implemented to the satisfaction to the City. Complements the Region's OP policies to improve transportation network efficiency through TDM and TSM[1]. Supports provincial policy to provide alternative development standards, such as reduced parking within MTSA's	• Reduce car dependence and the need for everyday single-occupant travel. • Promote non-automobile travel modes. • Provide strategies that align with the enhanced transportation policies for MTSAs
"Unbundle Parking"	This measure is also inherent to the reduced parking supply; since not all units will have a parking space, a sales program should be commenced which gives unit purchasers the option to reflect on the costs associated with alternative modes of transportation when buying a parking space. Identified in Halton Region TIS TDM Guidelines.	• Reduce car dependence and the need for everyday travel. • Provide strategies that align with the enhanced transportation policies for MTSAs
Mixed Use (Multiple Land Uses)	Permit resident visitors and retail visitors to share the overall supply of non-residential parking (100 spaces) in order to permit the efficient sharing between land uses. Complements the Region's OP policies to improve transportation network efficiency through TDM and TSM[1].	• Provide strategies that align with the enhanced transportation policies for MTSAs
Site Plan – Walkways	Direct and enhanced sidewalk facilities along Cooke Boulevard that provide direct connections to Aldershot GO and along Masonry Court. Identified in Halton Region TIS TDM Guidelines (bicycle/ped infrastructure).	• Reduce car dependence and the need for everyday single-occupant travel. • Promote non-automobile travel modes. • Provide strategies that align with the enhanced transportation policies for MTSA's
Transit Information Centre	Provide an information centre within the proposed buildings that ensure current transit information sources (arrival times, route information, advisory notices) is conveniently available to all residents and visitors of the site. The information will be delivered via transit information screen located in a central location of the building (i.e. a front lobby) or electronic applications for smart phones or tablets. Identified in Halton Region TIS TDM Guidelines (multi-modal marketing).	• Promote non-automobile travel modes such as transit and car-sharing. • Provide strategies that align with the enhanced transportation policies for MTSA's.

Measure	Description	TDM Plan Objective
Car-Share Program	Explore opportunities to offer car-share service on the site, ideally with car-share stations (i.e. ZipCar, Communauto, etc) providing at-least two (2) car-share vehicles on-site. This will be further explored during the Site Plan Approval (SPA) process.	• Reduce car dependence (and car ownership) and the need for everyday single occupant travel.
Bicycle Parking	A bicycle parking supply of 676 spaces (0.58 spaces / unit) including 596 long-term, 62 short-term and 18 commercial spaces are proposed to serve the cycling needs of the site. This bicycle parking supply exceeds and meets the recommended bicycle parking standards (0.55 spaces / unit) for the City of Burlington. Identified in Halton Region TIS TDM Guidelines (bicycle/ped infrastructure).	• Encourage and improve pedestrian/cycling convenience and promote use of non-automobile and low-carbon travel modes (transit, cycling, walking, car-share). • Provide strategies that align with the enhanced transportation policies for MTSAs.
Bike Repair Stations	Provide a bicycle repair / maintenance station within the residential bike parking storage area or near commercial-retail bicycle parking locations within the site.	• Encourage and improve pedestrian/cycling convenience and promote use of non-automobile and low-carbon travel modes (transit, cycling, walking, car-share).
Ride-Sharing (Carpool) Program	Explore opportunities to offer ride-sharing programs originating within the building to reduce car dependence for commercial-retail employees and promote carpooling and transit. Identified in Halton Region TIS TDM Guidelines.	• Reduce car dependence and the need for everyday travel. • Promote use of non-automobile and low-carbon travel modes. • Provide strategies that align with the enhanced transportation policies for MTSAs. •
Travel Mode Information Brochures	Each new resident receives a brochure and/or receives an email informing them of the different available travel options aside from driving a personal vehicle, including an overview of transportation (sidewalk connections, cycling routes, and transit) in the area. Identified in Halton Region TIS TDM Guidelines (multi-modal marketing).	• Reduce car dependence and the need for everyday travel. • Make it easy and attractive for people to walk and cycle. • Promote car-sharing and transit. • Provide strategies that align with the enhanced. transportation policies for MTSAs.
Community Marketing Outreach	It is recommended that an event should be held around the time of building launch focused on disseminating information about sustainable travel options (i.e. the Travel Mode Information Packages), to explore ride-sharing programs for residents.	• Reduce car dependence and the need for everyday travel. • Promote car-sharing. • Provide strategies that align with the enhanced

Measure	Description	TDM Plan Objective
	Identified in Halton Region TIS TDM Guidelines (multi-modal marketing).	transportation policies for MTSAs
Subsidized Transit Passes	Provide subsidized transit passes to first time residents in order to promote the use of public transit. Identified in Halton Region TIS TDM Guidelines (subsidized transit programs).	• Promote use of non-automobile and low-carbon travel modes (transit, cycling, walking, car-share). • Provide strategies that align with the enhanced transportation policies for MTSAs

Notes:
1. TSM = Transportation Supply Management

8.0 TRAFFIC VOLUME FORECAST

8.1 TRAFFIC ANALYSIS SCENARIOS AND DESIGN PERIODS

Traffic operations analyses have been undertaken during the weekday morning and afternoon street peak hours under the following conditions:

- Existing traffic – traffic activity level under current conditions;
- Future background traffic – traffic activity 15 years into the future, which includes allowances for corridor growth and background developments; and
- Future total traffic – traffic activity 15 years into the future with the site developed and projected site generated traffic added to the road network.

To provide a comprehensive traffic analysis review, additional traffic conditions were analyzed to improve operations along with sensitivity analysis scenarios. The analysis scenarios are as follows:

- **Baseline Analysis:** Existing, background development including the Metrolinx parking lot expansion project, and site traffic.

- **Sensitivity Analyses**:
  - Existing traffic plus site activity only
  - Existing, plus background development and site traffic (without Metrolinx parking lot expansion)

  Sensitivity analyses do not necessarily represent a built scenario but were explored to understand relative impacts of different development scenarios more fully.

Future horizon periods are described further in **Section 8.3.1** - Background Development and Corridor Growth.

8.2 EXISTING TRAFFIC VOLUMES

Existing baseline traffic volumes were established at intersections within the study area for the weekday morning and afternoon peak periods using traffic count information obtained from the City of Burlington and Ministry of Transportation Ontario (MTO). Traffic count surveys were also undertaken by Spectrum Traffic Data Inc. on behalf of BA Group in 2021. A listing of the count data and courses are provided in **Table 10**.

TABLE 10 EXISTING TRAFFIC DATA SOURCES

Intersection	Count Date	Source	Time Periods
S Service Road / Highway 403 EB On-Ramp & GO Station Lot Entrance	Thursday, October 13, 2016 Wednesday, November 2nd, 2022 Tuesday, May 30th, 2023	MTO Spectrum Traffic Data Inc.	7:30 to 9:30 am 4:00 to 6:00 pm
S Service Road / GO Station Bus Loop Access	Tuesday, March 2, 2021 Wednesday, November 2nd, 2022	Spectrum Traffic Data Inc.	
Cooke Boulevard / Masonry Court	Tuesday, March 2, 2021 Wednesday, November 2nd, 2022		
Waterdown Road & N Service Road / Highway 403 WB On-Ramp	Thursday, October 11, 2018 Wednesday, November 2nd, 2022 Tuesday, May 30th, 2023	City of Burlington Spectrum Traffic Data Inc.	
Waterdown Road & Highway 403 WB Off-Ramp / Panin Rd	Thursday, September 27, 2018 Tuesday, May 30th, 2023		
Waterdown Road & Highway 403 EB Off-Ramp / S Service Road	Wednesday, September 26, 2018 Wednesday, November 2nd, 2022 Tuesday, May 30th, 2023		
Waterdown Road & Masonry Court / Railway Road	Thursday, June 21, 2018 Wednesday, November 2nd, 2022 Tuesday, May 30th, 2023		
Waterdown Road & Lasalle Park Road / Plains Road	Tuesday, September 18, 2018		
Plains Road East & Cooke Boulevard	Thursday, October 5, 2017		7:00 to 9:00 am 4:00 to 6:00 pm

BA Group has counted the area intersections a number of times following the end of Covid-related lockdown and gathering restrictions and after transit activity has resumed regular service levels. The most recent counts under taken occurred in May 2023 and were reviewed in comparison to 2021 and older pre-covid counts and considered representative of typical weekday conditions.

2023 existing turning movement counts are provided in **Appendix F**.

Existing, balanced baseline area traffic volumes for the weekday morning and afternoon peak traffic hours are summarized in **Figure 14**.

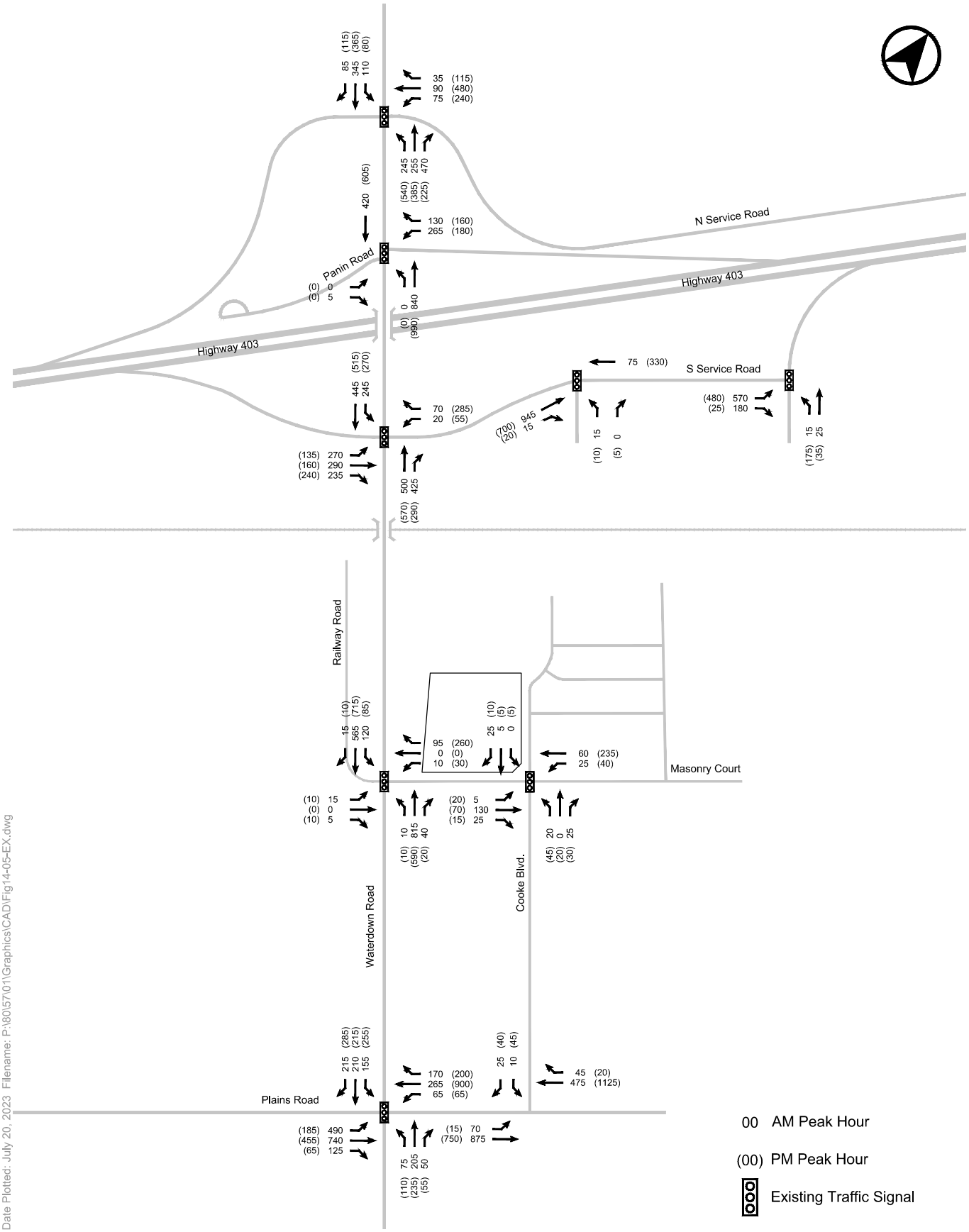


FIGURE 14 EXISTING TRAFFIC VOLUMES

8.3 FUTURE BACKGROUND TRAFFIC VOLUMES

Traffic growth in the site vicinity has been considered based upon an evaluation of traffic volume changes related to:

- specific area development traffic (i.e. background development traffic); and,
- general corridor growth on the area arterial roads (i.e. Waterdown Road and Plains Road) and Highway corridors (i.e. Highway 403).

8.3.1 Background Development and Corridor Growth

Traffic allowances were made for other proposed or approved developments in the area, based on a review of the Metrolinx Aldershot GO Station South parking lot expansion report and City of Burlington's list of current development projects as of July 2023. These sites represent in the order of 3,119 residential units, 3,540 m^2 of non-residential uses including of retail, office and church uses, and 938 additional GO transit parking spaces.

Area background developments are summarized in **Table 11** together with a description of the key development statistics for each. Traffic allowances made for each development were based upon traffic impact studies submitted to the City of Burlington as part of the development application process, unless otherwise noted.

TABLE 11 AREA BACKGROUND DEVELOPMENTS

Location	Development Description	Source / Trip Generation Notes
Aldershot GO Station South Parking lot	Phase 1 - 569 parking spaces Phase 2 - 369 parking spaces	AECOM (dated August, 2020)
35 Plains Road East	72 residential units 279 m^2 retail	Paradigm Transportation Solutions Limited (dated April, 2016)
92 Plains Road East[1]	49 residential units 157 m^2 office	WSP (dated October, 2017)
53 and 71 Plains Rd East	450 residential units 1,208 m^2 retail	Paradigm Transportation Solutions Limited (dated December, 2017)
1085 Clearview Avenue	160 residential units	Paradigm Transportation Solutions Limited (dated December, 2018)
1640, 1673, and 1751 Flatt Road and 1664 Waterdown Road	924 residential units	Read, Voorhees & Associates (dated December, 2012)
1350 Waterdown Road	1,126 m^2 Church 100 parking spaces	As per discussion with City Staff, Traffic was not considered as part of this analysis due to the negligible amount of trips being generated during peak hours.
1029 and 1033 Waterdown Road	295 residential units 189 m^2 retail	Crozier Consulting Engineers (December 2021)
1062-1074 Cooke Boulevard	809 residential units 581 m^2 retail	Crozier Consulting Engineers (September 2022)
40-70 Plains Road East	360 residential units	Paradigm Transportation Solutions Limited (dated December, 2020)
Total	**Residential: 3,119 units Retail: 2,257 m^2 Office: 157 m^2 Church: 1,126 m^2**	

Notes:
1. Traffic allowances made based on 1120 Cooke Boulevard forecasted residential site traffic distribution

The specific traffic allowances that have been made for area background developments represent a broad reaching area and effectively contribute the following growth rates along the major corridor routes if considering the horizons below:

- 5-Years: 2-18% per year
- 10-Years: 2-9% per year
- 15-Years: 2-6% per year

Each of the background developments have TIS studies that range from 2012 to September 2022 (1 to 11 years) that identify completion/occupancy dates of either less than 5 years from the date of each study or within 5 years from present day (i.e. 2028).

Each of the background developments also have different statuses for development (i.e. appealed/OLT, approved, pre-construction, under review, or otherwise unknown) making the actual occupancy dates difficult

to ascertain with certainty. However, they represent considerable corridor growth above and beyond a generalized 2% rate per year on a capacity constrained corridor.

Specific application of area background developments to represent background growth in this study's 15-year horizon period is appropriate to represent traffic either directly contributed by the developments above or by generalized corridor growth.

The future background traffic forecasts, given the above, are consistent across 5, 10, or 15 years. No allowances have been made to account for general traffic growth along these corridors over and above the site specific traffic allowances made for other area developments. It is reasonable to consider the general traffic growth along these corridors have been accommodated within the site specific area development traffic growth.

Traffic volumes contributed by area specific development are illustrated in **Figure 15**. A sensitivity analysis was also conducted without the Aldershot GO Station South Parking lot given uncertainty around the timing of this expansion and it significant contributing impacts on the area road network.

Traffic volumes contributed by area specific development (with the exception of Metrolinx's South Parking Lot expansion) are illustrated in **Figure 16**.

8.3.2 Future Background Traffic Volumes

The future background traffic volumes for the weekday morning and afternoon peak hours were developed by adding the above-mentioned allowances for the specific background development to base existing traffic volumes. The future background traffic volumes for the site with and without the expansion of the south parking lot of Aldershot GO Station are shown in **Figure 17**, and **Figure 18** respectively.

Construction of the expansion of the south parking lot of Aldershot GO Station proposed by Metrolinx was anticipated to commence construction during the spring of 2021. However, given the uncertainty of the application process, it is too unclear to include Metrolinx in the horizon years for the future background developments. Given this, BA Group conducted a sensitivity analysis and analyzed a traffic condition without Metrolinx's expansion in the future background developments. Refer to **Section 9.4** for the sensitivity analysis.

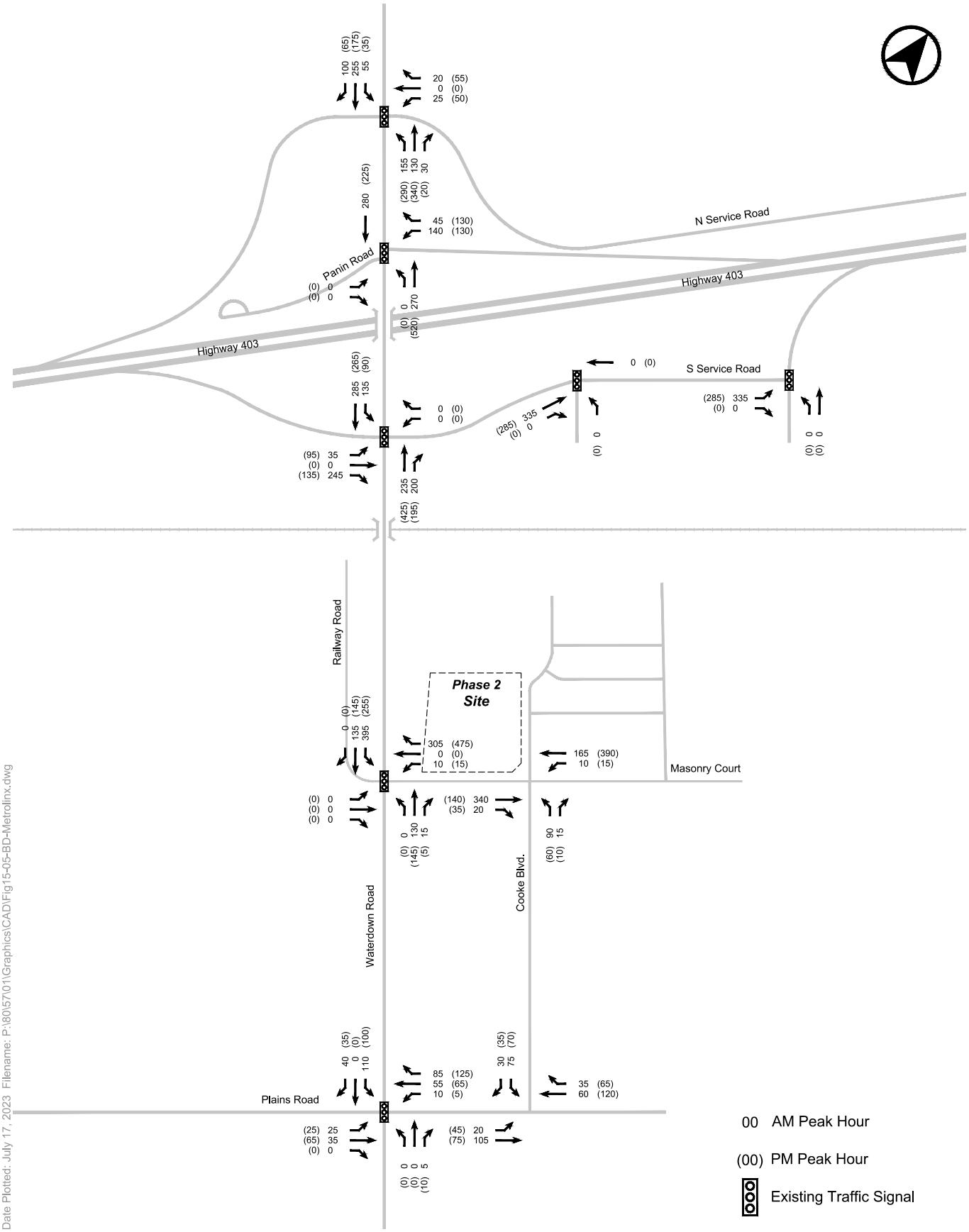


FIGURE 15 TOTAL BACKGROUND DEVELOPMENT TRAFFIC VOLUMES

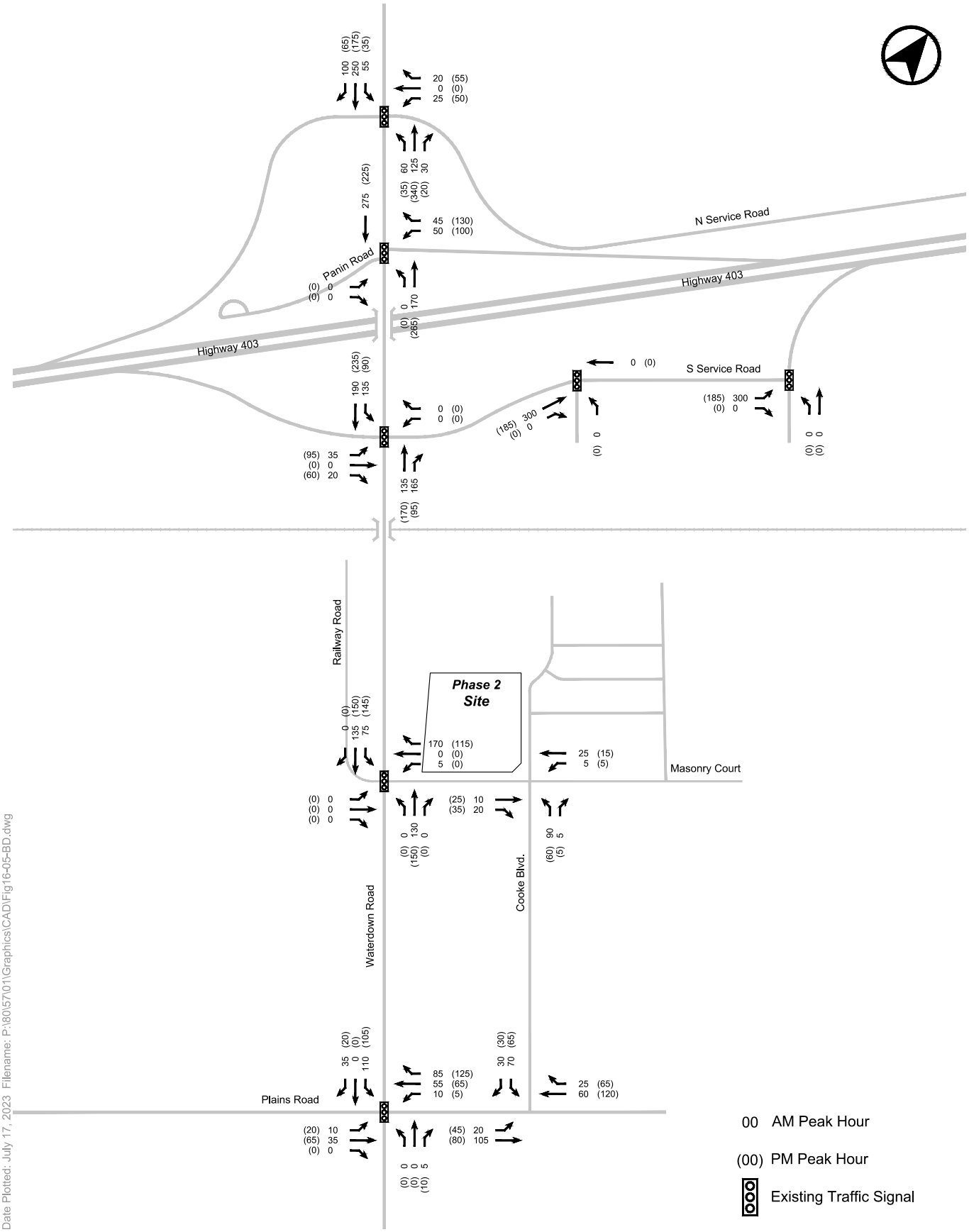


FIGURE 16 BACKGROUND DEVELOPMENT TRAFFIC VOLUMES (WITHOUT METROLINX PARKING LOT EXPANSION)

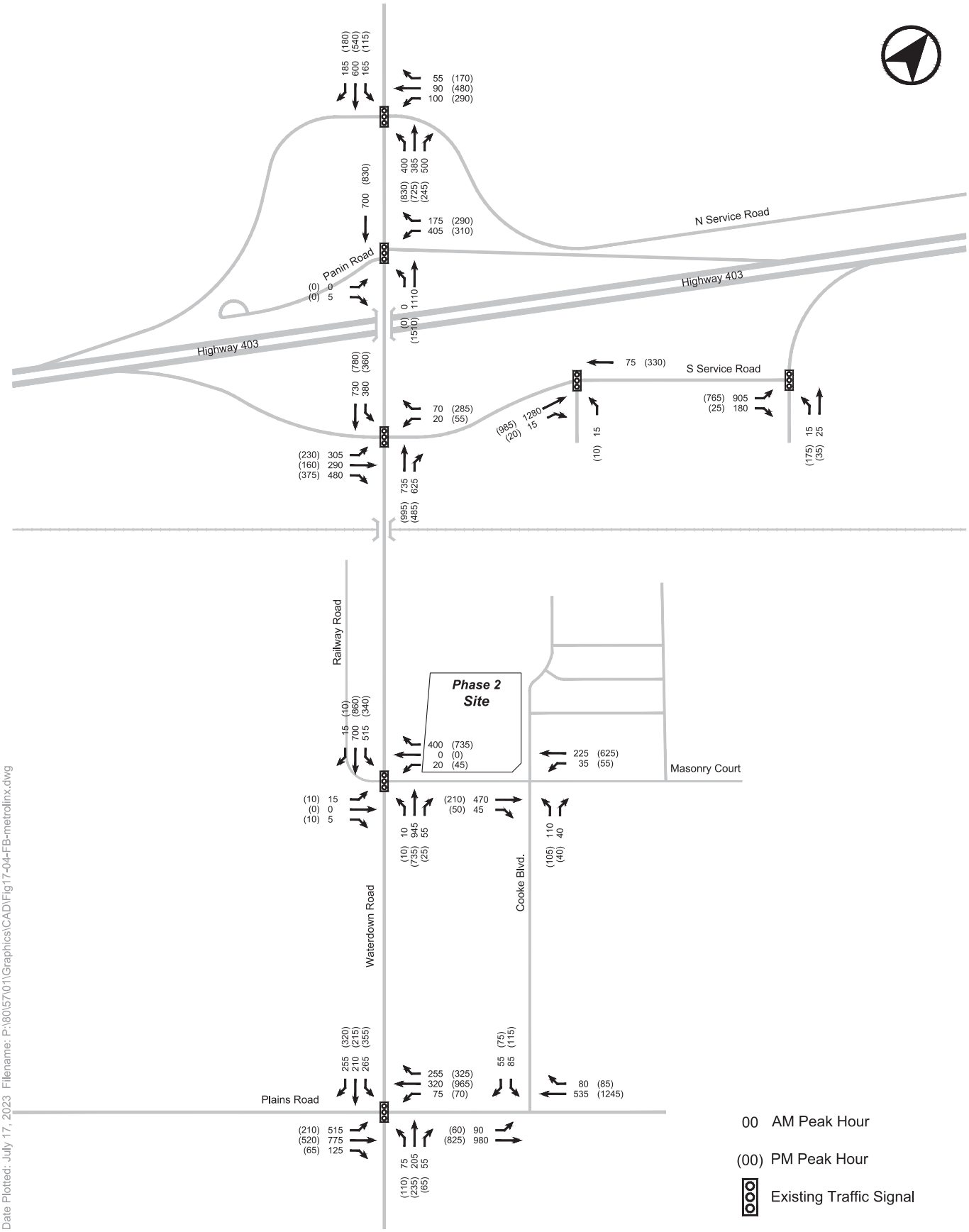
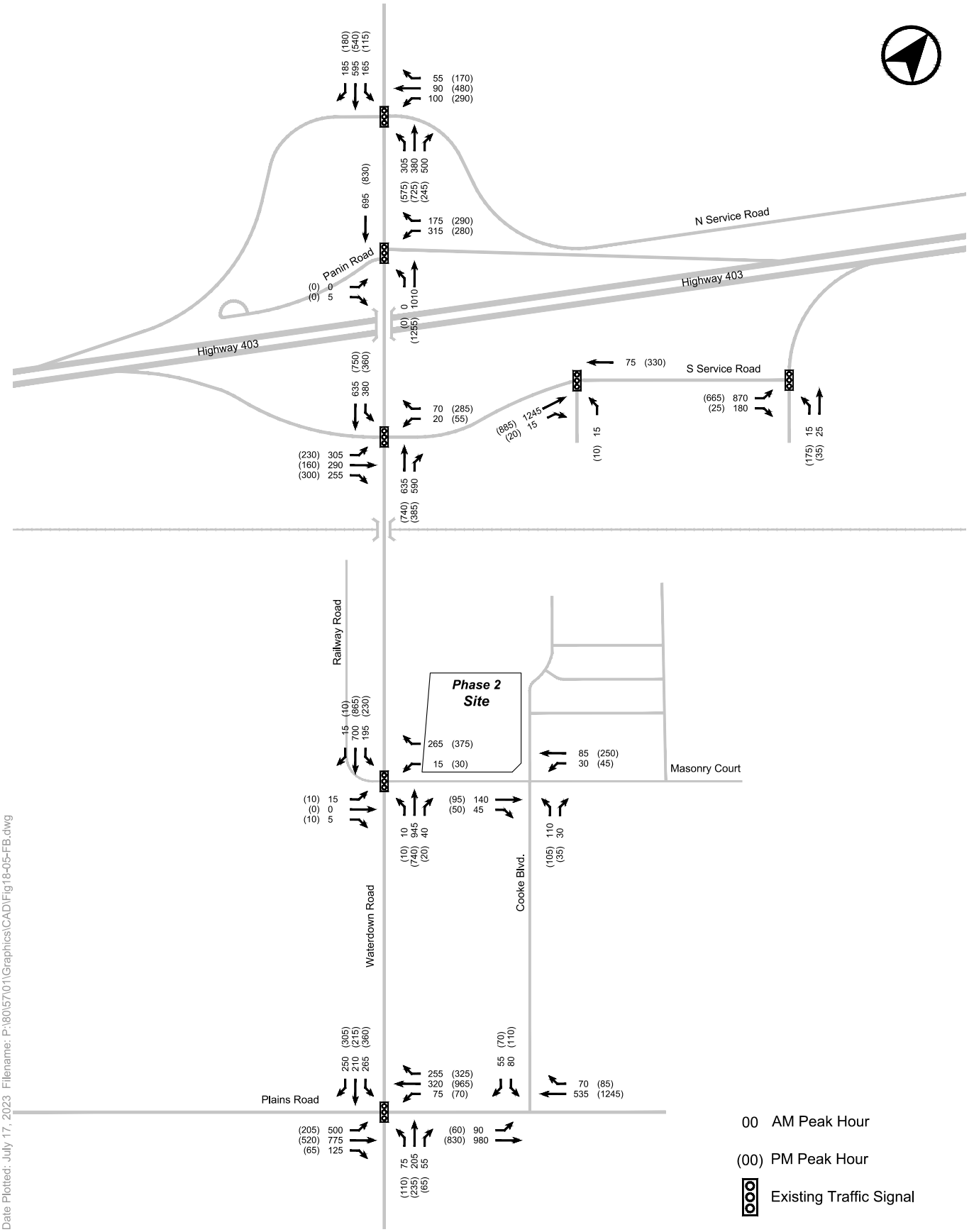


FIGURE 17 FUTURE BACKGROUND TRAFFIC VOLUMES



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FIGURE 18 FUTURE BACKGROUND TRAFFIC VOLUMES (WITHOUT METROLINX PARKING LOT EXPANSION)

8.4 SITE TRAFFIC VOLUMES

8.4.1 Trip Generation

Vehicular travel demand forecasts have been developed based on the 11th Edition of the Institute for Transportation Engineers (ITE) rates for the land use code 222: Multifamily Housing (High-Rise) and considered comparable with residential at existing mobility hub sites around Ontario. Based on the ITE adopted rates, the projected vehicle trip generation associated with site are outlined in **Table 12**. Overall, the site development is projected to generate 315 and 370 two-way residential vehicle trips during the AM and PM hours respectively.

TABLE 12 RESIDENTIAL TRIP GENERATION

	Number / Size	AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
Adopted Trip Rate	1,165 units	*0.07*	*0.20*	*0.27*	*0.20*	*0.12*	*0.32*
Number of New Trips (1,165 units)		80	233	315	231	142	373
Rounded[1]		**80**	**275**	**315**	**230**	**140**	**370**

Notes:
1. Rounded to the nearest 5 trips.

Due to the ancillary nature of the at-grade commercial-retail, it is assumed that the commercial-retail trips will be primarily pass by-trips related to other uses and will not generate a substantial amount of additional traffic.

8.4.2 Trip Distribution and Assignment

Site traffic was assigned onto the area road network based on the results of the 2016 Transportation Tomorrow Survey (TTS), prevailing traffic patterns and local area turn restrictions. General direction of approach percentages for site traffic was based on the results from the TTS and is summarized in **Table 13**.

TABLE 13 SITE TRAFFIC DISTRIBUTION

Street	Direction	Inbound	Outbound
Waterdown Road	North	5%	5%
	South	0%	0%
North Service Road	East	10%	10%
Highway 403	East	35%	45%
	West	15%	20%
Plains Road	East	30%	15%
	West	5%	5%
Total		**100%**	**100%**

Notes:
1. Trip assignment is based on a review of TTS data related to home-based trips during the weekday morning and afternoon peak periods to/from 2006 TTS Zones 4050, 4051, 4052, 4053, 4054, and 4055.
2. Values rounded to nearest 5%

The site is located in TTS Zone 4052. Zone 4053 has been included in the query in response to MTO comments. Zone 4053 consists of predominantly of undeveloped land and large commercial buildings such as IKEA Burlington, Fortinos grocery store with a large parking lot, Hydro One Burlington Transmission Station and retail stores along Plains Road East. Given this, the low number of existing residential traffic patterns within Zone 4053 did not influence the overall traffic distribution.

The projected site vehicle traffic volumes are shown in **Figure 19**.

TTS analysis is provided in **Appendix G**.

8.5 FUTURE TOTAL TRAFFIC VOLUMES

The future total traffic volume forecasts comprising the future background traffic with and without the south parking lot expansion with the addition of the site generated traffic volumes are illustrated in **Figure 20** and **Figure 21**, respectively.

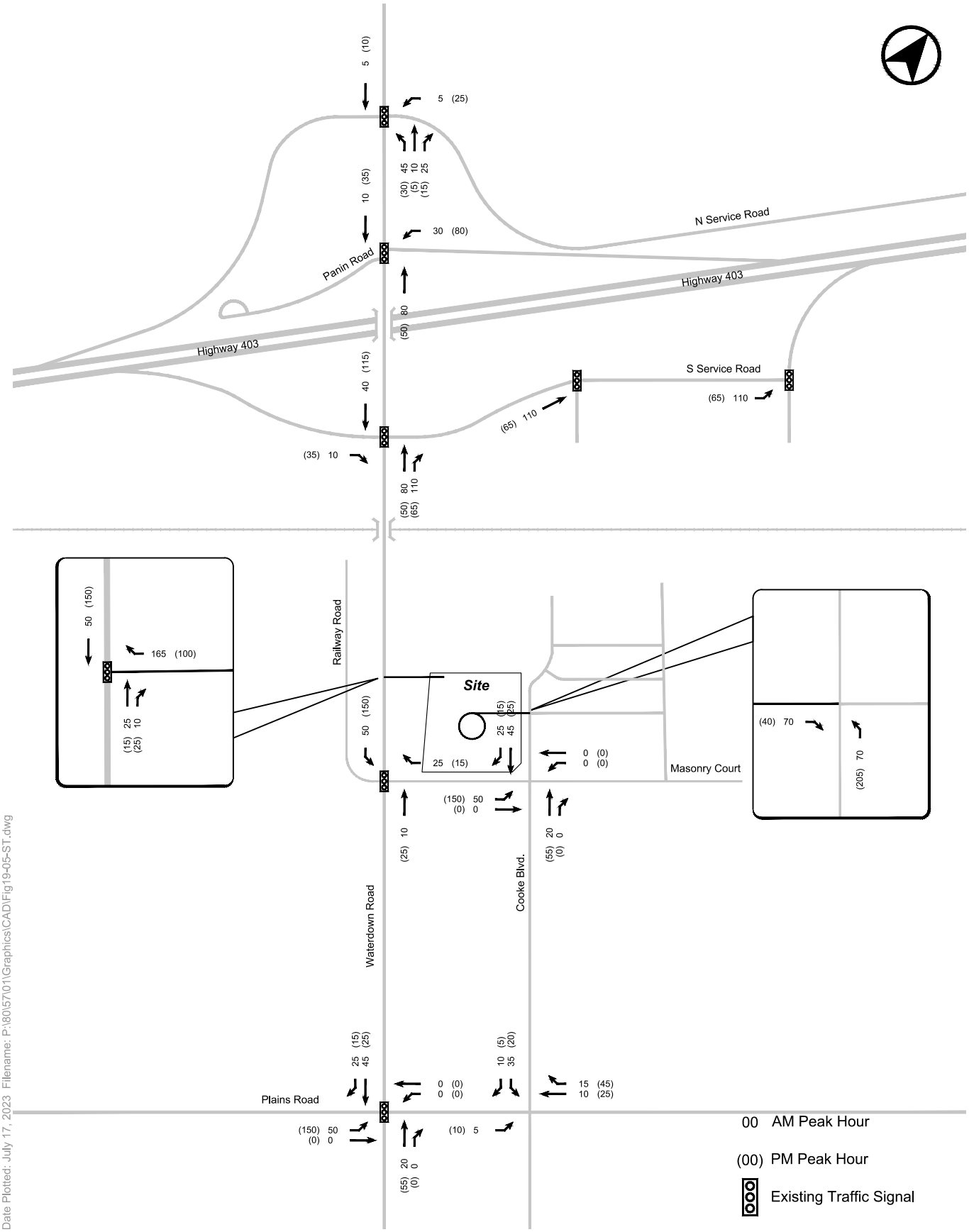


FIGURE 19 SITE TRAFFIC VOLUMES

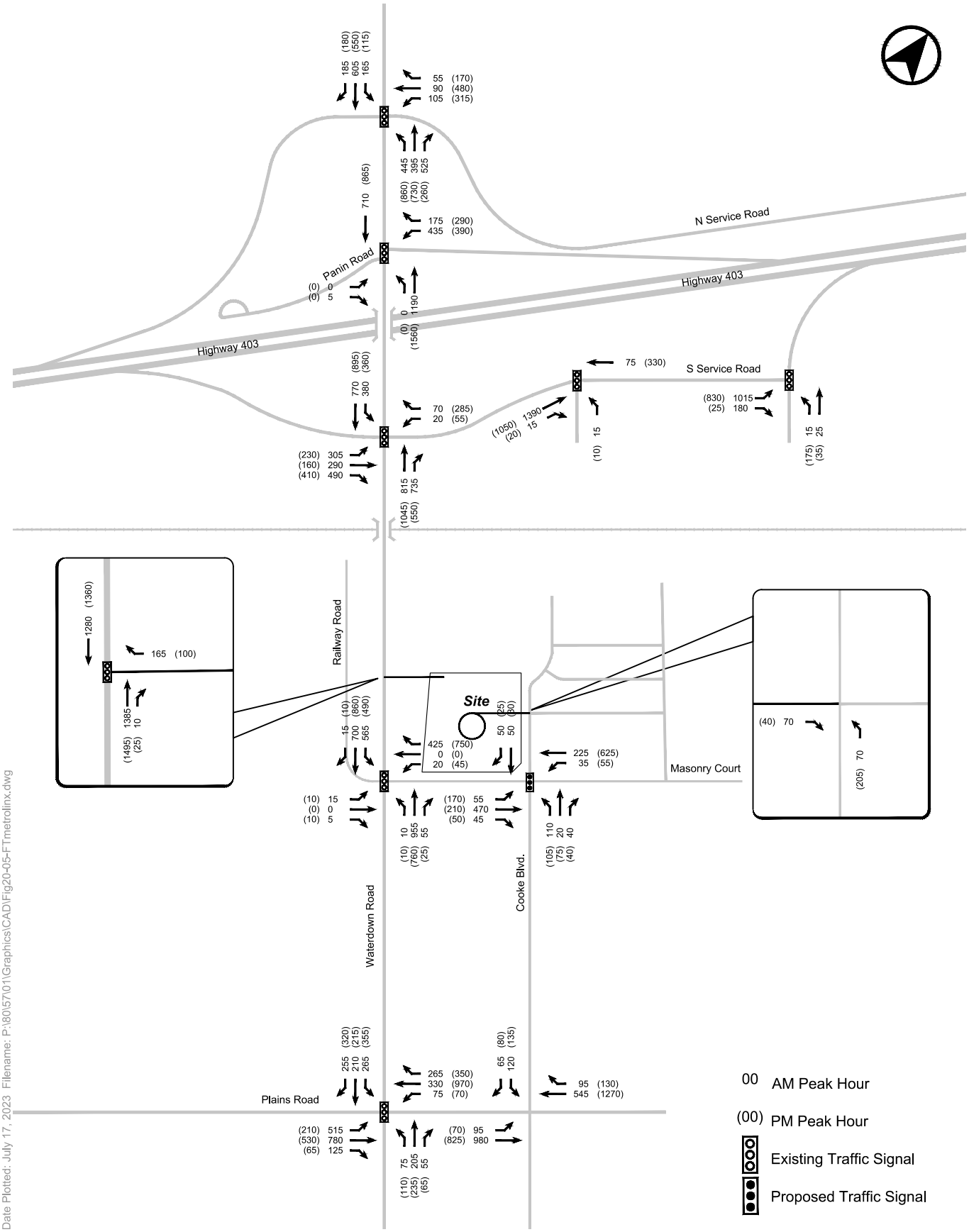


FIGURE 20 FUTURE TOTAL TRAFFIC VOLUMES

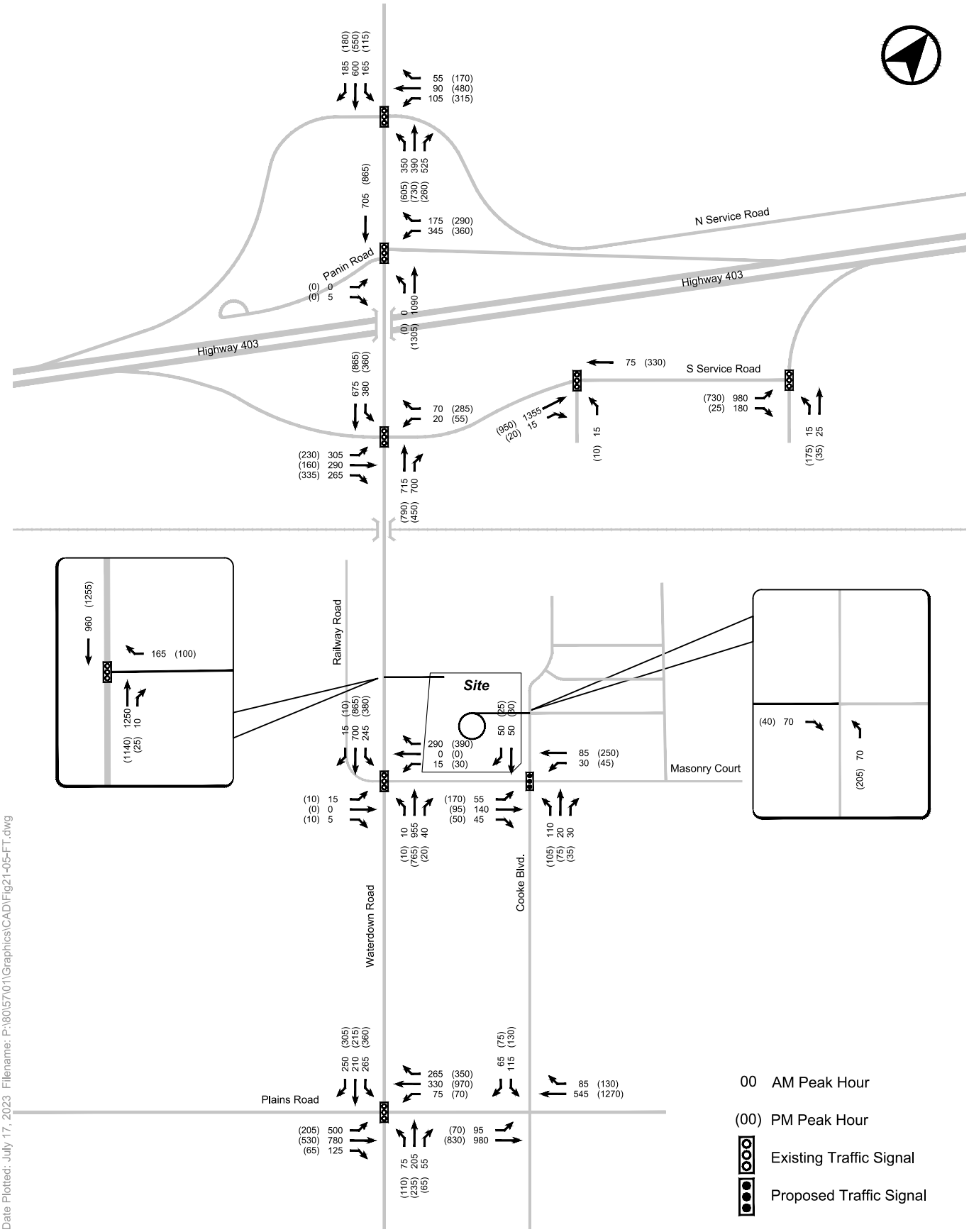


FIGURE 21 FUTURE TOTAL TRAFFIC VOLUMES (WITHOUT METROLINX PARKING LOT EXPANSION)

9.0 TRAFFIC OPERATIONS ANALYSIS

9.1 ANALYSIS METHODOLOGY AND ASSUMPTIONS

Traffic operations analyses have been completed using the Synchro (Version 11.0) capacity analysis software in accordance with the methodologies outlined in the *Highway Capacity Manual* (HCM) and Halton Region's *Transportation Impact Study Guidelines*, and *Ministry of Transportation (MTO) Traffic Impact Study Guidelines* (at interchange intersections).

The key performance indicator of the signalized intersection evaluation is an intersection performance index (volume to capacity ratio, or v/c), where a v/c index of 1.00 indicates 'at or near capacity' conditions.

The key performance indicator of the unsignalized intersection / driveway analyses is an average delay per vehicle (in seconds) and a level of service (LOS) designation, where the LOS A (little delay) to LOS F (extended delay) range provides an understanding of the relative time a motorist may have to wait to complete a turn at an intersection or driveway.

Signal Timings

Existing traffic signal timing plans for all signalized intersections within the study area were obtained from Halton Region. Analyses were undertaken using these signal timing plans for existing conditions and modified (where required) for future background and future total traffic conditions

The existing traffic signal timing plans are provided in **Appendix H**.

Road Network Assumptions

Base existing road network configurations are shown in **Figure 9**. Road network improvements, as described in **Section 10.0**, have been assumed in the analysis for future background and future total conditions.

Saturation Flow Rates

A base saturation flow rate of 1,900 passenger cars per hour of green time per lane (pcphgpl) was adopted as the base assumption within the Synchro analysis. This default rate was assumed in all analysis scenarios.

Heavy Vehicle Assumptions

Heavy and medium truck percentages incorporated into the analyses were based upon information obtained from observations made during existing intersection turning movement counts.

The relative proportion of heavy vehicles within in the general traffic stream was used as the basis for the heavy vehicle adjustment factor inputs adopted within the Synchro analysis for both existing and future scenarios. Where necessary, heavy percentage changes were made for certain intersections in the future scenarios.

Peak Hour Factors

The peak hour factors at the area intersection were calculated based on the existing traffic volume data extracted from the traffic count utilized in the study for the operations analysis. A peak hour factor of 0.92 was assumed for proposed driveway access.

Lost Time Adjustments

Lost time adjustments were set at a default of -1.0 seconds. The LTA parameter accounts for drivers taking advantage of the amber / all-red time (i.e. intergreen time) to clear the intersection (these vehicles are herein referred to as "sneakers"). A baseline adjustment of -1.0 seconds is applied to all signalized intersections in the study area during both peak hours (note that an uncalibrated Synchro model assumes that no vehicles complete their turn / movement on amber / all-red time). This recommended adjustment is a reasonable default calibration as it considers the on-field condition that drivers are either (a) unable to stop before the intersection as the signal suddenly goes from green to amber, or (b) more aggressive in traversing the intersection to avoid waiting for the next green phase (more common at busy urban intersections).

For left-turning phases at busy urban intersections that are near or at-capacity, the left turn phases are often coded with a protected (i.e. left turns have right-of-passage) and permissive (i.e. pedestrians and through and right turn traffic have right-of-passage but left turns may proceed on a suitable gap) phases. In both phase types at a busy urban intersection, drivers will continue to advance into the intersection during the intergreen time following each phase's respective green time based on explanations (a) and (b). This "consumed" intergreen time typically exceeds the recommended default LTA adjustment of -1.0 seconds.

A field study capturing the "intergreen effect" was undertaken at the intersections of Waterdown Road / N Service Road & Highway 403 WB On-Ramp and the Waterdown Road / S Service Road & Highway 403 EB Off-Ramp. The LTA parameters applied in the Synchro model for the purposes of calibrating the in-field intergreen behaviour are summarized in **Table 14**.

TABLE 14 INTERGREEN STUDIES AND LOST TIME ADJUSTMENT

Movement	Observed Number of Sneakers		Applied Lost Time Adjustment	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Waterdown Road / N Service Road & Highway 403 WB On-Ramp				
NBL	1	1.7	-1	-1.7
Waterdown Road / S Service Road & Highway 403 EB Off-Ramp				
SBL	1.5	1.2	-1.5	-1.2

Intergreen studies attached in **Appendix I**.

9.2 STUDY AREA INTERSECTIONS

Traffic operations and new site traffic related impacts have been reviewed at the following area intersections through capacity analysis:

Signalized

- Waterdown Road / N Service Road & Highway 403 WB On-Ramp;
- Waterdown Road / Panin Rd & Highway 403 WB Off-Ramp;
- Waterdown Road / S Service Road & Highway 403 EB Off- Ramp
- Waterdown Road / Masonry Court & Railway Road;
- Waterdown Road & Lasalle Park Road / Plains Road;
- S Service Road / Highway 403 EB Off-Ramp & GO Station Lot Entrance
- S Service Road / GO Station Bus Loop Access;
- Plains Road / Cooke Boulevard; and
- Cooke Boulevard / Masonry Court (Proposed Signalization).

Unsignalized

- Masonry Court / Cooke Boulevard;
- Waterdown Road / Site Driveway (West); and
- Cooke Boulevard / Site Driveway (East).

9.3 TRAFFIC ANALYSIS SUMMARY

A summary of the traffic analysis results for the signalized and unsignalized intersections within the study area is provided herein. Detailed Synchro analysis output sheets are included in **Appendix J**.

The study area intersections can be define by three distinct characteristics:

1. Highway 403/Waterdown Road Interchange & North Aldershot GO Entrance;
2. Waterdown Road / Masonry Court & South GO Entrance; and,
3. Plains Road Corridor.

9.3.1 Highway 403 / Waterdown Road Operations

The Highway 403 / Waterdown Road interchange has an unusual configuration that does not meet the typical Diamond I/C, Parclo B, or desirable Parclo A interchange configurations defined in the MTO's Highway Corridor Management Manual. The existing configuration requires three signals to facilitate on/off ramp manoeuvres:

1. The south signal is shared with the primary and only route to the north (and main) entrance for the Aldershot GO station;
2. The centre signal is shared with Panin Road; and,
3. The north signal is shared with the North Service Road.

None of the on or off-ramp manoeuvres permit free-flow movement on or off the freeway. The highway's eastbound on-ramp is served by an insufficient shared northbound-thru lane and insufficient southbound left turn lane, both constrained by bridge structures on either side of the intersection.

The bridge widening over Highway 403 has been identified by the City in its Capital Budget to permit a five-lane cross-section and active transportation along Waterdown Road. The bridge widening is not a requirement of the proposed development. This improvement has been identified in both the 2014 Development Charges Background Study (at the time, for construction in 2016) and again in the 2019 Development Charges Background Study / 2020 Capital Budget (for construction in 2028).

As identified in the City's Capital Budget:

> *With the completion of the Waterdown Road/403 interchange, and planned intensification around the Aldershot GO Mobility Hub, use of Waterdown Road by vehicles, buses, cyclists and pedestrians is expected to increase significantly. There are presently capacity limitations along the bridge section over the 403. This will be a joint project with the Ministry of Transportation to widen the structure to provide a five lane cross section with on-road bike lanes and improved pedestrian facilities.*

The existing Aldershot GO station and Highway 403 Eastbound On-Ramp currently share the same access via Alan Bryk Way and existing GO Station traffic contributes to a large amount of traffic volumes on the critical movements of the intersection. Given that both the existing Aldershot GO station and Highway 403 EB On-Ramp are large vehicle traffic generators, the critical movements at this intersection are currently operating at or near theoretical capacity.

Alan Bryk Way is planned to be extended to King Road. This was formerly planned for 2017 (2014 DC Background Study), 2019 (2018 Capital Projects) and currently planned for 2023 (2019 DC Background Study).

As identified in the City's Capital Budget:

> *This project involves the construction of the South Service Road (Alan Bryk Way) extension across the Aldershot GO Station property and provides for the City's share of a new bridge at the future crossing of South Service Road and Falcon Creek. The remainder of the South Service extension to King Road will be constructed through development, as it relates to the prosperity corridor.*
>
> *The timing, scope and limits of these proposed works may be impacted by the findings of the forthcoming QEW Prosperity Corridor Block Plan and Implementation Study.*

It not clear at this time whether extension of the Alan Bryk Way will provide improvements to or increase capacity issues for the Highway 403 Eastbound on-ramp. There is insufficient information on the development and trip generation potential in the prosperity corridor land parcels along this corridor to understand relief or impacts of this improvement. We expect this road extension and growth related to the trip generation potential of the overall Mobility Study area are expected to be reviewed as part of the Prosperity Corridor Study and Secondary Plan Study processes that are currently underway.

The Waterdown Road bridges (over Highway 403 and CN Rail) and eastbound on-ramp interchange will require significant improvements regardless of development of the subject site. The MTO and City have identified the need to widen the bridge over Highway 403 in order to implement a five-lane section and add active transportation. Mitigating improvement measures have been identified in the following sections, should background development proceed at the high rate projected for 2026 (from 6 to 17% per year) based on the list of approved and appealed developments. It is important to note that this bridge widening is not required for the proposed development.

The impact related to site traffic is minor and can readily be accommodated within the interchange improvements that continue to be forthcoming in the City's Capital Budget and are already required to address existing and future background conditions.

Detailed analysis results for the Highway interchange are provided in **Section 9.3.4**.

9.3.2 Waterdown Road / Masonry Court - South GO Entrance

The intersection of Waterdown Road / Masonry Court serves as the primary entrance for the South Aldershot GO entrance, as well as the only public access via Waterdown Road to the east side of the draft Mobility Study lands, between Highway 403 and Plains Road.

The existing southbound left lane storage at this intersection is insufficient for peak morning peak hour queuing activity and is recommended to be extended. Metrolinx has also acknowledged this intersection will experience capacity and queuing issues with the introduction of new traffic. With regard to geometric improvements, the 2017 TIS for Aldershot GO states:

> *The two intersections providing ingress/egress for the station (Waterdown Road/Aldershot Access Road and Waterdown Road/Masonry Court) are shown to require geometric changes to accommodate the future traffic growth in the vicinity of the station and traffic growth at the station itself. Due to the constrained nature of the site and the municipal planning direction provided to Metrolinx, it is recommended that signal improvements be implemented immediately, and that geometric changes to the road network be deferred in the short-term to encourage GO Station users to access the station outside of the AM and PM peak hours, or to access the station via municipal transit services.*

New Metrolinx traffic related to the South Lot expansion contributes more than twice the existing volume on the southbound left movement during the morning peak hour at Waterdown Road / Masonry Court, as shown in **Figure 22**.

Given the direction that Metrolinx is expecting travel behaviour to spread outside of the peak periods, we have conducted a sensitivity analysis for the southbound left turn movement at this intersection (with and without new Metrolinx traffic) to evaluate the site traffic contribution to road network improvements.

Detailed analysis results for the Highway interchange are provided in **Section 9.3.4**.

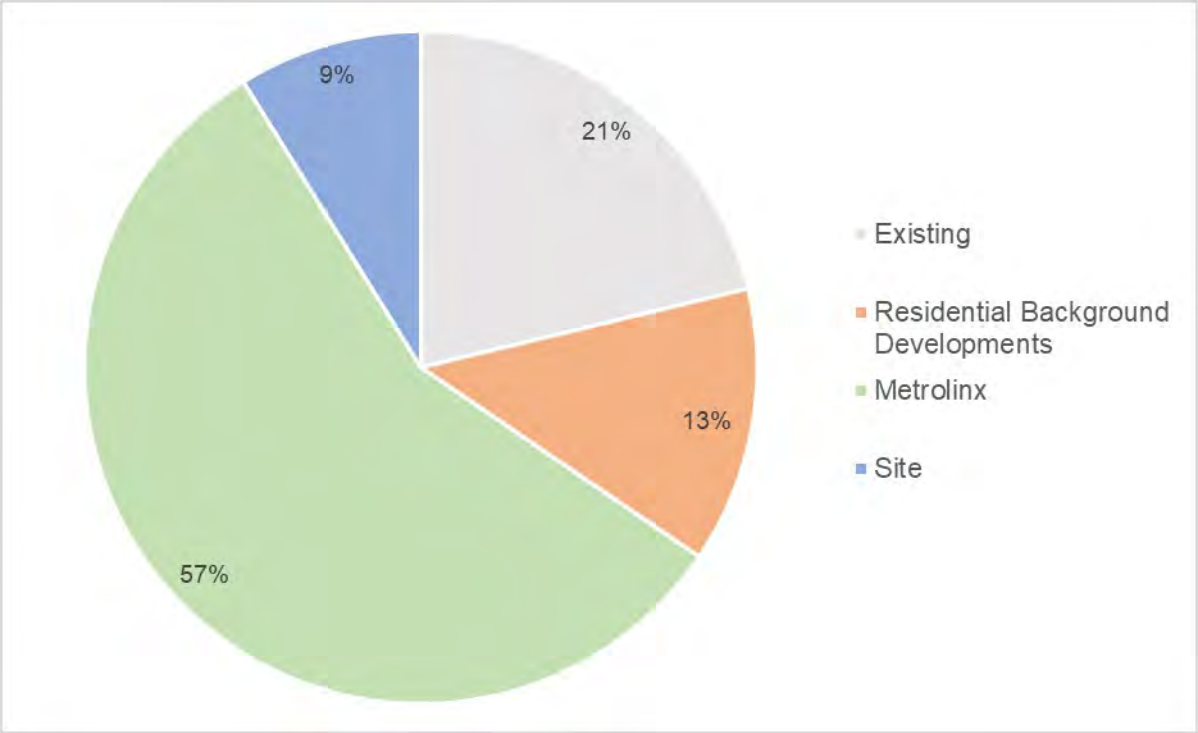


FIGURE 22: WATERDOWN ROAD & MASONRY COURT, FUTURE SOUTHBOUND LEFT TRAFFIC, CRITICAL MORNING PEAK HOUR

9.3.3 Plains Road Corridor

Future Site traffic can be acceptably accommodated on the left and right turn movements at the intersection of Plains Road / Cooke Boulevard. Site traffic travelling to/from the south and west is expected to have minimal impact on the turning movements at Plains Road / Waterdown Road and Plains Road / Emery Road.

Application of background development traffic indicates that the left and right turns at Waterdown Road / Plains Road will worsen over time. The introduction of a grid network road system, as contemplated by the draft Mobility Study will reasonably improve routing options for this traffic growth, without the need to expand turning lanes at the major intersections.

9.3.4 Signalized Intersection Analysis

9.3.4.1 Waterdown Road / N Service Road & Highway 403 WB On-Ramp

The Waterdown Road / N Service Road & Highway 403 WB On-Ramp intersection is signalized with typical cycle lengths of 100 seconds and 110 seconds during the weekday morning and afternoon peak periods, respectively.

A summary of the existing, future background and future total operations is shown in **Table 15**. A summary with improvements applied to the future background and future total scenario is shown in **Table 16**. Improvements are described in the following sections.

A summary of the 50th percentile and 95th percentile queues are summarized in **Table 17**.

Existing Conditions
Under existing traffic conditions, the Waterdown Road / N Service Road & Highway 403 WB On-Ramp intersection operates under acceptable conditions with overall v/c ratios of 0.32 and 0.73 during the weekday morning and afternoon peak hours, respectively. The northbound left movement approaches theoretical capacity with an individual v/c ratio of 0.94 during the weekday afternoon peak hour.

Under existing traffic conditions, the 95th percentile queue in the afternoon peak period exceeds the available northbound left storage of approximately 90 metres.

Future Background Conditions
Under future background traffic conditions, with the addition of traffic allowances associated with background developments, the Waterdown Road / N Service Road & Highway 403 WB On-Ramp intersection begins to operate under very busy conditions, over theoretical capacity during the weekday afternoon peak hour with an overall v/c ratio of 1.01. The critical movement is the northbound left movement, which operates with an individual v/c ratio of 1.70 in the afternoon peak hour.

In order to minimize the traffic impacts at the Waterdown Road / N Service Road & Highway 403 WB On-Ramp intersection, a lane configuration improvement is recommended to convert the existing northbound left configuration into a dual northbound left turn lane in the future. It is also recommended to modify the signal timing plan to increase the time for the northbound left phase during the afternoon peak hour.

The above-noted improvements are recommended to keep the existing and future conditions below capacity.

With the implementation of the proposed improvements, the future background scenario operates below capacity during the weekday morning and afternoon peaks hours, with overall v/c ratios of 0.43 and 0.79, respectively. The northbound left movement operates under capacity during the afternoon peak hour, with an individual v/c ratio of 0.79.

Future Total Conditions
Future total conditions at the Waterdown Road / N Service Road & Highway 403 WB On-Ramp intersection have been assessed, considering improvements required to address background development growth and the addition of site traffic to individual intersection movements.

The site adds a minor amount of traffic to the critical northbound left during the afternoon peak hour as shown in **Figure 23**.

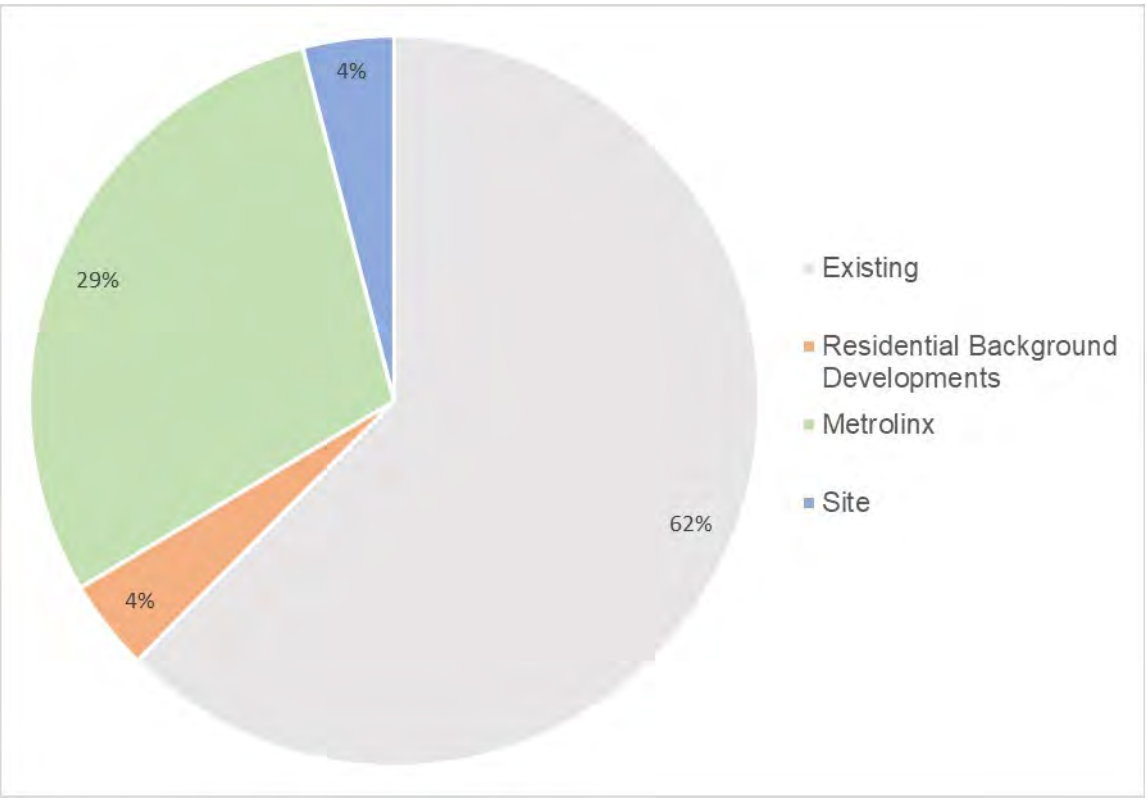


FIGURE 23: WATERDOWN ROAD / N SERVICE ROAD & HIGHWAY 403 WB ON-RAMP, FUTURE NORTHBOUND LEFT TRAFFIC, CRITICAL AFTERNOON PEAK HOUR

Future total conditions remain below capacity with the implementation of the proposed movements, with the intersection operating with overall v/c ratios of 0.49 and 0.81 during the weekday morning and afternoon peak hour, respectively.

Summary

Site-related impacts are anticipated to be minor relative to future background conditions and remain within the capacity limits of the intersection.

Dual northbound left lanes are recommended at this intersection.

With modifications, the future total 95th percentile queues for the future total scenario can be accommodated in the available storage under weekday morning and afternoon peak periods. Given this, the proposed development does not impact the queues for the northbound left turn lane.

Further improvements to bring this interchange and regional facility below typical critical thresholds of 0.75 and 0.85 are expected to be reviewed as part of the Prosperity Corridor Study and Secondary Plan Study processes that are currently underway.

Based on the foregoing, the traffic generated by the site can be acceptably accommodated at the intersection of Waterdown Road / N Service Road & Highway 403 WB On-Ramp.

TABLE 15 WATERDOWN ROAD / N SERVICE ROAD & HIGHWAY 403 WB ON-RAMP CAPACITY RESULTS

Key Movements	Existing		Future Background		Future Total	
	v/c	LOS	v/c	v/c	v/c	LOS
WBL	0.42 (0.43)	D (C)	0.51 (0.53)	D (C)	0.52 (0.58)	D (C)
WBT	0.45 (0.77)	D (D)	0.41 (0.79)	D (D)	0.40 (0.80)	D (D)
WBR	0.02 (0.08)	D (C)	0.04 (0.11)	D (C)	0.04 (0.11)	D (C)
NBL	0.36 (0.94)	A (D)	0.75 (1.70)	C (F)	0.82 (1.77)	C (F)
NBTR	0.28 (0.39)	A (C)	0.38 (0.68)	B (C)	0.40 (0.69)	B (C)
SBL	0.21 (0.26)	A (C)	0.36 (0.45)	A (C)	0.37 (0.46)	A (C)
SBTR	0.20 (0.53)	A (D)	0.41 (0.76)	B (D)	0.43 (0.75)	B (D)
Overall	**0.32 (0.73)**	**B (C)**	**0.48 (1.01)**	**B (F)**	**0.52 (1.03)**	**B (F)**
Analysis Notes	• Existing Lane Configuration					

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

TABLE 16 WATERDOWN ROAD / N SERVICE ROAD & HIGHWAY 403 WB ON-RAMP (WITH IMPROVEMENT) CAPACITY RESULTS

Key Movements	Existing		Future Background (With Improvements)		Future Total (With Improvements)	
	v/c	LOS	v/c	v/c	v/c	LOS
WBL	0.42 (0.43)	D (C)	0.51 (0.63)	D (D)	0.52 (0.70)	D (D)
WBT	0.45 (0.77)	D (D)	0.40 (0.94)	D (E)	0.40 (0.95)	D (E)
WBR	0.02 (0.08)	D (C)	0.04 (0.11)	D (C)	0.04 (0.11)	D (C)
NBL	0.36 (0.94)	A (D)	0.42 (0.78)	A (C)	0.49 (0.79)	B (C)
NBTR	0.28 (0.39)	A (C)	0.40 (0.60)	B (C)	0.40 (0.61)	B (C)
SBL	0.21 (0.26)	A (C)	0.35 (0.40)	A (C)	0.37 (0.42)	A (C)
SBTR	0.20 (0.53)	A (D)	0.38 (0.67)	B (D)	0.39 (0.71)	B (D)
Overall	**0.32 (0.73)**	**B (C)**	**0.43 (0.79)**	**B (C)**	**0.49 (0.81)**	**B (D)**
Analysis Notes			• Dual northbound left turn lane • PM Signal timing modifications		• Dual northbound left turn lane • PM Signal timing modifications	

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

TABLE 17 WATERDOWN ROAD / N SERVICE ROAD & HIGHWAY 403 WB ON-RAMP (WITH IMPROVEMENTS) QUEUE LENGTHS

Key Movements	Existing		Future Background (With Improvement)		Future Total (With Improvement)	
	50th	95th	50th	95th	50th	95th
NBL	4.3 (99.1)	26.5 (#154.4)	10.9 (38.4)	33.9 (76.6)	18.4 (54.5)	43.9 (82.3)

9.3.4.2 Waterdown Road / Panin Road & Highway 403 WB Off-Ramp

The Waterdown Road / Panin Road & Highway 403 WB Off-Ramp intersection is signalized with typical cycle lengths of 100 seconds and 110 seconds during the weekday morning and afternoon peak periods, respectively. A summary of the traffic analysis results for this intersection is shown in **Table 18**.

A summary of the 50th percentile and 95th percentile queues are summarized in **Table 19**.

Existing Conditions
Under existing traffic conditions, the Waterdown Road / Panin Road & Highway 403 WB Off-Ramp intersection operates under acceptable conditions with overall v/c ratios of 0.42 and 0.43 during the weekday morning and afternoon peak hours, respectively.

Future Background Conditions
Under future background traffic conditions with the addition of traffic allowances associated with background developments and general background corridor traffic growth, the Waterdown Road / Panin Road & Highway 403 WB Off-Ramp intersection operates under acceptable conditions with overall v/c ratios of 0.57 and 0.67 during the weekday morning and afternoon peak hours, respectively.

Future Total Conditions
With addition of site-related traffic under future total traffic conditions, the Waterdown Road / Panin Road & Highway 403 WB Off-Ramp intersection operates under acceptable conditions with overall v/c ratios of 0.62 and 0.73 during the weekday morning and afternoon peak hours, respectively. As described in **Section 8.3.1**, this condition is representative of a build out condition, as well as 5- and 10-year beyond build-out horizons.

Summary
Site-related impacts are anticipated to be minor at this intersection during the weekday morning and afternoon peak hours.

The future total 95th percentile queues can be accommodated in the available storage under weekday morning and afternoon peak periods.

TABLE 18 WATERDOWN ROAD / PANIN ROAD & HIGHWAY 403 WB OFF-RAMP CAPACITY RESULTS

Key Movements	Existing		Future Background		Future Total	
	v/c	LOS	v/c	LOS	v/c	LOS
EBLTR	0.01 (0.00)	D (A)	0.01 (0.00)	D (A)	0.01 (0.00)	D (A)
WBL	0.58 (0.52)	D (D)	0.70 (0.65)	D (D)	0.74 (0.74)	D (D)
WBR	0.09 (0.11)	D (D)	0.12 (0.56)	C (D)	0.12 (0.52)	C (D)
NBLT	0.40 (0.39)	B (A)	0.56 (0.63)	B (A)	0.61 (0.67)	B (A)
SBTR	0.20 (0.24)	A (A)	0.35 (0.35)	A (A)	0.36 (0.37)	A (A)
Overall	**0.42 (0.43)**	**B (B)**	**0.57 (0.67)**	**B (B)**	**0.62 (0.73)**	**B (B)**
Analysis Notes	• Existing Lane Configuration					

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

TABLE 19 WATERDOWN ROAD / PANIN ROAD & HIGHWAY 403 WB OFF-RAMP QUEUE LENGTHS

Key Movements	Existing		Future Background		Future Total	
	50th	95th	50th	95th	50th	95th
WBL	27.3 (21.1)	38.9 (31.9)	41.5 (36.4)	55.6 (49.2)	44.5 (46.1)	61.6 (64.4)
WBR	0.0 (0.0)	16.0 (19.5)	0.0 (22.3)	17.2 (52.5)	0.0 (21.8)	17.7 (54.9)

9.3.4.3 Waterdown Road / S Service Road & Highway 403 EB Off-Ramp

The Waterdown Road / S Service Road & Highway 403 EB Off-Ramp intersection is signalized with typical cycle lengths of 100 seconds and 110 seconds during the weekday morning and afternoon peak periods, respectively.

A summary of the traffic analysis results for this intersection are shown in **Table 20**. A summary of the traffic analysis results for this intersection with the proposed improvements applied is shown in **Table 21**.

A summary of the 50th percentile and 95th percentile queues are summarized in **Table 22**.

Existing Conditions
Under existing traffic conditions, the Waterdown Road / S Service Road & Highway 403 EB Off-Ramp intersection operates under capacity conditions with overall v/c ratios of 0.70 and 0.56 during the weekday morning and afternoon peak hours, respectively.

Future Background Conditions
Under future background traffic conditions with the addition of traffic allowances associated with background developments, the Waterdown Road / S Service Road & Highway 403 EB Off-Ramp intersection begins to operate under very busy conditions during the weekday morning and afternoon peak hours with overall v/c ratios of 1.00 and 0.95, respectively. The northbound through right and southbound left movements are the most critical movement with individual v/c ratio is the critical movements with individual v/c ratios above theoretical capacity at 1.44 and 1.07 during the weekday morning peak hours, and v/c ratios of 1.25 and 1.02, respectively, during the weekday afternoon peak hours.

In the short-term, in order to minimize the traffic impacts at the Waterdown Road / S Service Road & Highway 403 EB Off-Ramp intersection, the following mitigation improvement to the existing intersection could be considered in advance of the bridge widening already planned for 2028. These measures could improve the intersection on an interim basis, but extensive improvements are necessary to resolve the regional / interchange issues that will arise regardless of the proposed development:

- An auxiliary channelized northbound right turn lane
- A dual southbound left lane

Further improvements are needed to address ongoing regional growth and insufficient queuing space along Waterdown Road at this intersection beyond buildout of the site. The MTO could consider a number of improvements, including introducing typical free-flow elements of a Diamond or Parclo interchange or considering additional auxiliary lanes when widening the Waterdown bridge structures where typical interchange elements cannot be accommodated due to physical constraints. Future background traffic analysis results for this intersection reflect a potential dual southbound left and additional receiving lane for the northbound right channelized. These improvements are reflected in the capacity result table shown in **Table 21**. Under the improvement scheme, overall v/c ratios at this intersection are 0.70 and 0.62 during the weekday morning and afternoon peak hours, respectively. The channelized northbound right lane and the dual southbound left lanes represents one possible improvement, among several expected to be reviewed as part of the Prosperity Corridor Study and Secondary Plan Study processes that are currently underway.

Note this improvement is primarily caused by the addition of non-site related traffic growth since the site related traffic volume is a minor addition to the overall volumes at this intersection.

Future Total Conditions

Future total conditions at the Waterdown Road / S Service & Highway 403 EB Off-Ramp intersections have been assessed considering potential improvements required to address the addition of background area developments and the addition of site traffic to individual intersection movements.

Under future total traffic conditions without improvements, the Waterdown Road / S Service Road & Highway 403 EB Off-Ramp intersection operate under very busy conditions with overall v/c ratios over theoretical capacity at 1.10 and 1.02 in the weekday morning and afternoon peak hours, respectively.

With the potential improvements that were applied in the future background applied to the future total condition, the intersection operates under very busy conditions but under capacity, with overall v/c ratios of 0.82 and 0.70 during the weekday morning and afternoon peak hours, respectively. Note that a cycle length of 120 seconds was implemented during the weekday morning peak hours with the recommended improvement.

The future total 95th percentile queues can be accommodated in the available storage under weekday morning and afternoon peak periods. Southbound left queues do not meet existing storage under existing or future background conditions and site traffic does not specifically contribute to this constrained movement.

Summary

Based on the foregoing, the traffic generated by the site can be acceptably accommodated at the intersection of Waterdown Road / S Service Road & Highway 403 EB Off-Ramp. The traffic operations at this intersection are recommended to be monitored going forward in order to assess the necessity of both mitigating intersection improvements in advance of major improvements that are expected to be reviewed as part of the Prosperity Corridor Study, Secondary Plan Study, and Capital Budget processes that are currently underway.

Mitigating improvement measures are discussed under Future Background conditions above and have been identified in **Section 10.0**, should background development proceed at the high rate projected for 2026 (from 6 to 17% per year) based on the list of approved and appealed developments.

The impact related to site traffic is minor and can readily be accommodated within the interchange improvements that continue to be forthcoming in the City's Capital Budget and are already required to address existing and future background conditions.

TABLE 20 WATERDOWN ROAD / S SERVICE ROAD & HIGHWAY 403 EB OFF-RAMP CAPACITY RESULTS

Key Movements	Existing		Future Background		Future Total	
	v/c	LOS	v/c	LOS	v/c	LOS
EBL	0.73 (0.57)	D (D)	0.76 (0.76)	D (D)	0.76 (0.71)	D (D)
EBT	0.72 (0.62)	D (D)	0.66 (0.48)	D (D)	0.65 (0.45)	D (D)
EBR	0.16 (0.16)	C (D)	0.76 (0.65)	D (D)	0.81 (0.82)	D (E)
WBL	0.10 (0.18)	D (D)	0.10 (0.18)	D (D)	0.10 (0.18)	D (D)
WBR	0.05 (0.19)	D (D)	0.05 (0.21)	D (D)	0.05 (0.22)	D (D)
NBTR / NBR	0.76 (0.58)	D (C)	1.44 (1.25)	F (F)	1.68 (1.35)	F (F)
NBR	--	--	--	--	--	--
SBL	0.86 (0.69)	D (D)	1.07 (1.02)	F (F)	1.08 (1.08)	F (F)
SBT	0.28 (0.26)	B (B)	0.47 (0.42)	B (C)	0.50 (0.50)	B (C)
Overall	**0.70 (0.56)**	**D (C)**	**1.00 (0.95)**	**F (F)**	**1.10 (1.02)**	**F (F)**
Analysis Notes	• Existing Lane Configuration		• Existing Lane Configuration		• Existing Lane Configuration	

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

TABLE 21 WATERDOWN ROAD / S SERVICE ROAD & HIGHWAY 403 EB OFF-RAMP (WITH IMPROVEMENTS) CAPACITY RESULTS

Key Movements	Existing		Future Background (With Improvements)		Future Total (With Improvements)	
	v/c	LOS	v/c	LOS	v/c	LOS
EBL	0.98 (0.89)	F (E)	0.79 (0.80)	D (E)	0.79 (0.66)	D (D)
EBT	0.94 (0.32)	F (D)	0.69 (0.51)	D (D)	0.69 (0.42)	D (D)
EBR	0.56 (0.88)	D (E)	0.90 (0.77)	E (E)	0.96 (0.87)	F (E)
WBL	0.20 (0.36)	E (D)	0.12 (0.20)	D (D)	0.12 (0.21)	D (D)
WBR	0.08 (0.19)	F (F)	0.05 (0.26)	D (D)	0.05 (0.29)	D (D)
NBTR	0.99 (0.97)	D (D)	0.55 (0.66)	C (C)	0.62 (0.76)	C (C)
NBR	--	--	0.75 (0.39)	D (B)	0.95 (0.53)	E (B)
SBL[1]	1.20 (1.18)	F (F)	0.53 (0.56)	B (C)	0.58 (0.62)	B (C)
SBT	0.28 (0.40)	B (B)	0.42 (0.41)	B (B)	0.45 (0.50)	B (B)
Overall	**0.97 (0.96)**	**E (F)**	**0.70 (0.62)**	**D (C)**	**0.82 (0.70)**	**D (C)**
Analysis Notes	• Existing Lane Configuration		• Interchange Improvements, Such as: 1. Parclo or typical Diamond configuration 2. Separation of highway on/off ramp and primary GO traffic; **or**, 3. Introduction of Dual or Free Flow Left/Right Turns at interchange intersections; in combination with, 4. Widening of Waterdown Road over Highway 403 (already planned for 2028) • ***Dual SBL / Northbound Right receiving lane Implemented in Synchro*** • Signal timing modification and increase of signal timing plan to 120 seconds during the morning peak hour		• Future Background Lane Configuration and Signal Timing Plans	

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)
2. Includes a dual southbound left with an additional receiving lane for the northbound right channelized as a potential improvement to be explored by MTO as part of the Prosperity Corridor Study and Secondary Plan Study.

TABLE 22 WATERDOWN ROAD / S SERVICE ROAD & HIGHWAY 403 EB OFF-RAMP QUEUE LENGTHS

Key Movements	Existing		Future Background		Future Total	
	50th	95th	50th	95th	50th	95th
EBL	53.2 (29.0)	79.3 (47.5)	74.0 (48.0)	#125.6 (#94.6)	76.6 (49.0)	#125.6 (#94.6)
EBT	56.8 (34.8)	83.0 (55.0)	68.2 (31.7)	103.6 (56.3)	70.5 (32.3)	103.6 (56.3)
EBR	0.0 (0.0)	18.6 (21.8)	70.9 (35.4)	#145.2 (#94.6)	~83.6 (56.6)	#158.3 (#129.3)

9.3.4.4 Waterdown Road / Masonry Court & Railway Road

The Waterdown Road / Masonry Court & Railway Road intersection is signalized with a typical cycle length of 100 seconds and 110 seconds during the weekday morning and afternoon peak periods, respectively.

A summary of the traffic analysis results for this intersection are shown in **Table 23**. A summary of the traffic analysis results with improvements applied to the future background and future total horizons is shown in **Table 24**.

A summary of the 50th percentile and 95th percentile queues are summarized in **Table 25**.

Existing Conditions
Under existing traffic conditions, the intersection operates under acceptable volume-to-capacity conditions with overall v/c ratios of 0.34 and 0.27 during the weekday morning and afternoon peak hours, respectively. The existing queuing exceeds the available storage length of 45 metres on the southbound left turn lane.

Future Background Conditions
The addition of the South GO expansion lot will add queuing to the southbound left and westbound right movement of this intersection.

Under future background traffic conditions with the addition of traffic allowances associated with background developments, the intersection operates under acceptable conditions with overall v/c ratios of 0.78 and 0.83 during the weekday morning and afternoon peak hours, respectively. The SBL movement begins to operate above theoretical capacity with a v/c ratio of 1.04 in the afternoon peak hour. Signal timing modifications improve the SBL to a v/c ratio of 0.75. Signal timing modifications have also been made for the morning peak hours to improve the queueing condition of the southbound left movement.

To accommodate an increase in outbound GO transit activity, a reconfiguration of the westbound approach to an exclusive westbound lane and shared-left through lane had been previously proposed. A 2017 TIS prepared by AECOM addressed these improvements, by noting that “geometric changes to the road network be deferred in the short-term to encourage GO Station users to access the station outside of the AM and PM peak hours, or to access the station via municipal transit services”. These improvements have not been considered in this analysis.

BA Group has conducted further sensitivity analysis without the consideration of the proposed parking lot expansion in **Section 9.4**, recognizing that Metrolinx is anticipating traffic is expected to disperse outside of peak AM and PM peak hours.

Future Total Conditions

With addition of site-related traffic under future total traffic conditions, the intersection operates under busy yet acceptable volume-to-capacity conditions with overall v/c ratios of 0.84 and 0.92 during the weekday morning and afternoon peak hours, respectively. A signal timing modification will improve the operation of the SBL movement from 1.52 in the afternoon peak hour to 0.94. Southbound left queuing for future total conditions has been assessed as part of the Metrolinx sensitivity described in **Section 9.4.**

Site-related impacts are anticipated to have moderate impact at this intersection during the weekday morning and afternoon peak hours when compared to other development (notably GO transit activity) routing through this intersection.

Summary

An extension of the southbound left turn lane to 135 metres is proposed to accommodate Phase 1 of the South GO expansion and area background development volumes. Site traffic will add a minor amount to queuing in the morning and afternoon peak hours, as shown in **Table 25**. The TIS prepared for Metrolinx anticipates dispersal of traffic outside of the peak hour that may lessen the currently estimated traffic impact on this movement.

The impact related to site traffic is minor and can readily be accommodated with the improvements proposed for this intersection.

TABLE 23 WATERDOWN ROAD / MASONRY COURT & RAILWAY ROAD CAPACITY RESULTS

Key Movements	Existing		Future Background		Future Total	
	v/c	LOS	v/c	LOS	v/c	LOS
EBLTR	0.03 (0.04)	D (D)	0.08 (0.02)	D (B)	0.09 (0.02)	D (B)
WBL	0.12 (0.25)	D (D)	0.11 (0.08)	D (B)	0.10 (0.08)	D (B)
WBTR	0.06 (0.17)	D (D)	0.57 (0.82)	D (D)	0.63 (0.87)	D (D)
NBL	0.03 (0.03)	A (A)	0.07 (0.08)	C (C)	0.07 (0.07)	C (C)
NBTR	0.38 (0.25)	A (A)	0.87 (0.75)	D (C)	0.88 (0.75)	D (C)
SBL	0.25 (0.14)	A (A)	0.80 (1.04)	C (F)	0.91 (1.52)	D (F)
SBTR	0.22 (0.26)	A (A)	0.30 (0.55)	A (D)	0.31 (0.54)	A (C)
Overall	**0.34 (0.27)**	**A (B)**	**0.78 (0.83)**	**C (D)**	**0.84 (0.92)**	**C (E)**
Analysis Notes:	• Existing Lane Configuration					

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

TABLE 24 WATERDOWN ROAD / MASONRY COURT & RAILWAY ROAD (WITH IMPROVEMENTS) CAPACITY RESULTS

Key Movements	Existing		Future Background		Future Total	
	v/c	LOS	v/c	LOS	v/c	LOS
EBLTR	0.02 (0.12)	D (D)	0.06 (0.03)	D (C)	0.07 (0.03)	D (C)
WBLT	0.25 (0.62)	D (D)	0.15 (0.11)	D (C)	0.14 (0.12)	D (C)
WBR	0.14 (0.46)	D (D)	0.26 (0.83)	D (D)	0.35 (0.89)	D (E)
NBL	0.02 (0.03)	B (A)	0.08 (0.06)	C (B)	0.08 (0.07)	C (C)
NBTR	0.74 (0.47)	C (B)	0.92 (0.56)	D (B)	0.98 (0.71)	E (C)
SBL	0.77 (0.45)	D (A)	0.71 (0.75)	B (C)	0.76 (0.94)	C (D)
SBTR	0.24 (0.48)	A (A)	0.29 (0.43)	A (C)	0.29 (0.42)	A (B)
Overall	**0.70 (0.52)**	**C (B)**	**0.73 (0.68)**	**C (C)**	**0.78 (0.83)**	**C (D)**
Analysis Notes:	• Existing Lane Configuration		• Existing Lane Configuration • Signal Timing Modifications		• Existing Lane Configuration • Signal Timing Modifications	

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

TABLE 25 WATERDOWN ROAD / MASONRY COURT & RAILWAY ROAD QUEUE LENGTHS

Key Movements	Existing		Future Background		Future Total	
	50th	95th	50th	95th	50th	95th
SBL	1.1 (10.3)	1.8 (1.4)	90.4 (59.5)	m#134.8 (m78.4)	101.7 (98.1)	m#155.2 (m#125.0)

9.3.4.5 Waterdown Road & Lasalle Park Road / Plains Road

The Waterdown Road / Masonry Court & Railway Road intersection is signalized with a typical cycle length of 110 seconds during the weekday morning and afternoon peak periods.

A summary of the traffic analysis results for this intersection is shown in **Table 26.** A summary of traffic analysis results for this intersection with signal timing improvements is shown in **Table 27**.

Existing Conditions
Under existing traffic conditions, the intersection operates under acceptable conditions with overall v/c ratios of 0.69 and 0.80 during the weekday morning and afternoon peak hours.

Future Background Conditions
Under future background traffic conditions with the addition of traffic allowances associated with background developments and general background corridor traffic growth, the intersection operates under busy yet acceptable conditions with overall v/c ratios of 0.80 and 0.95 during the weekday morning and afternoon peak hours. It is noted that the SBL movement operates over theoretical capacity at a v/c ratio of 1.05 during the afternoon peak hour. A signal timing modification, as described in **Section 11.1**, is proposed to improve the operation of the southbound left to a 0.75 v/c ratio.

Future Total Conditions
With addition of site-related traffic under future total traffic conditions, the intersection operates under busy yet acceptable conditions with overall v/c ratios of 0.81 and 0.96 during the weekday morning and afternoon peak hours. It is noted that the SBL movement and the WBTR shared lane operate over theoretical capacity at a v/c ratio of 1.02 and 1.05, respectively during the afternoon peak hour. A signal timing modification is proposed for the afternoon peak hour to improve the operation of the SBL movement to 0.97 and the WBTR lane to 0.97. This signal timing modification is described in greater detail in **Section 11.1**.

Summary

Site-related impacts are anticipated to be a minor impact at this intersection during the weekday morning and afternoon peak hours when compared to other developments and corridor traffic routing through this intersection.

The analysis provides a conservative projection of future corridor traffic volumes in the area. It is anticipated that the volumes reported at this intersection may never be fully realized, as it is unclear if the Metrolinx South Parking Lot expansion will proceed and it is likely that other background development volumes may be dispersed, realized in other modes of travel or accommodated at new north-south road connections within the draft Mobility Study Area. It is recommended that the City monitor this intersection for estimated vs realized growth on turning movements to assess the necessity of intersection improvements, such as a dual eastbound left turn lane and auxiliary westbound right turn lane. Additional north-south routes, that would establish a grid-network, are recommended to alleviate regional growth, improve capacity, and provide alternative routes and better local access conditions to the local area north of Plains Road.

TABLE 26 WATERDOWN ROAD & LASALLE PARK ROAD / PLAINS ROAD CAPACITY RESULTS

Key Movements	Existing		Future Background		Future Total	
	v/c	LOS	v/c	LOS	v/c	LOS
EBL	0.86 (0.73)	C (C)	0.93 (0.80)	D (D)	0.93 (0.80)	D (D)
EBTR	0.56 (0.33)	C (B)	0.60 (0.38)	C (C)	0.60 (0.39)	C (C)
WBL	0.25 (0.16)	C (B)	0.35 (0.19)	C (A)	0.35 (0.19)	C (A)
WBTR	0.40 (0.80)	C (D)	0.68 (0.99)	D (D)	0.72 (1.02)	D (D)
NBL	0.23 (0.34)	C (C)	0.23 (0.35)	C (C)	0.23 (0.35)	C (C)
NBTR	0.72 (0.88)	D (E)	0.73 (0.92)	D (E)	0.73 (0.92)	D (E)
SBL	0.53 (0.78)	C (D)	0.87 (1.05)	D (E)	0.89 (1.05)	D (E)
SBT	0.49 (0.45)	D (D)	0.46 (0.43)	C (B)	0.46 (0.43)	C (B)
SBR	0.16 (0.20)	C (F)	0.19 (0.22)	C (E)	0.19 (0.22)	C (D)
Overall	**0.69 (0.80)**	**C (D)**	**0.80 (0.95)**	**D (D)**	**0.81 (0.96)**	**D (D)**
Analysis Notes:	• Existing Lane Configuration		• Existing Lane Configuration • Existing Signal Timing Plan		• Existing Lane Configuration • Existing Signal Timing Plan	

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

TABLE 27 WATERDOWN ROAD & LASALLE PARK ROAD / PLAINS ROAD (WITH SIGNAL IMPROVEMENTS) CAPACITY RESULTS

Key Movements	Existing		Future Background – with Signal Improvement		Future Total – with Signal Improvement	
	v/c	LOS	v/c	LOS	v/c	LOS
EBL	0.86 (0.73)	C (C)	0.93 (0.97)	D (F)	0.93 (0.97)	D (F)
EBTR	0.56 (0.33)	C (B)	0.60 (0.39)	C (C)	0.60 (0.40)	C (C)
WBL	0.25 (0.16)	C (B)	0.35 (0.19)	C (A)	0.35 (0.19)	C (A)
WBTR	0.40 (0.80)	C (D)	0.68 (0.95)	D (D)	0.72 (0.97)	D (D)
NBL	0.23 (0.34)	C (C)	0.23 (0.34)	C (C)	0.23 (0.35)	C (C)
NBTR	0.72 (0.88)	D (E)	0.73 (0.96)	D (F)	0.73 (0.97)	D (F)
SBL	0.53 (0.78)	C (D)	0.87 (0.97)	D (E)	0.89 (0.97)	D (E)
SBT	0.49 (0.45)	D (D)	0.46 (0.42)	C (C)	0.46 (0.43)	C (C)
SBR	0.16 (0.20)	C (F)	0.19 (0.29)	C (E)	0.19 (0.30)	C (E)
Overall	**0.69 (0.80)**	**C (D)**	**0.80 (0.95)**	**D (D)**	**0.81 (0.96)**	**D (D)**
Analysis Notes:	• Existing Lane Configuration		• Existing Lane Configuration • Modified Signal Timing Plan		• Existing Lane Configuration • Modified Signal Timing Plan	

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

9.3.4.6 S Service Road / Highway 403 EB On-Ramp & GO Station Lot Entrance

The S Service Road / Highway 403 EB On-Ramp & GO Station Lot Entrance intersection is signalized with an actuated-uncoordinated free cycle length plan during the weekday morning and afternoon peak periods, respectively.

A summary of the traffic analysis results for this intersection is shown in **Table 28**.

A summary of the 50th percentile and 95th percentile queues are summarized in **Table 29**.

Existing Conditions
Under existing traffic conditions, the intersection operates under acceptable conditions with overall v/c ratios of 0.53 and 0.55 during the weekday morning and afternoon peak hours, respectively.

Future Background Conditions
Under future background traffic conditions with the addition of traffic allowances associated with background developments, the intersection operates under capacity conditions with overall v/c ratios of 0.81 and 0.74 during the weekday morning and afternoon peak hours, respectively.

Future Total Conditions
With addition of site-related traffic under future total traffic conditions, the intersection operates under capacity with overall v/c ratios of 0.91 and 0.80 during the weekday morning and afternoon peak hours, respectively.

A queuing analysis was also conducted at the S Service Road / Highway 403 EB On-Ramp & GO Station Lot Entrance intersection to confirm that future total queues do not extend beyond the available storage capacity and obstruct traffic volumes related to the Highway 403 off-ramp terminals.

The future total 95th percentile queues can be accommodated in the available storage under weekday morning and afternoon peak periods.

TABLE 28 S SERVICE ROAD / HIGHWAY 403 EB ON-RAMP & GO STATION LOT ENTRANCE CAPACITY RESULTS

Key Movements	Existing		Future Background		Future Total	
	v/c	LOS	v/c	LOS	v/c	LOS
EBL	0.55 (0.62)	A (B)	0.85 (0.83)	B (B)	0.96 (0.91)	C (C)
EBR	0.13 (0.02)	A (A)	0.14 (0.02)	A (A)	0.15 (0.02)	A (A)
NBLT	0.38 (0.43)	C (B)	0.39 (0.53)	C (C)	0.39 (0.53)	C (C)
Overall	**0.53 (0.55)**	**A (B)**	**0.81 (0.74)**	**A (B)**	**0.91 (0.80)**	**C (C)**
Analysis Notes	• Existing Lane Configuration					

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

TABLE 29 S SERVICE ROAD / HIGHWAY 403 EB ON-RAMP & GO STATION LOT ENTRANCE QUEUE LENGTHS

Key Movements	Existing		Future Background		Future Total	
	50th	95th	50th	95th	50th	95th
EBL	0.0 (27.3)	56.1 (61.4)	0.0 (60.1)	#173.5 (#148.8)	0.0 (72.4)	#208.5 (#170.1)
EBR	0.0 (0.0)	4.4 (2.9)	0.0 (0.0)	6.3 (2.9)	0.0 (0.1)	7.1 (2.9)

9.3.4.7 S Service Road / GO Station Bus Loop Access

The S Service Road / GO Station Bus Loop Access intersection is signalized with as an actuated-uncoordinated free cycle length plan during the weekday morning and afternoon peak periods, respectively.

A summary of the traffic analysis results for this intersection is shown in **Table 30**.

A summary of the 50th percentile and 95th percentile queues are summarized in **Table 31**.

Existing Conditions
Under existing traffic conditions, the intersection operates under acceptable conditions with overall v/c ratios of 0.41 and 0.36 during the weekday morning and afternoon peak hours, respectively.

Future Background Conditions
Under future background traffic conditions with the addition of traffic allowances associated with background developments, the intersection operates under acceptable conditions with overall v/c ratios of 0.53 and 0.47 during the weekday morning and afternoon peak hours, respectively.

Future Total Conditions
With addition of site-related traffic under future total traffic conditions, the intersection operates under busy yet acceptable conditions with overall v/c ratios of 0.57 and 0.50 during the weekday morning and afternoon peak hours, respectively.

Summary
Site-related impacts are anticipated to have minor impact at this intersection during the weekday morning and afternoon peak hours when compared to other developments routing through this intersection.

A queuing analysis was also conducted at the S Service Road / GO Station Bus Loop Access intersection to confirm that future total queues do not extend beyond the available storage capacity and obstruct traffic volumes related the Highway 403 off-ramp terminals if the intersection remains in the existing configuration.

The future total 95th percentile queues can be accommodated in the available storage under weekday morning and afternoon peak periods. Based on the foregoing, the traffic generated by the site can be acceptably accommodated at the intersection of S Service Road / GO Station Bus Loop Access.

TABLE 30 S SERVICE ROAD / GO STATION BUS LOOP ACCESS CAPACITY RESULTS

Key Movements	Existing		Future Background		Future Total	
	v/c	LOS	v/c	LOS	v/c	LOS
EBTR	0.42 (0.37)	A (A)	0.54 (0.48)	A (A)	0.58 (0.52)	A (A)
WBT	0.03 (0.16)	A (A)	0.03 (0.15)	A (A)	0.03 (0.15)	A (A)
NBLR	0.33 (0.25)	C (C)	0.36 (0.27)	C (C)	0.37 (0.27)	C (C)
Overall	**0.41 (0.36)**	**A (A)**	**0.53 (0.47)**	**A (A)**	**0.57 (0.50)**	**A (A)**
Analysis Notes:	• Existing Lane Configuration					

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

TABLE 31 S SERVICE ROAD / GO STATION BUS LOOP ACCESS QUEUE LENGTHS

Key Movements	Existing		Future Background		Future Total	
	50th	95th	50th	95th	50th	95th
EBTR	0.0 (0.0)	36.1 (27.0)	0.0 (0.0)	55.4 (41.2)	0.0 (0.0)	64.1 (45.6)

9.3.4.8 Plains Road / Cooke Boulevard

The Plains Road / Cooke Boulevard intersection is signalized with a 100 seconds and 110 seconds cycle length plan during the weekday morning and afternoon peak periods, respectively.

A summary of the traffic analysis results for this intersection is shown in **Table 32**.

Existing Conditions
Under existing traffic conditions, the intersection operates under acceptable conditions with overall v/c ratios of 0.36 and 0.46 during the weekday morning and afternoon peak hours, respectively.

Future Background Conditions
Under future background traffic conditions with the addition of traffic allowances associated with background developments, the intersection operates under acceptable conditions with overall v/c ratios of 0.50 and 0.63 during the weekday morning and afternoon peak hours, respectively.

Future Total Conditions
Under future total traffic conditions, the intersection operates under acceptable conditions with overall v/c ratios of 0.55 and 0.68 during the weekday morning and afternoon peak hours, respectively.

Site-related impacts are anticipated to have minor impact at this intersection during the weekday morning and afternoon peak hours when compared to other developments routing through this intersection.

Based on the foregoing, the traffic generated by the site can be acceptably accommodated at the intersection of Plains Road / Cooke Boulevard. No mitigation measures or improvements are recommended at this intersection.

TABLE 32 PLAINS ROAD / COOKE BOULEVARD CAPACITY RESULTS

Key Movements	Existing		Future Background 2026		Future Total 2026	
	v/c	LOS	v/c	LOS	v/c	LOS
EBL	0.12 (0.04)	A (A)	0.19 (0.23)	A (A)	0.21 (0.30)	A (B)
EBT	0.36 (0.28)	A (A)	0.46 (0.35)	A (A)	0.49 (0.35)	A (A)
WBTR	0.24 (0.47)	A (A)	0.33 (0.64)	A (B)	0.38 (0.70)	B (B)
SBLR	0.15 (0.39)	D (D)	0.60 (0.66)	D (D)	0.70 (0.71)	D (D)
Overall	**0.36 (0.46)**	**A (A)**	**0.50 (0.63)**	**A (B)**	**0.55 (0.68)**	**B (B)**
Analysis Notes	• Existing Lane Configuration					

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

9.3.4.9 Cooke Boulevard / Masonry Court

The Cooke Boulevard / Masonry Court intersection is currently an unsignalized intersection with a minor street STOP-controlled operation.

A summary of the traffic analysis results for this intersection is shown in **Table 33**.

Existing Conditions
As shown in **Table 34**, the Cooke Boulevard / Masonry Court intersection operates acceptably at a level of service LOS B or better during the weekday morning and afternoon peak hours under existing traffic conditions.

As described in the Metrolinx sensitivity discussion in **Section 9.4**, an All-Way STOP-control is required for this intersection with the exception of the expansion of the South GO Aldershot parking lot.

Future Background Conditions
Under future background traffic conditions with the addition of traffic allowances associated with background developments, the northbound approach begins to experience delays of around 100 seconds. It is recommended to signalize the Cooke Boulevard / Masonry Court intersection with the development of the site given that the minor approaches are experiencing extended delays due to the South GO Aldershot parking lot expansion by Metrolinx.

Future Total Conditions
Under future total 2031 traffic conditions, the intersection operates under acceptable conditions with overall v/c ratios of 0.61 and 0.75 during the weekday morning and afternoon peak hours, respectively. Under future total 2036 traffic conditions, the intersection operates under acceptable conditions with overall v/c ratios of 0.74 and 0.85 during the weekday morning and afternoon peak hours, respectively.

For the purposes of this analysis, it is recommended that the intersection operate with a cycle length of 100 and 110 seconds during the weekday morning and afternoon peak hours, respectively, to maintain coordination with the adjacent intersection at Waterdown Road / Cooke Boulevard & Railway Road.

Summary
Based on the foregoing, the traffic generated by the site can be acceptably accommodated at the intersection of Cooke Boulevard / Masonry Court, with the implementation of a signal for the South GO Aldershot parking lot expansion. As further discussed in **Section 9.4**, the site can be acceptably accommodated with an all-way stop control without South GO Aldershot parking lot expansion. The site plan reflects space for the implementation of a future signal, if needed.

TABLE 33 COOKE BOULEVARD / MASONRY COURT CAPACITY RESULTS

Key Movements	Existing	Future Background	Future Total	
			v/c	LOS
EBLTR	Unsignalized – see **9.3.5**	Unsignalized – see **9.3.5**	0.81 (0.94)	C (D)
WBLTR			0.39 (0.78)	B (B)
NBLTR			0.37 (0.47)	B (C)
SBLTR[2]			0.13 (0.09)	B (B)
Overall			**0.61 (0.75)**	**B (C)**
Analysis Notes:	• Existing Lane Configuration	• Existing Lane Configuration	• Signalize	

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

9.3.5 Unsignalized Intersections

Unsignalized intersection capacity results are summarized in **Table 34**. All unsignalized intersections within the study area operate acceptably at LOS B or better under all scenarios.

Vehicular access to the site will be provided via two driveways located on Cooke Boulevard and Waterdown Road. The proposed driveways will provide two-way access to the proposed loading and underground parking facilities. The driveways will operate under minor street STOP-controlled with full manoeuvres permitted at Cooke Boulevard and only right-in / right-out manoeuvres permitted at Waterdown Road. These driveways are anticipated to operate at a good level of service (LOS A or better) with very minimal delay in the future.

TABLE 34 UNSIGNALIZED INTERSECTION ANALYSIS SUMMARY (BUILD OUT)

Key Movements	Existing		Future Background		Future Total	
	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
Cooke Boulevard / Masonry Court						
EBTLR	A (A)	0.2 (1.6)	A (A)	0.1 (0.9)	Signalized with the development of the Site.	
WBTLR	A (A)	2.3 (1.3)	A (A)	1.6 (1.2)		
NBTLR	B (B)	10.6 (13.3)	F (F)	61.4 (109.7)		
SBTLR	A (B)	9.2 (12.0)	B (C)	11.9 (23.2)		
Waterdown Road / Site Driveway (West)						
WBR	-- (--)	-- (--)	-- (--)	-- (--)	B (B)	11.3 (12.6)
Cooke Boulevard / Site Driveway (East)						
EBL	-- (--)	-- (--)	-- (--)	-- (--)	8.8 (8.6)	A (A)
NBLR	-- (--)	-- (--)	-- (--)	-- (--)	7.0 (6.7)	A (A)

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

9.4 SENSITIVITY ANALYSIS – METROLINX EXPANSION

AECOM conducted a TIS on behalf of Metrolinx in relation to a proposed south parking lot expansion for the existing Aldershot GO station. The proposed expansion consists of two (2) phases with a total of 938 additional parking spaces provided. At the time of the TIS, Phase 1 considers the construction of 569 additional parking spaces with an anticipated opening year of 2023. Phase 2 considered the construction of 369 additional parking spaces and was anticipated to be only constructed if the demand of the Aldershot GO station warranted additional parking spaces in the future. As part of the AECOM's study, it was assumed all 938 additional parking spaces would be constructed by the year 2033. The study concluded that "*the proposed station's south parking lot expansion would not create any new traffic operational issues at the movement and / or overall intersection at the Highway 403 ramp terminals along Waterdown Road*."

Metrolinx site traffic contributes significant peak hour volumes on the local southbound left and westbound right movements of the intersection of Waterdown Road / Masonry Court compared to any individual development application in the MTSA as shown in **Figure 22**. The 2017 TIS prepared by AECOM addressed these site-related improvements, by noting that "geometric changes to the road network be deferred in the short-term to encourage GO Station users to access the station outside of the AM and PM peak hours, or to access the station via municipal transit services".

Due to the uncertainty regarding the application process and completion of the proposed south parking lot expansion, the TIS prepared for Metrolinx anticipates dispersal of traffic outside of the peak hour that may lessen the traffic impact, and encourages deferral of road improvements to support other modes of access and spread of peak activity - a sensitivity analysis was explored. Therefore, BA Group has conducted a sensitivity analysis without the consideration of the proposed parking lot expansion.

For the purposes of this sensitivity analysis, the study area included the following intersections:

- Waterdown Road / Masonry Court & Railway Road; and
- Cooke Boulevard / Masonry Court.

The following ramp terminals were also reviewed to assess relative impact of Metrolinx on constrained movements:

- Waterdown Road & N Service Road / WB On-Ramp
- Waterdown Road & S Service Road / EB Off-Ramp

The operations assessment results of the sensitivity analysis without the proposed parking lot expansion implemented for signalized intersections are summarized in **Table 35**. The operations of the unsignalized intersection (Cooke Boulevard and Masonry Court) are summarized in **Table 36**.

Synchro analysis worksheets are provided in **Appendix J**.

Traffic operations of the sensitivity analysis without the proposed parking lot expansion implemented are summarized in the following:

- The **Waterdown Road / Masonry Court & Railway Road** intersection operates at acceptable conditions with overall v/c ratio of 0.47 and 0.49 or better in the weekday morning and afternoon peak hours, respectively. A southbound left turn of 90 metres is required to suitably accommodate future site traffic.

- The **Cooke Boulevard / Masonry Court** intersection operates at acceptable conditions under a two-way stop control under existing conditions with all movements at LOS C or better. An All-Way Stop Control intersection is recommended at this intersection, However, a signal is not required at this intersection, unless Metrolinx expands its South parking lot.

- **The Waterdown Road / Highway WB-On Ramp & N Service Road** intersection operates at acceptable levels of service with overall v/c ratios of 0.48 and 0.96 during the weekday morning and afternoon peak hours, respectively. While operating close to capacity, the implementation of the dual northbound left is not necessary unless Metrolinx expands its South parking lot.

- The **Waterdown Road / Highway EB-Off Ramp & S Service Road** intersection operates at very busy levels of service with overall v/c ratios of 1.03 and 0.86 during the weekday morning and afternoon peak hours, respectively. It is noted that the operation of this intersection during the morning peak hour without added traffic from the expansion of the South parking lot will still trigger the need for an ancillary right turn lane to accommodate high right-turning traffic volumes. With the ancillary right turn implemented, the intersection operates with acceptable levels of service with overall v/c ratios of acceptable levels of service with overall v/c ratios of 0.84 and 0.62 during the weekday morning and afternoon peak hours, respectively.

TABLE 35 SIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS (SENSITIVITY ANALYSIS WITHOUT METROLINX EXPANSION)

Key Movements	Future Total	
	v/c	LOS
Waterdown Road / Masonry Court & Railway Road		
EBLTR	0.06 (0.58)	D (E)
WBL	0.21 (0.60)	D (D)
WBTR	0.15 (0.24)	D (D)
NBL	0.01 (0.03)	A (B)
NBTR	0.59 (0.52)	B (B)
SBL	0.57 (0.67)	A (B)
SBTR	0.22 (0.43)	A (B)
Overall	**0.55 (0.57)**	**B (C)**
Waterdown Road / Highway 403 WB On-Ramp & N Service Road		
EBL	0.94 (0.76)	E (D)
EBT	0.81 (0.48)	D (D)
EBR	0.19 (0.61)	C (D)
WBL	0.10 (0.19)	D (D)
WBR	0.05 (0.19)	D (D)
NBT	0.60 (0.61)	C (C)
NBR	0.94 (0.30)	E (D)
SBL	0.94 (0.83)	E (D)
SBT	0.40 (0.46)	B (C)
Overall	**0.84 (0.62)**	**D (D)**
Waterdown Road / Highway 403 EB Off-Ramp & S Service Road		
WBL	0.52 (0.72)	D (D)
WBT	0.40 (0.98)	D (E)
WBR	0.04 (0.11)	D (C)
NBL	0.71 (0.98)	C (E)
NBTR	0.40 (0.60)	B (C)
SBL	0.37 (0.48)	A (C)
SBTR	0.40 (0.93)	B (E)
Overall	**0.48 (0.96)**	**B (D)**

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

Based on the foregoing, the signalized intersections within the study area along Waterdown Road operate in an acceptable manner.

The local improvements along Masonry Court related to the site include a southbound left turn extension of 90 metres and all-way stop control at Masonry Court / Cooke Boulevard, with provision in the site design for a future signal if needed. The all way stop control operation of Cooke Boulevard / Masonry Court is shown in **Table 36**.

TABLE 36 UNSIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS (SENSITIVITY ANALYSIS WITHOUT METROLINX EXPANSION)

Key Movements	Future Total	
	LOS	Delay
EBTLR	B (B)	11.0 (14.6)
WBTLR	A (B)	9.5 (13.8)
NBTLR	B (B)	10.4 (12.8)
SBTLR	A (A)	8.9 (9.9)

9.5 SENSITIVITY ANALYSIS – EXISTING + SITE TRAFFIC

The active background development applications being considered represent 3119 new units – a significant increase from existing conditions. Each of the background developments have TIS studies that range from 2012 to September 2022 (1 to 11 years) that identify completion/occupancy dates of either less than 5 years from the date of each study or within 5 years from present day (i.e. 2028).

Each of the background developments also have different statuses for development (i.e. appealed/OLT, approved, pre-construction, under review, or otherwise unknown) making the actual occupancy dates difficult to ascertain with certainty. However, they represent considerable corridor growth above and beyond a generalize 2% rate per year on a capacity constrained corridor. Active background developments represent 2-6% growth rate per year if developed over 15 years, a much higher rate than generalized corridor growth.

A sensitivity analysis was conducted of Existing traffic plus Site traffic volumes only. We recognize this is not representative of an actual development scenario, but was explored to understand the direct impact of Site traffic relative to all other growth occurring in the area.

The Site represents 1165 (34%) of the overall 3360 units estimated for the MTSA.

The operations assessment results of the sensitivity analysis with Existing + Site traffic is summarized in **Table 37** and **Table 38.**

Synchro analysis worksheets are provided in **Appendix J**.

TABLE 37 SIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS (EXISTING AND SITE TRAFFIC SENSITIVITY SCENARIO)

Key Movements	Existing		Existing + Site Traffic		Existing + Site Traffic (With Improvements)	
	v/c	LOS	v/c	LOS	v/c	LOS
Waterdown Road / Masonry Court & Railway Road						
EBTLR	0.03 (0.04)	D (D)	0.03 (0.04)	D (D)	No Improvements Required	
WBL	0.12 (0.25)	D (D)	0.10 (0.25)	D (D)		
WBTR	0.06 (0.17)	D (D)	0.08 (0.18)	D (D)		
NBL	0.03 (0.03)	A (A)	0.03 (0.03)	A (A)		
NBTR	0.38 (0.25)	A (A)	0.40 (0.28)	A (A)		
SBL	0.25 (0.14)	A (A)	0.35 (0.39)	A (A)		
SBTR	0.22 (0.26)	A (A)	0.23 (0.26)	A (A)		
Overall	**0.34 (0.27)**	**A (B)**	**0.36 (0.29)**	**A (B)**		
Waterdown Road / Highway 403 WB On-Ramp & N Service Road						
WBL	0.42 (0.43)	D (C)	0.44 (0.47)	D (C)	0.44 (0.47)	D (C)
WBT	0.45 (0.77)	D (D)	0.44 (0.76)	D (D)	0.44 (0.77)	D (D)
WBR	0.02 (0.08)	D (C)	0.02 (0.08)	D (C)	0.02 (0.08)	D (C)
NBL	0.37 (1.00)	A (E)	0.44 (1.03)	A (E)	0.44 (0.99)	A (E)
NBTR	0.28 (0.39)	A (C)	0.30 (0.40)	A (C)	0.30 (0.40)	A (C)
SBL	0.21 (0.26)	A (C)	0.22 (0.29)	A (C)	0.22 (0.28)	A (C)
SBTR	0.20 (0.52)	A (D)	0.21 (0.62)	A (D)	0.21 (0.57)	A (D)
Overall	**0.32 (0.75)**	**B (D)**	**0.35 (0.80)**	**B (D)**	**0.35 (0.77)**	**B (D)**
Waterdown Road / Highway 403 EB Off-Ramp & S Service Road						
EBL	0.73 (0.57)	D (D)	0.73 (0.56)	D (D)	No Improvements Required	
EBT	0.72 (0.62)	D (D)	0.72 (0.61)	D (D)		
EBR	0.16 (0.16)	C (D)	0.17 (0.18)	C (D)		
WBL	0.10 (0.18)	D (D)	0.10 (0.18)	D (D)		
WBR	0.05 (0.19)	D (D)	0.05 (0.19)	D (D)		
NBTR	0.76 (0.58)	D (C)	0.94 (0.70)	D (C)		
SBL	0.86 (0.69)	D (D)	0.87 (0.73)	E (D)		
SBT	0.28 (0.26)	B (B)	0.30 (0.32)	B (C)		
Overall	**0.70 (0.56)**	**D (C)**	**0.78 (0.62)**	**D (D)**		

TABLE 38 UNSIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS (SENSITIVITY ANALYSIS WITHOUT METROLINX EXPANSION)

Key Movements	Existing		Existing + Site Traffic	
	LOS	Delay	LOS	Delay
EBTLR	A (A)	0.2 (1.6)	A (A)	2.0 (6.0)
WBTLR	A (A)	2.3 (1.3)	A (A)	2.3 (1.3)
NBTLR	B (B)	10.6 (13.3)	B (E)	13.0 (40.8)
SBTLR	A (B)	9.2 (12.0)	B (C)	12.1 (20.3)

The addition of site traffic to the existing traffic generally results in very minimal increases of v/c ratios across the intersections chosen for the sensitivity analysis. The addition of site traffic to the northbound left movement at the Highway 403 Westbound Off-Ramp does result in an individual capacity of 1.03, but it is noted that this movement operates at 1.00 under existing conditions. This confirms that site traffic, while contributing to capacity constraints of the northbound left movement, is still a minimal impact to this movement and the proposed improvement of a northbound dual left will be required with or without the Site.

Site traffic is representative of 1% growth on the existing corridor per year (over 15 years) and individually (when not considering other growth) contributes to requiring the following improvements when compared to existing conditions:

- Signal optimization or early implementation of northbound dual left at the Highway 403 Westbound Off-Ramp
- Signal optimization or early implementation of the dedicated northbound right lane at the Highway 403 Eastbound On-Ramp

The Site is expected to have a similar vehicle directional traffic distribution to all other Aldershot MTSA residential developments and is a contributing development amongst all other developments in the MTSA towards the long term area infrastructure improvements, not necessarily the triggering development for extensive improvements. Historical growth has not yet indicated that the MTSA is actually growing at the rate projected in the baseline analysis of this study. Regardless of this, interchange improvements are required to support area growth including the site and recommendations are further described in **Section 11.0.**

The Site is also uniquely suited within the MTSA to create one of the greatest opportunities to capture transit-oriented trips by walking or cycling to Aldershot GO and contributing to new transit ridership from the Site's building without directly impacting the vehicular road network (i.e. transit riders would not have to traverse the arterial or collector public road network to reach the GO station. They will have sidewalks direct to the station within the community). The Site itself, as planned, does not physically preclude the expansion and investigation of multiple options to improve the Highway 403 interchange over time.

10.0 ACCESS CONSIDERATIONS

The Site is proposed to be provided with two accesses:

- All-moves access at Cooke Boulevard (Side Street Stop-controlled); and,
- Right-turns only access along Waterdown Road (Side Street Stop-controlled)

The primary and 'front-door' access and address to the Site will be via Cooke Boulevard, where delivers, loading, visitors, and residents will have access to services, lobbies, and underground parking.

A secondary access is recommended for residents of the Site to:

- Provide distribution and redundancy for the Site's parking garage access on a daily basis and over time (i.e. including to allow redundancy for maintenance procedures); and,
- Provide distribution of site traffic across the local road network that is connecting into Waterdown Road.

Given the site's context within a permit control area, the *MTO Highway Corridor Management Manual – April 2022* guides the minimum and desirable offset spacing criteria for private road access relative to an interchange facility.

Desirable offset spacing for the Site's context is based on posted speed (Waterdown Road is posted at 50 km/hr) and distance to the nearest ramp terminal.

- Desirable Spacing is 125 metres based on local context along Waterdown Road
- The MTO's typical desirable spacing criteria ranges from 125 metres (50 km/hr) to 185 metres (80 km/hr)

The intersection spacing review drawing in **Appendix K** demonstrates that there is approximately 260 metres in advance of the existing Highway 403 EB Off-Ramp / Alan Bryk Way (135 metres above and beyond the MTO guideline's desirable offset spacing).

A right turns only access is proposed along Waterdown Road. This access is recommended to be designed such that:

- Physical measures prevent southbound left and westbound left movements. An extended centre median along Waterdown Road would accomplish this;
- It is used as a secondary access and that visitors and deliveries are directed to the address and primary entrance on Cooke Boulevard; and that
- the design permit clear sightlines, turnaround space and be compatible with the City's requirements for SWM pond access.

Review the proposed site access along Waterdown Road indicates it is appropriately placed relative to the downstream highway interchange intersections (and MTO desirable offset criteria) and upstream Masonry Court signalized intersection.

11.0 RECOMMENDED INTERSECTION IMPROVEMENTS

As discussed in **Section 9.3**, there are several infrastructure improvements recommended for the area street network over the next 15 years.

The future lane configuration for the full build out is identified on **Figure 24**. Local development-led improvements are identified in **Figure 25**. Regional improvements are identified in **Figure 26** and briefly described below:

Near Term Localized Road Improvements

Local road improvements (from north to south) are required to support near term growth and buildout of the site (2026) include:

- Convert the single northbound left to a dual northbound left at Waterdown Road / N Service Road & Highway 403 WB On-Ramp;
- Extend the southbound left lane to 135 metres of storage at Waterdown Road / Masonry Court;
- Convert the westbound left / through-right to a westbound through-left / right at Waterdown Road / Masonry Court and extend the westbound curb lane to Cooke Boulevard;
- Protect for signalization of Masonry Court / Cooke Boulevard if required by expansion of Metrolinx lands (otherwise provide All-Way Stop Control); and,
- Provide New Site Driveways.

The above-noted improvements accommodate local traffic needs for buildout of the site.

Long Term Area Road Improvements

Regional road improvements recommended to mitigate ongoing constraints and address regional growth include:

- Monitor the Waterdown Road / S Service Road & Highway 403 EB Off-Ramp for estimated vs. realized growth. Background developments (approved and appealed) account for 6% to 17% of annual growth by 2026. In the event that this growth is realized in advance of the bridge widening already planned for 2036, the following temporary mitigating improvements could be considered by the municipality and MTO:
    - Convert the existing westbound dual left to a single westbound left, introduce a channelized northbound right, and optimize signal timing.

- By Future Total, with the consideration of background development traffic, the Highway 403 / Waterdown Road interchange requires one of the following improvements to address increase in activity between future MTSA residents/visitors and the highway. Notably changes that would improve access to/from the highway that currently operate from a shared-lane environment. A range of improvements could address this including:
    1. Widening of Waterdown Road over Highway 403 (currently planned for 2036); in combination with;
    2. Introduction of Dual or Free Flow Left/Right Turns at Waterdown and the EB On-Ramp; in combination with, or
    3. Separation of highway on/off ramp and primary GO traffic; or,
    4. Parclo or typical Diamond configuration.

Dual turning lanes have been considered for improvements in this study's Synchro analysis to confirm the ability to provide capacity for future traffic demands, recognizing they represent one possible solution and are not necessarily the desired interchange configuration in an unconstrained environment.

The Site limits and site access do not preclude any of the long term road network options noted above.

- The proposed site driveways are located in compliance with the Highway Corridor Management Manual

- Monitor the Waterdown Road / Plains Road intersection for estimated vs. realized growth. Traffic operations at this intersection could be addressed with new road connections within the MTSA, or dual eastbound left, dual southbound left, and an auxiliary westbound right turn movement at Waterdown Road / Plains Road.

11.1 SIGNAL TIMING MODIFICATION

In addition to the functional design plans discussed and presented herein, under future background and total traffic conditions, traffic signal timings and changes in cycle lengths were adjusted as necessary at selected intersections to best accommodate future traffic demands and patterns.

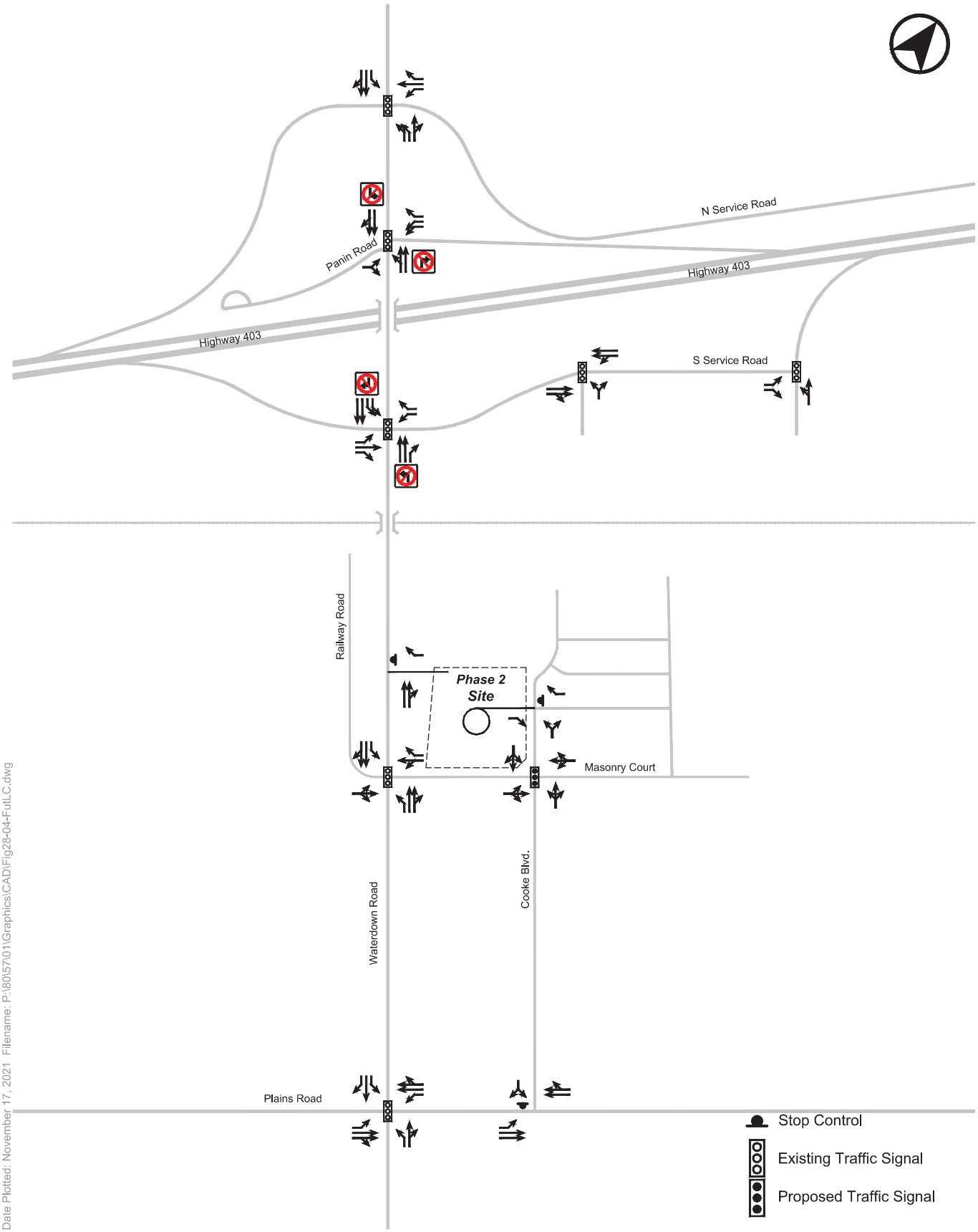


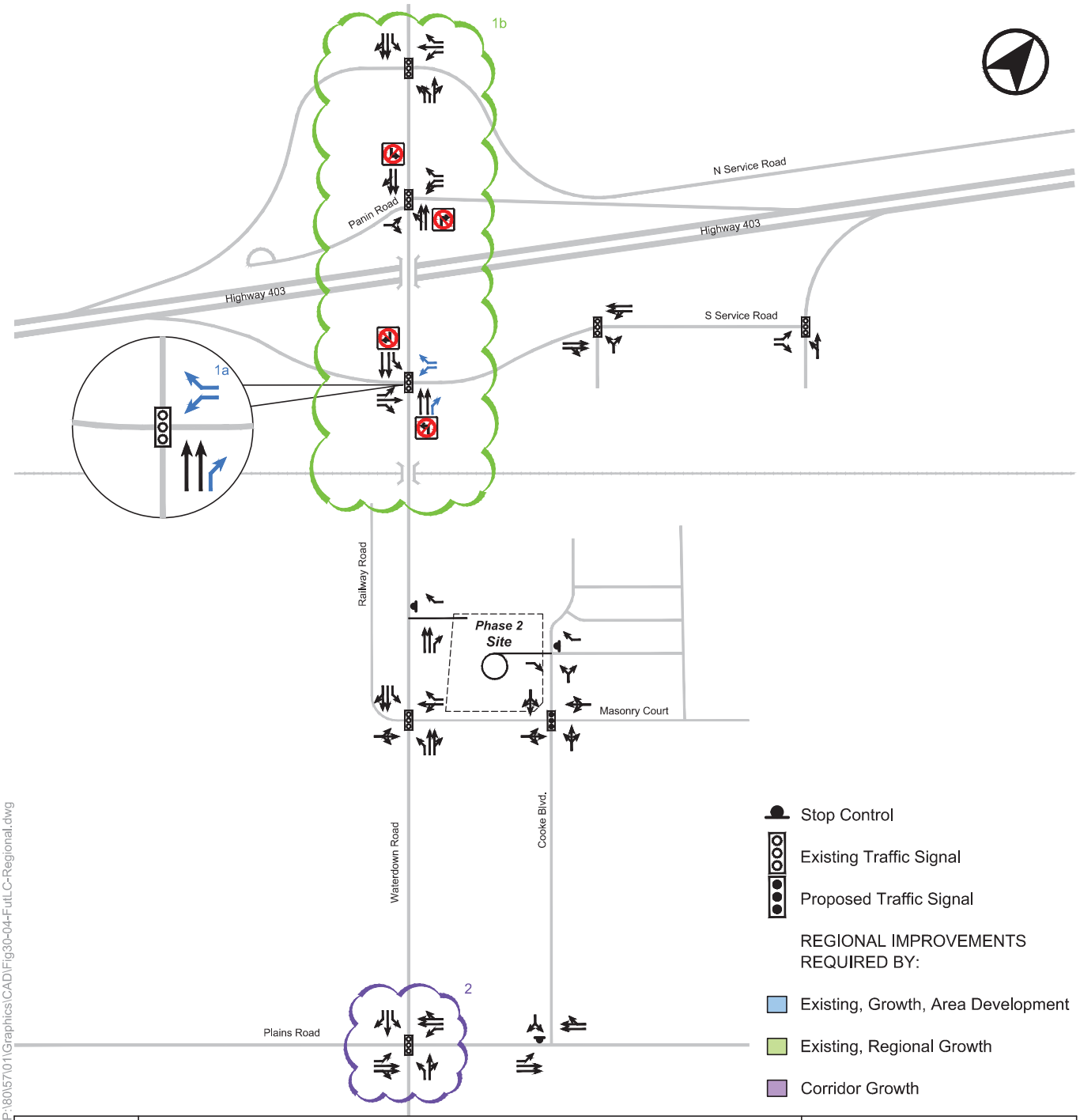
FIGURE 24 FUTURE LANE CONFIGURATION & TRAFFIC CONTROL



Improvement	Description	Required by
1	- Convert Single NBL to Dual NBL	Regional Growth, Metrolinx, and Site
2	- Extend SBL Storage	- ~45m existing - 45m to 90m required by Metrolinx (2026) - 90m to 135m required by Site (2026) - 135m to 240m required by Metrolinx and Regional Growth (2031 and 2036)
3	- Convert WBL/WBTR to WBTL/WBR - Extend Second Lane to Cooke Blvd	Metrolinx, and Site
4	- Signalize Intersection	Metrolinx
5	- New Site Driveways	Site

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FIGURE 25 LOCAL ROAD IMPROVEMENTS



Improvement	Description	Required by
1a	Monitor and Mitigate (if required)	Existing, Growth, and Area Development
1b	- Interchange Improvements, such as: Parclo or typical Diamond configuration (may be limited by physical constraints) Separation of highway on/off ramp or primary GO traffic; or, Introduction of Dual or Free Flow Left/Right Turn at interchange; in combination with, Widening of Waterdown Road over Highway 403 (already planned for 2028)	- Existing Constraint/ Non-conforming Interchange Serving multiple functions; and, - Regional Growth
2	- Provide dual EBL and auxiliary WBR; **OR**, - Monitor and introduce new road connections within the draft Mobility Study area	Corridor Growth Only

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FIGURE 26 REGIONAL ROAD IMPROVEMENTS

11.2 FUNCTIONAL DESIGN CONSIDERATIONS

The three intersections recommended to be modified to support growth from other planned developments as well as this proposed development are identified in **Figure 24** and discussed in greater detail below.

11.2.1 Waterdown Road / N Service Road & Highway 403 WB On-Ramp

Based upon the results summarized in **Section 9.3.4.1**, it is recommended the provision of an additional northbound left turn lane is recommended within the existing pavement limits (i.e. restriping of the intersection). The restriping of the intersection is shown in a draft functional road plan provided in **Appendix L**.

The turning lane storage and taper lengths to accommodate the intersection modification is summarized in **Table 39**, along with the maximum 95th percentile queue lengths reported in **Section 9.3**.

TABLE 39 WATERDOWN ROAD / N SERVICE ROAD & HIGHWAY 403 WB ON-RAMP RECOMMENDED TURNING LANE CONFIGURATION

Movement	Storage (m)	Taper (m)	Max. 95th Percentile Queue (m)
NBL	100	xx	91

Notes:
1. Rounded to the nearest 5 metres.

11.2.2 Waterdown Road / Highway 403 EB Off-Ramp & S Service Road

Based upon the results summarized in **Section 9.3.4.3**, it is recommended that traffic operations at this junction be monitored going forward. If it is determined that improvements are required to address traffic operations at the intersection, the provision of a channelized northbound right turn lane and conversion of the dual westbound left to a single westbound left is a potential mitigating measure until further measures are implemented at this intersection.

11.2.3 Waterdown Road / Masonry Court & Railway Road

Based upon the results summarized in **Section 9.3.4.4**, the southbound left turn lane to accommodate a storage length of approximately 75 metres. Note that for the southbound left turn lane is approximately 25 metres longer than the existing storage length of 50 metres. The westbound approach is proposed to be converted to a through-left lane right lane operates as an exclusive lane with a storage length extension.

The recommended improvements at this intersection are shown in a draft functional road plan (FD-01A) provided in **Appendix L**. The provision of the functional design plan is to ensure that the nature of the recommended improvement is understood going forward. An extension of the centre median along Waterdown Road is further recommended to physically prevent left turns to/from the proposed Waterdown Road site access.

12.0 RESPONSE TO COMMENTS

The Region of Halton, City of Burlington, and the Ministry of Transportation (MTO) have provided comments pertaining to the *BA Group's TIS - November 2021* submission to facilitate their review of the transportation related elements of the application in the following memorandums:

- The City of Burlington staff prepared a memorandum entitled "*1120 Cooke Blvd, Transportation Impact Brief – August 2022"* dated August 29th, 2022
- The Region of Halton, Planning and Building Department prepared a memorandum entitled "*Official Plan Amendment & Zoning By-law Amendment, 1120 Cooke Boulevard, City of Burlington, 505-01/22 & 520-01/22*" dated August 8th, 2022.
- The Ontario Ministry of Transportation (MTO), received via email entitled *"Request for Comments – 1120 Cooke REVISED submission"* dated April 19, 2023.

A response to City and Region Comments was provided in a letter prepared by BA Group dated March 3, 2023 as it relates to OPA and ZBA is was supplemented by regular coordination and collaboration with municipal staff. Adi and their technical consultants continue collaborate with all municipal agencies to address outstanding comments. April 19 comments from the MTO are provided in **Appendix M** and re-iterated below in **Section 12.1**.

For the purpose of this resubmission of the Official Plan Amendment and Zoning By-law Amendment applications, this section will be addressing the comments received from the MTO. The current submission, as proposed, does not preclude continued discussion required road improvements that are subject to site plan approval by the MTO as a commenting agency.

Comments from the MTO are addressed in the following sections, and responses have been organized by comment with a summary discussion provided in each case, which refers, as appropriate, to technical materials provided within this updated TIS.

12.1 MINISTRY OF TRANSPORTATION COMMENTS

General Comments:

Comment:

Do not copy and paste entire emails into the comment matrix. You may contact the MTO for assistance with creating bullet points.

Response:

Noted. Comments below have been provided exactly as the bullet points received in bulleted format in the April 19, 2023 comments provided by MTO (received through City staff).

Comment:

The site is within the MTO's permit control area. A MTO Building and Land Use permit is required prior construction.

Response:

Noted.

Comment:

These comments were previously provided in 2021. We are not in receipt of a revised traffic impact study to-date.

Response:

Noted. The revised submission in March 2023 responded to comments from City and Region staff that were scoped to site and access design, vehicle manouevres, and zoning bylaw requirements. This report updates the former TIS in its entirety.

Comment:

Further comments will be provided upon receipt of the revised traffic impact study. It is anticipated that the existing interchange cannot accommodate this development along with background traffic plus any other planned developments in the area without interchange improvements.

Response:

Noted. We concur the interchange requires improvements to accommodate growth in a balanced manner with encouraging transit and active transportation around a Major Transit Station Area. The 1120 Cooke Site is one of several contributing developments of the Aldershot MTSA. As discussed in **Section 8.3.1** of this TIS, the rate of development of the surrounding area is highly variable by status of each development and including all development applications considers a growth rate that high compared to typical corridor growth and does not match typical yearly expectations or historical data observed for this area. Despite this, and while delayed from the initial timeline of 2016 - the City continues to identify the Waterdown Bridge widening in its Development Charges forecast within less than 15 years (currently identified for 2036), and major interchange improvement could be coordinate concurrently with this widening and concurrently with construction of development applications that support transit accessibility and that do not physically preclude viable interchange improvements.

We anticipate the forthcoming Transportation Assessment for the Aldershot MTSA will identify whether there continues to be a need for advancing this widening and other area infrastructure improvements as it relates to

MTSA growth, the purpose for which the widening was initially identified in addition to its purpose to connect gap in existing bike facilities. We also anticipate that any growth-related infrastructure identified will be captured by the City's next Development Charges By-law update, consistent with the City's Phasing and Financial Tools identified in the 2022 MTSA – Area-Specific Planning Study. The widening remains within the 15-year study horizon assessed as part of this TIS.

In the interim, **Section 11.0** also identifies mitigating road network improvements that will improve the local area existing road network conditions that can allow area growth to proceed, will allow immediate uptake of transit ridership on the existing extensive transit service available to local residents without precluding long term infrastructure.

Comment:

There are no planned improvements at 403/Waterdown in the MTO 5-year plan. The City of Burlington and/or the developer would be responsible for funding any highway improvements triggered by any land use changes and development in the area.

Response:

Noted. The developer will continue to work with the City and MTO to determine funding for near-term mitigating improvements and contributions (via development charges) to allow for area-growth related improvements.

Comment:

The report selected TTS Survey Zones of 4050, 4051, 4052, 4054 and 4055. The study area is within Zone 4051. Include zone 4053 which is adjacent to Zone 4051.

Response:

The study area is in TTS Zone 4052, not Zone 4051.

A large portion of Zone 4053 consists of undeveloped land and large commercial buildings such as IKEA Burlington, Fortinos grocery store with a large parking lot, Hydro One Burlington Transmission Station and retail stores along Plains Road East. Given that TTS Zone 4053 contains a significant portion of land that is not residential.

While it was not selected as part of BA Group's TTS data for residential traffic distribution, the TTS Zone 4053 was included in the updated analysis and does not change the overall distribution.

See **Section 8.4.2** for further details. The data from TTS is included in **Appendix G**.

Comment:

Please provide a copy of TTS reports, and the detailed analyzing sheets, to show and explain the summary of Travel Mode Distribution (Table 6), Mode Split(Table 9),and Site Traffic Distribution(Table 14).

Response:

Sections 7.1 and **8.4.2** provide details on the travel mode distribution, mode split and traffic distribution. The data from TTS is included in **Appendix G.**

TMC Data:

Comment:

Attach a copy of TMC report collected on Sep/26/2018 at Waterdown Rd & Hwy 403 EB Off-ramp (south ramp terminal) by City of Burlington, which was used in the report.

Response:
BA Group sent this TMC in an e-mail March 31, 2023. The TMC was attached in the ZIP folder alongside with the other TMCs used for the initial submission.

2023 counts are provided in **Appendix F**. Should any further data be required for agency review, please feel free to contact BA Group directly for a PDF or clarification if there is a discrepancy.

Comment:
The report did not use MTO TMCs data collected in 2016 by MTO Waterdown Rd Interchange area intersections but used the data 2018 collected by City of Burlington. Compare the 2018 data with the 2016 data. As of November 2022, the current traffic volume Highway 403 mainline shows that the total and peak hour volumes are still lower than in 2018. The TIS correctly uses Pre-Covid data.

Response:
See **Section 8.2**. BA Group has counted the area intersections a number of times following the end of Covid-related lockdown and gathering restrictions and after transit activity has resumed regular service levels. The most recent counts undertaken occurred in May 2023 and were reviewed in comparison to 2022, 2021 as well older pre-covid counts and considered representative of typical weekday conditions.

2023 existing turning movement counts are provided in **Appendix F**.

Figure 14-24:
Comment:
Figure 14 – Existing 2021 Volumes: comparing the data with 2016, and 2018 TMCs data do not match or have errors. E.g. Some numbers showing growths, some are not, and rates are different, please fix.

Response:
Traffic volumes have been updated to reflect 2023 volumes (**Figure 14**) and specific traffic layers for growth with and without the expansion of the South GO Parking Lot are identified in **Figure 15** and **Figure 16**, respectively.

2023 counts are provided in **Appendix F**. Should any further data be required for agency review, please feel free to contact BA Group directly for a PDF or clarification if there is a discrepancy.

Comment:
Figure 15- Corridor Growth Volumes: stated this figure had applied corridor growth of 2% per year, but the volumes are not showing all movements, missing some movements. Please update.

Response:
See **Section 8.3.1** regarding Growth assumptions.

Comment:

The Table 12 listed Area Background Developments, but the report has not provided any more detailed traffic volumes information generated by these developments such as how to distribute the study area intersections. Provide this information.

Response:

A PDF of the background development volumes in the traffic assignment sheets are provided in **Appendix O**. **Figure 15** shows combined background traffic volumes developed from those individual sheets, with the inclusion of expected generated traffic from the South GO Lot expansion. **Figure 16** shows combined background traffic volumes without the expected generated traffic from the South GO Lot expansion. Where study area did not match intersection used in this TIS, background development traffic was extended through the network based on turning restrictions and area travel characteristics.

Comment:

Figure 16 - 2026 Volumes: the volumes should combine Figure 14 and Figure 15, but the volumes are not matched. Please fix.

Response:

Traffic volume figures have been updated. **Figure 17** and **Figure 18** now show the Future Background Traffic volumes, with and without the inclusion of the South GO Parking Lot Expansion, respectively. Future Background traffic volumes are representative of background development traffic added to existing traffic volumes. Should any further data be required for agency review, please feel free to contact BA Group directly for a PDF or clarification if there is a discrepancy.

Comment:

Figure 17- 2031 Volumes: compared with Figure 16, some numbers are showing growth, some of them are kept the same. Please fix.

Response:

Traffic volume figures have been updated. **Figure 17** and **Figure 18** now show the Future Background Traffic volumes, with and without the inclusion of the South GO Parking Lot Expansion, respectively. Future Background traffic volumes are representative of background development traffic added to existing traffic volumes. Should any further data be required for agency review, please feel free to contact BA Group directly for a PDF or clarification if there is a discrepancy.

Comment:

Figure 18- 2036 Volumes: compared with Figure 17, some numbers are showing growth, some of them are kept the same. Please fix.

Response:

Traffic volume figures have been updated. **Figure 17** and **Figure 18** now show the Future Background Traffic volumes, with and without the inclusion of the South GO Parking Lot Expansion, respectively. Future Background traffic volumes are representative of background development traffic added to existing traffic volumes. Should any further data be required for agency review, please feel free to contact BA Group directly for a PDF or clarification if there is a discrepancy.

Comment:

Figure 19 - Phase 1 Volumes: please provide a copy of the original report figure.

Response:

Traffic volume figures have been updated. It is noted that site traffic from Phase 1 of the development is captured in Turning Movement Counts (TMCs) captured in 2023, which were subsequently used in this TIS Update. Should any further data be required for agency review, please feel free to contact BA Group directly for a PDF or clarification if there is a discrepancy.

Comment:

Figure 22 to 24: please double check the volume update. Ensure the numbers add up.

Response:

Traffic volume figures have been updated. **Figure 20** and **Figure 21** now show Future Total Traffic Volumes, with and without the inclusion of the South GO Parking Lot Expansion, respectively. Future total traffic volumes are representative of site traffic volumes added to future background traffic volumes, which are comprised of existing traffic volumes and background development traffic volumes. Should any further data be required for agency review, please feel free to contact BA Group directly for a PDF or clarification if there is a discrepancy.

General Comments:

Comment:

Figures 25, 26 and 27, please provide clearer images, the legends and chart color are hard to see and match, and please provide detailed supporting information of the outcome.

Response:

Figures have been updated. The legends of **Figure 22** and **Figure 23** have been enlarged for clarity.

Comment:

The summary and analysing years are the future conditions of 2026, 2031 and 2036, missing the existing year-2021. The existing year should be included.

Response:

Section 9.3.4 of the initial TIS report included separate tables for each signalized intersection summarizing the existing (2021) and future traffic analysis of each intersection.

Section 9.3.5 of the initial TIS report included a summary table of the capacity results for the unsignalized intersections. The tables were divided into two, where the first table would summarize the existing and build out year, and the second table would summarize the future total results of 2031 and 2036.

This updated TIS refers to existing results in **Section 9.3** for each study area intersection.

Comment:

Please provide all relevant supporting reports or documents which are used as a reference at this report.

Response:

Noted. Please refer to **Appendix N** that contains the links to the documents used and referenced in the initial TIS report. Keep in mind that a number of documents are no longer published documents on the agencies' website. There is a note of this in the list provided in **Appendix N**. The documents that do not contain a link can be e-mailed to MTO if needed.

Synchro and Sim Traffic:

Comment:

Please explain how derived the PHFs used at Synchro analysis. The report has not attached 15 min TMCs report or have not provided information of the PHFs used.

Response:

PHF is calculated based on the intersection for each analyzed peak hour period. The formula is the sum of all vehicles in the peak hour divided by four times the busiest 15 minutes vehicles during the peak hour.

This value is calculated based on the turning movement counts. The turning movement counts (TMCs), which include 15 minute divisions, are included in **Appendix F**. The value that is entered into Synchro is the intersection PHF and not the movement or approach PHF.

The default PHF is 0.92 as per HCM 2000.

Comment:

Recommending developing all scenarios within one single Synchro 11 file under the same geometric configuration, such as AM, PM, existing, and future etc. it may be easier to analyze and compare.

Response:

Synchro files were split between scenarios to study the impact of different signal timing modifications and infrastructure improvements on different analysis scenarios.

Comment:

Sim Traffic calibration setting, recommending duration of 15min seeding with 60min recording, and final queue lengths determined (update) from SimTraffic.

Response:

Analysis results from Synchro demonstrate the need for signal timing modifications and infrastructure improvements under future background traffic volumes. SimTraffic results are valuable when real world conditions need to be replicated as closely as possible to confirm results from Synchro; for instance, to confirm that infrastructure improvements are not needed for the proper functioning of an intersection. In this case, the macrosimulation condition from Synchro 11 is showing the need for the improvements described in this report; and results from SimTraffic will inevitably confirm these recommendations.

General Comments

Comment:

Capacity analysis shall be performed at all proposed site access points and intersections in the study network in accordance with the methodology described in the latest edition of the Highway Capacity Manual (HCM). At signalized intersections, movements with v/c ratio greater than 0.85 are deemed to be “critical” in terms of operations. Movements that experience a v/c ratio of 0.85 or greater should be evaluated for possible operational improvements. For ramps, a v/c ratio for terminal ramp approaches with a value greater than 0.75 would be deemed critical and should be evaluated for 3 possible operational improvements. The 95th queue lengths should be determined from SimTraffic Simulation of recommended settings.

Response:

Noted. Under existing conditions, several movements experience a v/c ratio greater than 0.85 and several ramps experience a v/c ratio greater than 0.75. While the MTO has identified these thresholds to aid in identifying areas that require additional review, it should be noted that a v/c ratio over 0.85 or 0.75, while representing very busy conditions, does not automatically trigger the need for operational or geometric road improvements. A v/c ratio under 1.00 represents a movement/ intersection that is considered within capacity and operational, even if the conditions are not ideal. For movements where v/c ratios have been reported to be over 1.00, operational improvements have been proposed in this report to improve conditions.

Comment:

The site plan, and the proposed street network showing a new access point (Parking entrance) from the development direct to Waterdown Rd between south ramp terminal and Masonry Ct. Considering the existing geometric and operational conditions within the interchange area, we are not recommending the proposed new access. Refer to our previous comments. A section may be included in the traffic impact study in lieu of a I-HAMP study discussing the access and associated access design for our review/comment. The TIS already includes other elements of a I-HAMP such as a discussion of municipal land use planning and transportation initiatives..

Response:

Section 10.0 provides a description of the design of the access along Waterdown Road that will enforce right-in-right-out only movements, eliminating the operational issues of allowing left turns. This access is proposed to be treated as a secondary access, with the intention that most residents and visitors will be directed to use the access from Cooke Boulevard. Additionally, **Section 10.0** provides a summary of the studies that have been undertaken to ensure that the spacing of the proposed access is appropriate in relation to the interchange area. MTO Guidelines state that the minimum spacing distance of an offset intersection on a road with a posted speed limit of 50 km/h such as Waterdown Road is 125 metres. The intersection spacing review, provided in **Appendix K**, demonstrates that there is approximately 260 metres in advance of the eastbound off-ramp, which is an additional 135 metres above and beyond the MTO’s guideline for desirable access spacing.

13.0 SUMMARY AND CONCLUSIONS

BA Group has been retained by Adi Developments (Masonry) Inc. (referred to herein as the "client") to provide transportation consulting services in relation to an Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) applications for the lands located at 1120 Cooke Boulevard (herein referred to as the "site") in the City of Burlington, formerly identified as Phase 2 of 101 Masonry Court lands.

The site is located on the north-east corner of the Waterdown Road and Masonry Court intersection. Both roads are under City jurisdiction. The site is approximately 9,534.66 m^2 / 102,630.25 ft^2 in size and is bounded by Waterdown Road to the west, Masonry Court to the south, Cooke Boulevard to the east and a rail corridor for GO Trains operated by Metrolinx to the north. The site is conveniently located within a short walking distance to Aldershot GO Station (approximately 450 metres to the south lot) located directly north of the site. The site is also located within the Aldershot MTSA that is subject to a number of enhanced provincial, regional, and city policies. In addition, the site is near the Highway 403 and Waterdown Road interchange.

The current development proposal on the site includes:

- 1,165 resident units
- 495 m^2 of commercial-retail space
- 1,137 parking spaces (1037 resident and 100 non-residential spaces)
- 676 bicycle spaces (596 long-term, 62 short-term and 18 commercial spaces)
- 5 loading spaces (2 formal and 3 informal moving spaces)

The proposed development consists of three (3) buildings which will be constructed in three phases. The proposed three (3) phases and description is listed below:

- Phase 1 (Building A) – 436 units and 430 parking spaces
- Phase 2 (Building B) – 358 units and 346 parking spaces
- Phase 3 (Building C) – 371 units and 361 parking spaces

The primary vehicular access and main entrance to the development is proposed via a two-way, all-moves driveway on Cooke Boulevard, which will operate as an unsignalized intersection with the driveway under STOP control. The driveway will provide access to the proposed parking garage, loading area and a pick-up and drop-off loop. A second right-turns only vehicular access to the development is proposed from Waterdown Road.

Key findings are summarized as follows:

Transportation Context

1. The site is located in great proximity to transit routes, including Aldershot GO Station, that connect the site to a wider transit network within and outside Burlington. The site is located less than 500 metres from Aldershot GO Station's South parking lot, the 1 Plains bus route, the 101 Plains express bus route, the 4 Central bus route, and the 18 Waterdown bus route. This site is also less than a kilometre from the 87 North Service- Aldershot bus route.

2. The site is well served by cycling and pedestrian facilities. Sidewalks are provided along most of the road corridors. In addition, there are planned cycling facilities in close proximity to the site that will introduce protected bikeways along Plains Road, Alan Bryk Way and Waterdown Road up to the CN rail bridge, and local street bikeways identified for Masonry Court and Cooke Boulevard.

Vehicular Parking

3. Application of the City of Burlington Zoning By-law 2020 (amended) results in a requirement of 1,473 vehicular spaces, including 1,456 residential (inclusive of visitors) and 17 non-residential parking spaces. The effective residential parking rate is 1.25 spaces / unit.

4. The proposed parking supply will provide a total of 1,037 spaces including 1037 resident parking and 100 non-residential parking spaces to be shared between commercial – retail and residential visitors. The effective resident parking rate is approximately 0.89 spaces / unit and 0.09 spaces / unit non-residential parking rate. The parking spaces are to be supplied in a five (5) level underground parking garage. Six (6) parking spaces will be provided for the commercial-retail at-grade.

5. A rate of 0.97 spaces per unit adopted for the site is understood to be supported by City staff (if accompanied by a robust TDM plan) per ongoing discussions with City staff (see **Appendix D**).

6. The proposed parking supply is less than the required parking supply of 1,473 spaces as outlined in Zoning By-law 2020 (amended), and exceeds the City supported (with robust TDM) parking standard of 0.97 spaces / unit.

Loading

1. Application of the Zoning By-law 2020 results in a requirement of three (3) loading spaces.

2. The proposed development includes five (5) loading spaces including two (2) formal lay-by waste collection spaces are proposed to support the typical loading / garbage activities and three (3) informal moving spaces are proposed to support the deliveries and moving activities associated to the development.

3. Although the proposed loading supply does not meet the required three (3) loading spaces, two (2) of the proposed loading spaces contribute towards the minimum requirement while the three (3) moving spaces will complement the supply. Thus, it is BA Group's opinion that the proposed loading scheme will be able to support the commercial and residential functions of the proposed development as each building will be equipped with an informal moving space and be supported by a formal waste collection space.

Bicycle Considerations

4. The City of Burlington Zoning By-law 2020 does not include bicycle parking requirements for residential buildings. However, the *Burlington City-Wide Parking Standards Review*, a report prepared by IBI Group in July 2017 recommends the provision of bicycle parking for residential buildings and retail stores.

5. The City's minimum recommended bicycle parking requirements applicable to the site as per the Burlington City-Wide Parking Standards Review requires the provision of 586 long-term bicycle parking spaces and 62 short-term bicycle parking spaces, resulting in a total of 648 bicycle parking spaces.

6. A total of 676 bicycle parking spaces are proposed, including 596 residential long-term, 62 short-term and 18 commercial bicycle parking spaces to serve the proposed development across three

buildings. Bicycle parking is provided in bicycle lockers below grade on parking levels 1 and 2, and at-grade (indoors), and bicycle racks are provided outdoors.

7. The proposed bicycle parking supply of 676 bicycle parking spaces meets and exceeds the recommended bicycle parking standards applicable to the site as per the Burlington City-Wide Parking Standards Review.

Transportation Demand Management (TDM)

8. A Transportation Demand Management (TDM) framework has been developed to support the use of non-auto modes of travel, and to encourage a change in travel behaviour that reduces automobile travel. The strategies include a proposed reduced vehicular parking supply than the prevailing Zoning By-law, unbundle parking, permit resident and retail visitors to share the overall non-residential parking supply of 100 spaces, provision of sidewalk facilities along Cooke Boulevard, implementation of a transit information centre, a car-share program, a bike repair station, bicycle parking spaces, distribution of travel information brochures, carpool program, a community marketing outreach event, and subsidized transit passes to first time residents.

Traffic Volumes Forecast

9. There are ten (10) area background development sites, including the Aldershot South GO expansion that account for 2 to 18% growth along Waterdown Road per year in the next 5 years.

10. Site traffic includes Phase 1 (already built) and Phase 2 (the site). Phase 1 is built and occupied and no longer owned by Adi Developments (Masonry) Inc. However, Phase 1 has been included in accordance with the terms of reference for this study for the purpose of traffic assessment.

11. The proposed development is forecast to generate in the order of 315 and 370 two-way net-new vehicle trips during the weekday morning and afternoon peak hour periods, respectively.

Traffic Operations

12. The study area intersections can be defined by three distinct characteristics:
    1. Highway 403/Waterdown Road Interchange & North Aldershot GO Entrance;
    2. Waterdown Road / Masonry Court & South GO Entrance; and,
    3. Plains Road Corridor.

Highway 403 / Waterdown Road Interchange

13. The Highway 403 / Waterdown Road interchange has an unusual configuration that does not meet the typical Diamond I/C, Parclo B, or desirable Parclo A interchange configurations defined in the MTO's Highway Corridor Management Manual. This interchange has been identified by the MTO and City to have existing constraints and expected increases in activity related to the Aldershot GO Mobility Hub. The City has already planned for part of this work, a bridge widening to 5-lanes plus active transportation for 2028 and is identifying potential infrastructure solutions as part of an ongoing Prosperity Corridor Study. The bridge widening is not a requirement of the proposed development. Operations at this interchange intersection will continue to be constrained under future conditions, irrespective of development of the subject site.

Waterdown Road / Masonry Court & South GO Entrance

14. The intersection of Waterdown Road / Masonry Court serves as the primary entrance for the South Aldershot GO entrance, as well as the only public access via Waterdown Road to the east side of the draft Mobility Study lands, between Highway 403 and Plains Road.

The existing southbound left lane storage at this intersection is insufficient for morning peak hour queuing activity (i.e. inbound commuters). Both Metrolinx and site traffic will contribute to this movement. Traffic activity will also increase at the intersection of Masonry Court / Cooke Boulevard with the buildout of Phase 1 and 2 of the Aldershot South Go expansion lot.

Plains Road Corridor

15. Site traffic can be acceptably be accommodated at the Plains Road / Cooke Boulevard intersection that leads directly to the main entrance to the development and will have minimal impact on the Plains Road / Waterdown Road and Plains Road / Emery Road intersections.

    Application of background development volumes indicates that the left and right turns at Waterdown Road / Plains Road will worsen over time without the introduction of additional turning lanes or additional routing options through a grid network system such as those contemplated in the draft Mobility Hub.

Road Network Improvements

16. Infrastructure improvements have been identified in two categories:
    1. Local development-led measures; and
    2. Measures required to address regional growth.

    The following mitigating improvement measures have been identified near-term should background development proceed at the high rate projected for 2026 (from 2 to 18% per year) based on the list of approved and appealed developments:

    - The provision of a channelized northbound right turn lane and conversion of the dual westbound left to a single westbound left at the Waterdown Road / S Service Road & Highway 403 EB Off-Ramp intersection

    Further improvements are needed by 2031 to address ongoing regional growth and insufficient queuing space along Waterdown Road beyond buildout of the site. The MTO could consider a number of improvements, including:

    1) Introducing typical free-flow elements of a Diamond or Parclo interchange;
    2) Separation of highway on/off ramp and primary GO traffic;
    3) Introduction of Dual or Free Flow Left/Right Turns at interchange intersections; in combination with,
    4) Widening of Waterdown Road over Highway 403 (already planned for 2028)

    The proposed right-turns site driveway on Waterdown Road is located approximately 200 metres south of the existing rail line (~255 metres to S Service Road) and exceeds the desirable offset spacing of 125 metres for Commercial / Private Road access to a Diamond I/C or Parclo interchange along a 50 km/hr posted roadway. The proposed site driveways and proposed local improvements do not preclude consideration of any of the above noted improvements that would address long term regional growth.

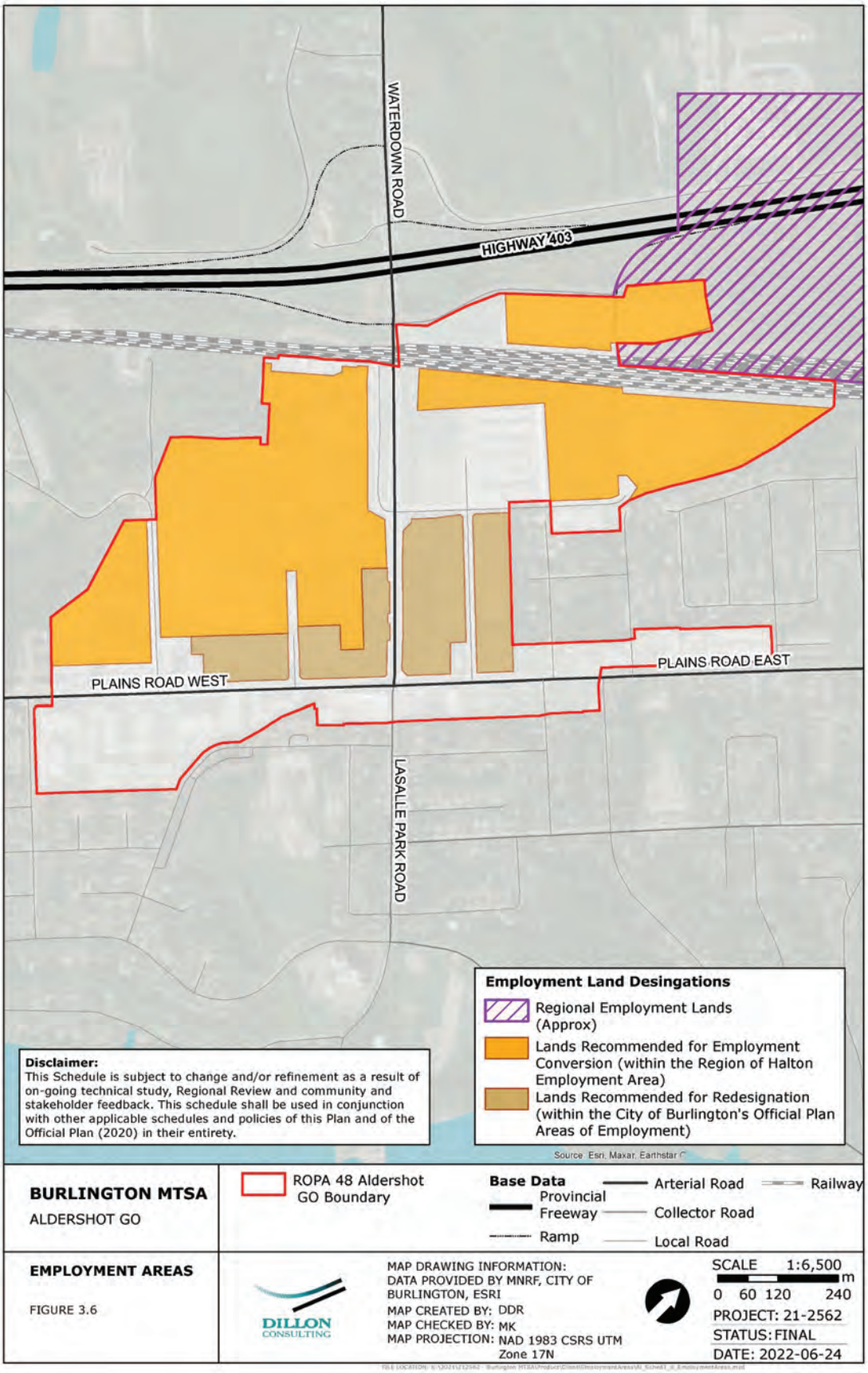
Overall

17. The traffic demands of the site can be acceptably accommodated with the proposed local road network improvements and development of the site does not preclude the ability for the municipalities to provide long term improvements at the Highway 403 interchange to address regional growth.

18. The site is well positioned relative to the significant transit and active transit improvements planned in the immediate vicinity and proposes extensive Transportation Demand Management (TDM) measures that aim to reduce the dependency on single-occupant vehicles, and direct transit supportive growth next to existing GO Stations on the Lakeshore West GO rail corridor.

Appendix A:
Aldershot GO MTSA (Figures from *2022 Major Transit Station Area – Area-Specific Planning Study)*

Figure 3.6 - Aldershot GO MTSA Employment Areas



Appendix B:
Terms of Reference

Memorandum

TO:
Kaylan Edgcumbe, C.E.T.
Manager, Integrated Mobility
Transportation Services Department
City of Burlington

FROM:
Emily J. Ecker

PROJECT:
8057-01
1120 Cooke Boulevard

DATE:
October 14, 2020

SUBJECT: TRAFFIC IMPACT STUDY SCOPE FOR OPA/ZBA – 1120 COOKE BOULEVARD

BA Group has been retained by Adi Development Group to provide transportation consulting services for the proposed residential development located at 1120 Cooke Boulevard, located in the northeast quadrant of the Waterdown Road / Masonry Court intersection, in the City of Burlington. The subject site is currently vacant.

The development proposal is for Phase 2 of the previously name "101 Masonry Court" site. The development proposal consists of three (3) to four (4) new residential buildings with below-grade parking. The current draft development concept contains in the order of 1,300 condominium units. The development statistics and concept plan are draft only, and continue to be refined.

Phase 1 (located east of the subject site) is partially occupied and consists of a mix of condominium apartment units and back-to-back, regular, rear lane, and stacked townhouses.

We understand, in accordance with discussions to this point, that the MTO would continue to require an iHAMP study or completion of the Prosperity Study in advance of building permit approvals for this site.

The proposed scope for a Traffic Impact Study for the Official Plan Amendment and Zoning By-Law Amendment for 1120 Cooke Boulevard is outlined below for your comment and consideration.

1.0 SCOPE OF WORK

Intersections to be analyzed:

Signalized Intersections:

- Waterdown Rd & N Service Rd / HWY 403 WB on-ramp
- Waterdown Rd & HWY 403 WB off-ramp / Panin Rd
- Waterdown Rd & HWY 403 EB off-ramp / S Service Rd
- S Service Rd & HWY 403 EB on-ramp / Go Station Lot Entrance
- Waterdown Rd & Masonry Ct / Railway Rd
- Waterdown Rd / Lasalle Park Rd & Plains Rd E / Plains Rd W

Unsignalized Intersections:

- Masonry Ct & Cooke Blvd
- Cooke Blvd & East Site Driveway(s)

Analysis Time Periods:

Weekday morning and weekday afternoon peak hours for:

- existing
- future background (5 and 10-years); and,
- future total (5 and 10-years).

Study Guidelines:

- Halton Region TIS Guidelines (2015)
- MTO TIS Guidelines (2014)
- MTO Geometric Design Standards for Ontario Highways
- MTO Highway Corridor Management Manual (2018)
- Ontario Traffic Manual
- Transportation Association of Canada Geometric Design Guide for Canadian Roads

Analysis inputs (sat flow for example) at City intersections will be prepared in accordance with Halton Region TIS Guidelines.

Analysis inputs at Highway terminals will be prepared in accordance with MTO TIS Guidelines.

Analysis Methodology:

Highway Capacity Manual methodology using Synchro 9 software.

Existing TMC:

A review of the latest counts available pre-COVID from BA Group, City of Burlington and MTO. Counts that are more recent than February 2020 will not be considered representative of typical conditions.

Background Traffic:
For highway intersections: a 2% annual growth rate will be applied.
For City intersections: an annual growth rate that will either be adopted from the City's Transportation Master Plan (TMP) or through discussion with City staff and review of historical count data for the local area (if available).

Traffic allowances based on specific developments will also be considered for proposed, approved, or under construction developments in the site vicinity. The area developments we are aware of from the Metrolinx Aldershot GO Station Traffic Brief report and City of Burlington development application website include:

- 101 Masonry Rd Phase 1
- Aldershot GO Station south parking lot expansion
- 35 Plains Rd East
- 92 Plains Rd East
- 53 & 71 Plains Rd East
- 1085 Clearview Avenue
- 1640, 1673, and 1751 Flatt Road and 1664 Waterdown Road Eagle Heights and Taylor Subdivisions

Please advise of other specific development proposals to consider.

Site Traffic
Traffic generation for the residential development will be based upon a review of Institute for Transportation Engineers (ITE) Trip Generation Manual and studies conducted by BA Group at comparable developments that are in a similar transportation context to the proposed site.

Mode Split
Mode split for the residential development will be determined based on a review of the City's TMP targets and existing comparable Major Transit Stations Areas (MTSAs).

Trip Distribution
Trip distribution will be based upon 2016 Transportation Tomorrow Survey (TTS) data. Trip distribution and assignment assumptions will reflect TTS data and local area turning restrictions and network constraints.

Parking and Loading Review
We will review the suitability of the proposed loading and parking supplies based on our experience at similar facilities and taking into consideration relevant standards and by-law requirements.

Appendix C:
Reduced Architectural Plans (Not to Scale)



1120 COOKE BOULEVARD - PHASE 2

ISSUED FOR DISCUSSION
5 JUNE 2023

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	05 JUNE 2023
02	RE-ISSUED FOR OPA/ZBA	03 FEBRUARY 2023
01	ISSUED FOR OPA/ZBA	07 OCTOBER 2021

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CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS ON THE JOB.

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1120 COOKE BLVD

PHASE 2
BURLINGTON ONTARIO

Drawn	
Scale	NTS
Checked	
Date	05 JUNE 2023

Title
TITLE

Project No.	20-129
Drawing No.	A001

101 Masonry Court - GCA / Gross Building Area

	BUILDING A		BUILDING B		BUILDING C		RETAIL		TOTAL	
	BUILDING OUTLINE (GCA) sq.ft.	BUILDING OUTLINE (GCA) sq.m.	BUILDING OUTLINE (GCA) sq.ft.	BUILDING OUTLINE (GCA) sq.m.	BUILDING OUTLINE (GCA) sq.ft.	BUILDING OUTLINE (GCA) sq.m.	BUILDING OUTLINE (GCA) sq.ft.	BUILDING OUTLINE (GCA) sq.m.	sq.ft.	sq.m.
GROUND	11,640	1,081.36	12,610	1,171.51	10,803	1,003.62	5,328	494.98	35,053	3,256.51
LEVEL 2	12,283	1,141.09	12,610	1,171.51	10,803	1,003.62			35,695	3,316.22
LEVEL 3	12,283	1,141.09	12,610	1,171.51	10,803	1,003.62			35,695	3,316.22
LEVEL 4	12,283	1,141.09	12,610	1,171.51	10,803	1,003.62			35,695	3,316.22
LEVEL 5	12,283	1,141.09	12,610	1,171.51	10,803	1,003.62			35,695	3,316.22
LEVEL 6	12,283	1,141.09	12,610	1,171.51	10,803	1,003.62			35,695	3,316.22
LEVEL 7	12,283	1,141.09	8,068	749.59	8,068	749.54			28,419	2,640.21
LEVEL 8	12,283	1,141.09	8,068	749.59	8,068	749.54			28,419	2,640.21
LEVEL 9	12,283	1,141.09	8,068	749.59	8,068	749.54			28,419	2,640.21
LEVEL 10	12,283	1,141.09	8,068	749.59	8,068	749.54			28,419	2,640.21
LEVEL 11	12,283	1,141.09	8,068	749.59	8,068	749.54			28,419	2,640.21
LEVEL 12	12,283	1,141.09	8,068	749.59	8,068	749.54			28,419	2,640.21
LEVEL 13	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 14	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 15	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 16	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 17	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 18	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 19	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 20	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 21	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 22	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 23	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 24	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 25	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 26	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 27	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 28	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 29	8,073	750.00	8,068	749.59	8,068	749.54			24,209	2,249.12
LEVEL 30	8,073	750.00			8,068	749.54			16,141	1,499.54
LEVEL 31	8,073	750.00			8,068	749.54			16,141	1,499.54
LEVEL 32	8,073	750.00							8,073	750.00
LEVEL 33	8,073	750.00							8,073	750.00
MPH	4,758	442.01	4,873	452.75	4,831	448.78			14,462	1,343.54
TOTAL GCA/GROSS BUILDING (ABOVE GRADE)	321,837.77	29,825.38	266,107.92	24,722.24	271,346.60	25,208.92	5,327.96	494.98	858,492	79,756.54

	BUILDING A sq.ft.	BUILDING A sq.m.	BUILDING B sq.ft.	BUILDING B sq.m.	BUILDING C sq.ft.	BUILDING C sq.m.	RETAIL sq.ft.	RETAIL sq.m.	TOTAL sq.ft.	TOTAL sq.m.
PARKING LEVEL P-6	39,084	3,631.01							39,084	3,631.01
PARKING LEVEL P-5	37,894	3,520.47	28,352	2,634.30	32,568	3,025.63			98,814	9,180.10
PARKING LEVEL P-4	37,894	3,520.47	28,352	2,634.00	32,568	3,025.63			98,814	9,180.10
PARKING LEVEL P-3	37,894	3,520.47	28,352	2,634.30	32,568	3,025.63			98,814	9,180.10
PARKING LEVEL P-2	37,894	3,520.47	28,352	2,634.00	32,568	3,025.63			98,814	9,180.10
PARKING LEVEL P-1	37,894	3,520.47	28,352	2,634.30	32,568	3,025.63			98,814	9,180.10
TOTAL GCA (BELOW GRADE)	228,551	21,233.36	141,761	13,170.00	162,838	15,128.15			533,153	49,531.51

	BUILDING A sq.ft.	BUILDING A sq.m.	BUILDING B sq.ft.	BUILDING B sq.m.	BUILDING C sq.ft.	BUILDING C sq.m.	RETAIL sq.ft.	RETAIL sq.m.	TOTAL sq.ft.	TOTAL sq.m.
PARKING LEVEL P-6	6,081	564.95							6,081	564.95
PARKING LEVEL P-5	6,081	564.95	1,603	148.90	3,252	302.10			10,936	1,015.96
PARKING LEVEL P-4	6,081	564.95	1,603	148.90	3,252	302.10			10,936	1,015.96
PARKING LEVEL P-3	6,081	564.95	1,603	148.90	3,252	302.10			10,936	1,015.96
PARKING LEVEL P-2	6,329	587.97	2,184	202.89	3,252	302.10			11,765	1,092.97
PARKING LEVEL P-1	6,674	620.05	5,100	473.79	4,669	433.76			16,443	1,527.61
TOTAL GROSS BUILDING (BELOW GRADE)	37,327	3,467.82	12,092	1,123.40	17,676	1,642.18			67,096	6,233.40

	sq.ft.	sq.m.
TOTAL GCA	1,396,973	129,783.04
TOTAL RESIDENTIAL GFA (ABOVE GRADE)	791,879	72,638.98
TOTAL COMMERCIAL GFA (ABOVE GRADE)	5,328	494.98
TOTAL GROSS BUILDING AREA	925,588	85,989.94
TOTAL SITE AREA (m2)		9,534.66
FLOOR AREA RATIO		9.0

7 A100 GCA CHART REF.

ABBREVIATION LEGEND

ACC	ARCHITECTURAL CONCRETE TYPE
ACT	ACOUSTIC TILE
AD	AREA DRAIN
AES	ARCHITECTURAL EXPOSED STEEL
ALUM	ALUMINUM
AFF	ABOVE FINISHED FLOOR
C	COLD
C/H	COLD & HOT
CAR	CARPET
CB	CONCRETE BLOCK
℄	CENTRE LINE
CF	CERAMIC TILE
CJ	CONCRETE FINISH TYPE
CL	CONCRETE JOINT
COL	CLOSET
CONC	CONCRETE BLOCK
CONT	CONTINUOUS
CT	CONCRETE COLUMN
C/W	COVERED WITH
D	DIAMETER, DRYER
DFJ	DEFLECTION JOINT
DN	DOWN
DWG	DRAWING
EL	ELEVATION
ELEC	ELECTRICAL
EOS	EDGE OF SLAB
EP	ELECTRICAL PANEL
EQ	EQUAL
EIF	EXTERIOR INSULATION FINISH TYPE
EXP	EXPOSED
EXJ	EXPANSION JOINT
EXT	EXTERIOR
FD	FLOOR DRAIN
FDN	FOUNDATION
FIN	FINISH(ED)
FL	FLOOR
FT	FOOT
FTG	FOOTING
FRG	FIBRE REINFORCED GYPSUM
GALV	GALVANIZED
GBL	GLASS BLOCK
GR	GRANITE
GL	GLASS
GWB	GYPSUM WALLBOARD
H	HOT
HD	HUB DRAIN
HM	HOLLOW METAL
HOR	HORIZONTAL
HSS	HOLLOW STEEL SECTION
HT	HEIGHT
HW	HARDWOOD STRIP
IM	INSULATED METAL
INS	INSULATION
INT	INTERIOR
JT	JOINT
LAM	LAMINATED
LIN	LINEN
MA	MARBLE TYPE
MAX	MAXIMUM
MECH	MECHANICAL
MIN	MINIMUM
ML	MELAMINE
MOD	MODULE
MT	METAL TYPE
NFWH	NO FREEZE WATER HOSE
NIC	NOT IN CONTRACT
N°	NUMBER
NTS	NOT TO SCALE
O/C	ON CENTRE
OD	OUTSIDE DIAMETER
OH	OVERHEAD
PC	PRECAST CONCRETE
PLM	PLASTIC LAMINATE
PLYWD	PLYWOOD
PRE-FAB	PRE-FABRICATED
PS	PRESSED STEEL
PT	PAINT
P/T	PRESSURE TREATED
QM	QUIRK MITRE
R	RISER, RADIUS
R.O.	ROUGH OPENING
R/A	RETURN AIR
RAD	RADIATOR
RB	RUBBER BASE
RC	REINFORCED CONCRETE
RD	ROOF DRAIN
REF	REFERENCE DIMENSIONS
REINF	REINFORCED, REINFORCING
REQ'D	REQUIRED
RV	REVEAL
REV	REVERSE
R INSUL	RIGID INSULATION
RM	ROOM
S	SINK
S/A	SUPPLY AIR
SC	SEALED CONCRETE
SD	SCUPPER DRAIN
SPEC	SPECIFICATION
SQ	SQUARE
SQ FT	SQUARE FEET
SSTL	STAINLESS STEEL
STL	STEEL
SIM	SIMILAR
ST	STONE TYPE
STOR	STORAGE
STRUCT	STRUCTURE, STRUCTURAL
SW	SWITCH
T	TREAD
TBB	TILE BACKER BOARD
TEL	TELEPHONE
THK	THICK, THICKNESS
T&G	TONGUE & GROOVE
TV	TELEVISION
TYP	TYPICAL
T/O	TOP OF SLAB
T.O.B.	TOP OF BEAM
T.O.W.	TOP OF WALL
U/S	UNDERSIDE
V	VOLT
VB	VAPOUR BARRIER
VCT	VINYL COMPOSITE TILE TYPE
VERT	VERTICAL
VEST	VESTIBULE
VP	VAPOUR BARRIER
W	WASHER, WIDE
WD	WOOD TYPE
WF	WOOD FINISH TYPE
WP	WORKING POINT
W.P.	WATERPROOF (MEMBRANE)
W.R.T.	WITH RESPECT TO
W/	WITH
XGWB	EXTERIOR GYPSUM BOARD

3 A100 ABBREVIATION LEGEND 1:300

GROSS FLOOR AREA BREAKDOWN

FLOOR		RESIDENTIAL UNIT	RETAIL ft2	RETAIL m2	BUILDING A (PHASE 1) SALABLE ft2	SALABLE m2	NON-SALABLE ft2	NON-SALABLE m2	BUILDING B (PHASE 2) SALABLE ft2	SALABLE m2	NON-SALABLE ft2	NON-SALABLE m2	BUILDING C (PHASE 3) SALABLE ft2	SALABLE m2	NON-SALABLE ft2	NON-SALABLE m2	TOTAL GFA ft2	TOTAL GFA m2	TOTAL INDOOR AMENITY ft2	TOTAL INDOOR AMENITY m2	TOTAL DEDUCTABLE ft2	TOTAL DEDUCTABLE m2
PARKING LEVEL P-6	PARKING				0	0.00	0	0.00									0	0.00	0	0.00	39,084	3,631.01
PARKING LEVEL P-5					0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	98,814	9,180.10
PARKING LEVEL P-4					0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	98,814	9,180.10
PARKING LEVEL P-3					0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	98,814	9,180.10
PARKING LEVEL P-2					0	0.00	822	76.41	0	0.00	0	0.00	0	0.00	0	0.00	822	76.41	0	0.00	97,991	9,103.69
PARKING LEVEL P-1					0	0.00	3,340	311.00	0	0.00	2,645.12	245.74	0	0.00	2,237	207.84	8,230	764.50	0	0.00	90,584	8,415.52
GROUND		0	5,328	494.98	0	0.00	7,175	666.53	0	0.00	9,885	899.80	0	0.00	8,943	845.03	23,803	2,211.36	10,023	931.17	11,250	1,045.15
LEVEL 2	PODIUM	49			10,435	969.40	894	83.03	10,707	994.71	869	80.70	7,917	735.54	1,195	111.00	32,016	2,974.38	0	0.00	3,679	341.81
LEVEL 3		50			10,435	969.40	894	83.03	10,707	994.71	869	80.70	8,592	798.18	1,177	109.38	32,673	3,035.38	0	0.00	3,023	280.84
LEVEL 4		48			10,435	969.40	894	83.03	9,521	884.56	2,054	190.85	8,587	797.79	1,181	109.75	32,673	3,035.38	0	0.00	3,023	280.84
LEVEL 5		48			10,435	969.40	985	91.54	9,521	884.56	2,054	190.85	8,587	797.79	1,181	109.75	32,764	3,043.89	0	0.00	2,931	272.33
LEVEL 6		48			10,435	969.40	985	91.54	9,521	884.56	2,054	190.85	8,587	797.79	1,181	109.75	32,764	3,043.89	0	0.00	2,931	272.33
LEVEL 7		36			10,435	969.40	985	91.54	5,675	527.27	1,359	126.22	5,436	504.98	1,598	148.47	25,488	2,367.88	2,598	241.34	2,931	272.33
LEVEL 8		41			10,435	969.40	985	91.54	6,957	646.28	501	46.55	6,964	646.98	493	45.80	26,334	2,446.55	0	0.00	2,085	193.66
LEVEL 9	PODIUM	41			10,435	969.40	985	91.54	6,957	646.28	501	46.55	6,964	646.98	493	45.80	26,334	2,446.55	0	0.00	2,085	193.66
LEVEL 10		41			10,435	969.40	985	91.54	6,957	646.28	501	46.55	6,964	646.98	493	45.80	26,334	2,446.55	0	0.00	2,085	193.66
LEVEL 11		41			10,435	969.40	985	91.54	6,957	646.28	501	46.55	6,964	646.98	493	45.80	26,334	2,446.55	0	0.00	2,085	193.66
LEVEL 12		41			10,435	969.40	985	91.54	6,957	646.28	501	46.55	6,964	646.98	493	45.80	26,334	2,446.55	0	0.00	2,085	193.66
LEVEL 13		33			5,225	486.11	2,237	207.84	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	1,672	155.30	1,833	170.26
LEVEL 14		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 15		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 16		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 17		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 18		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 19		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 20		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 21	TOWER	36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 22		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 23		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 24		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 25		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 26		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 27		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 28		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 29		36			6,938	644.59	524	48.66	6,957	646.28	501	46.55	6,964	646.98	493	45.80	22,377	2,078.86	0	0.00	1,833	170.26
LEVEL 30		24			6,938	644.59	524	48.66	0	0.00	0	0.00	6,964	646.98	493	45.80	14,919	1,386.03	0	0.00	1,222	113.50
LEVEL 31		24			6,938	644.59	524	48.66	0	0.00	0	0.00	6,964	646.98	493	45.80	14,919	1,386.03	0	0.00	1,222	113.50
LEVEL 32		12			6,938	644.59	524	48.66	0	0.00	0	0.00	0	0.00	0	0.00	7,462	693.25	0	0.00	611	56.75
LEVEL 33		12			6,938	644.59	524	48.66	0	0.00	0	0.00	0	0.00	0	0.00	7,462	693.25	0	0.00	611	56.75
MECHANICAL PH		0			0	0.00	4,218	391.87	0	0.00	4,343	403.46	0	0.00	4,300	399.45	12,860	1,194.70	0	0.00	1,601	148.76
TOTAL		1,165	5,327.98	494.98	258,770.97	24,040.61	38,839.05	3,608.27	208,696.40	19,388.53	38,955.72	3,433.30	214,843.24	19,959.59	32,826.17	3,049.65	790,931.55	73,479.95	14,292.43	1,327.81	600,713.86	55,808.13

TOTAL ABOVE GRADE DEDUCTABLE	7,117.59
TOTAL BELOW GRADE DEDUCTABLE	48,690.54

2 A100 GFA CHART REF.

BUILDING A(33 STORIES)

UNIT BREAKDOWN	BACHELOR (400-450sf)	1BED (450-529sf)	1BED+D (530-625sf)	2BED (625-750sf)	2BED+D (731-825sf)	3BED (900-1100sf)	NO. OF LEVELS	TOTAL
GROUND	0	0	0	0	0	0	1	0
LEVELS 2 - 3	0	3	8	5	1	0	2	34
LEVELS 4 - 12	0	3	8	5	1	0	9	153
LEVELS 13	0	3	4	2	0	0	1	9
LEVELS 14-33	0	4	4	4	0	0	20	240
TOTAL	0	116	172	137	11	0	33	436
PROVIDED %	0%	27%	39%	31%	3%	0%		100%
		66%		34%				
NO OF BARRIER FREE UNITS REQUIRED	0	43.2		22.2		0		
AMENITY AREA* (m²/UNIT)	0	5760		5180				10,940

*15 m²/EFFICIENCY UNIT, 20 m²/1B UNIT, 35 m²/2B or more UNIT

BUILDING B(29 STORIES)

UNIT BREAKDOWN	BACHELOR (400-450sf)	1BED (450-529sf)	1BED+D (530-625sf)	2BED (625-750sf)	2BED+D (731-900sf)	3BED (900-1100sf)	NO. OF LEVELS	TOTAL
GROUND	0	0	0	0	0	0	1	0
LEVELS 2 - 3	0	4	10	1	3	0	2	36
LEVELS 4 - 6	0	3	9	2	2	0	3	48
LEVEL 7	0	2	5	3	0	0	1	10
LEVELS 8 - 29	0	2	6	3	1	0	22	264
TOTAL	0	63	184	77	34	0	29	358
PROVIDED %	0%	18%	51%	22%	9%	0%		100%
		69%		31%				
NO OF BARRIER FREE UNITS REQUIRED	0	37.05		18.65		0		
AMENITY AREA* (m²/UNIT)	0	4940		3885				8,825

*15 m²/EFFICIENCY UNIT, 20 m²/1B UNIT, 35 m²/2B or more UNIT

BUILDING C(31 STORIES)

UNIT BREAKDOWN	BACHELOR (400-450sf)	1BED (450-529sf)	1BED+D (530-625sf)	2BED (625-750sf)	2BED+D (751-900sf)	3BED (900-1100sf)	NO. OF LEVELS	TOTAL
GROUND	0	0	0	0	0	0	1	0
LEVEL 2	1	2	6	4	1	0	1	14
LEVEL 3	1	2	6	5	1	0	1	15
LEVELS 4 - 6	1	2	6	5	1	0	3	45
LEVEL 7	1	3	1	3	1	0	1	9
LEVELS 8 - 31	0	5	3	4	0	0	24	288
TOTAL	6	133	103	123	6	0	31	371
PROVIDED %	2%	36%	28%	33%	2%	0%		100%
		65%		35%				
NO OF BARRIER FREE UNITS REQUIRED	0.9	35.1		19.35		0		
AMENITY AREA* (m²/UNIT)	90	4720		4515				9,325

*15 m²/EFFICIENCY UNIT, 20 m²/1B UNIT, 35 m²/2B or more UNIT

TOTAL UNITS (BUILDING A+B+C): 1,165

UNIT BREAKDOWN	BACHELOR	1B	1B+D	2B	2B+D	3B	TOTAL
TOTAL	6	312	459	337	51	0	1,165
PROVIDE %	0.5%	26.8%	39.4%	28.9%	4.4%	0.0%	100%

6 A100 UNIT BREAKDOWN REF.

PARKING PROVIDED (RESIDENTIAL+VISITOR)	REGULAR PARKING	BARRIER FREE PARKING TYPE A	BARRIER FREE PARKING TYPE B	TANDEM	TOTAL
P-6 PARKING	76	1	0	5	82
P-5 PARKING	207	6	0	5	218
P-4 PARKING	207	6	0	5	218
P-3 PARKING	207	6	0	5	218
P-2 PARKING	203	6	1	5	215
P-1 PARKING	175	5	0	0	180
GROUND	0	0	0	0	0
TOTAL PARKING PROVIDED	1075	31		25	1131

PARKING REQUIRED (RESIDENTIAL + VISITOR)	
RESIDENTIAL PARKING AT .89	1037
VISITOR PARKING AT .08	93
TOTAL PARKING REQUIRED AT .97	1130

PARKING (COMMERCIAL)	REGULAR PARKING	BARRIER FREE PARKING TYPE A	BARRIER FREE PARKING TYPE B	TOTAL
GROUND(OUTDOOR)	5	1	0	6
TOTAL PARKING PROVIDED	5	1		6

PARKING DEMARCATION - STUDY - PHASING

PARKING PER PHASE	PHASE 1 (BUILDING A)	PHASE 2 (BUILDING B)	PHASE 3 (BUILDING C)	TOTAL PER FLR
P-6 PARKING	82	0	0	82
P-5 PARKING	73	72	73	218
P-4 PARKING	73	72	73	218
P-3 PARKING	73	72	73	218
P-2 PARKING	71	72	72	215
P-1 PARKING	62	56	79	180
GROUND (COMMERCIAL)	6	0	0	6
TOTAL PROVIDED	458	346	391	1193

RESIDENTIAL + VISITOR PARKING PER PHASE REQUIREMENT		PHASE 1 (BUILDING A)	PHASE 2 (BUILDING B)	PHASE 3 (BUILDING C)
RESIDENTIAL	0.89	388	319	330
VISITOR	0.08	35	28	30
TOTAL REQUIREMENT		423	347	360

CITY RECOMMENDED BICYCLE PARKING STANDARDS (INTENSIFICATION AREAS)	UNITS/GFA	MINIMUM RATE	MINIMUM REQUIREMENT (spaces)
APARTMENT UNITS	1165 units	LONG-TERM: 0.5 spaces/unit	583
		SHORT-TERM: 0.05 spaces/unit	58
RETAIL	495 sq.m.	LONG-TERM: 2 spaces + 1 space / 1000 sq.m. GFA	3
		SHORT-TERM: 3 spaces + 1 space / 1000 sq.m. GFA	4
TOTAL		LONG-TERM	586
		SHORT TERM	62
		TOTAL	648

BIKE PARKING		RESIDENTIAL LONG-TERM		RES. SHORT-TERM (OUTDOOR)	COMMERCIAL LONG-TERM	COMMERCIAL SHORT-TERM	TOTAL
PHASE 1 (BUILDING A)	PROVIDED	GROUND: 78, UNDERGROUND: 144	222	22			
	REQUIRED	218		22			
PHASE 2 (BUILDING B)	PROVIDED	GROUND: 36, UNDERGROUND: 154	190	20	5	5	
	REQUIRED	170		18	2	2	
PHASE 3 (BUILDING C)	PROVIDED	GROUND: 64, UNDERGROUND: 122	186	20	4	4	
	REQUIRED	186		19	1	2	
TOTAL	PROVIDED	598		62	9	9	670
	REQUIRED	583		58	7		648

5 A100 PARKING & BIKE PARKING STATISTICS REF.

AMENITY SPACE	AMENITY (*15 m²/EFFICIENCY UNIT, 20 m²/1B UNIT, 35 m²/2B or more UNIT)						
BUILDING A	INDOOR AMENITY	OUTDOOR AMENITY	BALCONY & TERRACE	PARK AREA	RETAIL PLAZA	TOTAL	RATIO PER UNIT
PROVIDED	545	391	5172	1259	0	7367	16.90
REQUIRED						10940	
BUILDING B							
PROVIDED	464	403	4442	0	216	5525	15.43
REQUIRED						8825	
BUILDING C							
PROVIDED	300	498	4263	0	216	5277	14.22
REQUIRED						9325	
A+B+C	1309	1292	13877	1259	432	18169	
TOTAL REQUIRED						29090	
TOTAL PROVIDED						18169	15.60

4 A100 AMENITY STATISTICS REF.

ARCHITECTURAL DRAWING LIST

DRAWING NO.	TITLE	CONSULTANT
SCHEDULES		
A001	TITLE	CORE
A100	STATISTICS & ZONING	CORE
A100a	STATISTICS & ZONING - PHASE 1, 2 & 3	CORE
A101	CONTEXT PLAN	CORE
A102	PHASING DIAGRAM	CORE
A103	SITE PLAN	CORE
A103a	SITE PLAN - PHASE 1	CORE
A103b	SITE PLAN - PHASE 2	CORE
A103c	SITE PLAN - PHASE 3	CORE
A104	SURVEY PLAN	
PLANS		
A200	PARKING LEVEL 6	CORE
A201	PARKING LEVELS 3-5	CORE
A202	PARKING LEVEL 2	CORE
A203	PARKING LEVEL 1	CORE
A204	GROUND LEVEL	CORE
A205	LEVEL 2	CORE
A206	LEVEL 3	CORE
A207	LEVEL 4-6	CORE
A208	LEVEL 7	CORE
A209	LEVEL 8-12	CORE
A210	LEVEL 13	CORE
A211	TYPICAL TOWER	CORE
A212	MECHANICAL PENTHOUSE	CORE
A213	ROOF PLAN	CORE
ELEVATIONS / SECTIONS		
A400	SOUTH ELEVATION	CORE
A401	EAST ELEVATION	CORE
A402	NORTH ELEVATION	CORE
A403	WEST ELEVATION	CORE
A410	BUILDING SECTION 1	CORE
A411	BUILDING SECTION 2	CORE
A412	BUILDING SECTION 3	CORE
A413	RAMP DETAILS	CORE
PERSPECTIVES		
A600	BUILDING PERSPECTIVE	CORE
A601	BUILDING PERSPECTIVE	CORE
A602	BUILDING PERSPECTIVE	CORE
A603	RETAIL PLAZA PERSPECTIVE	CORE
A604	RETAIL PLAZA PERSPECTIVE	CORE

NOTE: SHADOW STUDY AT SEPARATE PACKAGE

1 A100 DRAWING LIST REF.

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	05 JUNE 2023
02	RE-ISSUED FOR OPA/ZBA	10 FEBRUARY 2023
01	ISSUED FOR OPA/ZBA	07 OCTOBER 2021

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1120 COOKE BLVD

PHASE 2
BURLINGTON ONTARIO

Drawn: TA
Scale: N.T.S.
Checked: DL
Date: 05 JUNE 2023
Title: STATISTICS & ZONING
Project No. 20-129
Drawing No. A100

PHASE 01 - BLDG A

BUILDING A	PERCENTAGE	m	ft²	m²	RATIO
NET SITE AREA			39,570.38	3,676.19	
LOT COVERAGE	43%				
FSI (TOTAL GFA/SITE AREA)					8.2

LEVELS (ABOVE GRADE)	FLOOR PLATE		No. OF FLOORS	GFA	
BUILDING A	ft²	m²		ft²	m²
GROUND	16,968	1,576	1	16,968	1,576
LEVELS 2-3	12,283	1,141	2	24,565	2,282
LEVELS 4-12	11,283	1,141	9	110,543	10,270
LEVEL 13	8,073	750	1	8,073	750
LEVELS 14-33	8,073	750	20	161,459	15,000
MECH. PH.	4,826	448	1	4,826	448
TOTAL RESIDENTIAL (ABOVE GRADE)			34	326,433	30,326

LEVELS (BELOW GRADE)	FLOOR PLATE		No. OF FLOORS	GFA	
	ft²	m²		ft²	m²
PARKING LEVEL P4	40,084	3,724	1	40,084	3,724
PARKING LEVEL P3	37,894	3,520	3	113,682	10,561
PARKING LEVEL P2	37,894	3,520	1	37,894	3,520
PARKING LEVEL 1	37,894	3,520	1	37,894	3,520
TOTAL RESIDENTIAL (ABOVE GRADE)			6	229,554	21,325

UNIT BREAKDOWN	BACHELOR	1BED	1BED+D	2BED	2BED+D	No. of Floors	TOTAL
BUILDING A	(400-450 SF)	(450-529 SF)	(530-624 SF)	(625-750 SF)	(751-899 SF)		
GROUND	0	0	0	0	0	1	0
LEVELS 2-3	0	3	8	5	1	2	34
LEVELS 4-12	0	3	8	5	1	9	153
LEVEL 13	0	1	4	2	0	1	9
LEVELS 14-33	0	4	4	4	0	20	240
TOTAL	0	116	172	137	11	33	436

AMENITY AREAS (*15 m²/EFFICIENCY UNIT, 20 m²/1B UNIT, 35 m²/2B or more UNIT)							
AMENITY REQUIRED - PHASE 01	BACHELOR	1BED	1BED+D	2BED	2BED+D		TOTAL
TOTAL	0	116	172	137	11		436
REQUIRED	0	5760		5,180			10,940

AMENITY PROVIDED - PHASE 01	INDOOR	OUTDOOR	BALCONY & TER.	PARK	RETAIL PLAZA		TOTAL
BUILDING A	545	391	5,172	1,259			7,367

BARRIER FREE UNITS			
	BACHELOR/1BED/1BED+D	2 BED/2BED+D	TOTAL
BARRIER FREE UNITS - REQUIRED (15%)	43	22	65.40
BARRIER FREE UNITS - PROPOSED	43	22	65
PERCENTAGE PROPOSED	15%	15%	

VEHICULAR PARKING - REQUIRED				
BUILDING A	RATIO	TYPICAL	BARRIER FREE	
RESIDENTIAL	0.89	388	(2SP+2%)	10
VISITOR /RETAIL	0.08	35	4%	1
TOTAL		423	11	423 *incl. B.F. parking

VEHICULAR PARKING - PROPOSED				
BUILDING A	RATIO	TYPICAL	BARRIER FREE	
RESIDENTIAL	0.89	389	(2SP+2%)	10
VISITOR /RETAIL	0.08	35	4%	1
TOTAL		424	11	424 *incl. B.F. parking **as boundary 1 carries P4/2

BICYCLE PARKING - REQUIRED					
	RESIDENTIAL LONG TERM (0.5/UNIT)	RESIDENTIAL SHORT TERM (0.05/UNIT)	RETAIL (LONG-TERM) 3+1 space/ 1000sq.m.	RETAIL (SHORT-TERM) 3+1 space/ 1000sq.m.	
BUILDING A	218	22	0	0	240

BICYCLE PARKING - PROPOSED					
	RESIDENTIAL LONG TERM	RESIDENTIAL SHORT TERM	RETAIL (LONG TERM)	RETAIL (SHORT TERM)	
BUILDING A	220	22	0	0	242

LOCKERS - PROVIDED			
BUILDING A (ABOVE GRADE)	NO. OF LOCKERS	NO. OF LEVELS	TOTAL
LEVEL 2-6	5	5	25
LEVEL 7	5	1	5
LEVEL 8-32	5	5	25
BUILDING A (BELOW GRADE)			
PARKING LEVEL P1	0	1	0
PARKING LEVEL P2	0	1	0
PARKING LEVEL P3-P4	82	3	246
PARKING LEVEL P5	79	1	79
TOTAL			380

1 STATISTICS - PHASE 1

PHASE 02 - BLDG B

BUILDING B	PERCENTAGE	m	ft²	m²	RATIO
NET SITE AREA			29,983.00	2,729.78	
LOT COVERAGE	54%				
FSI (TOTAL GFA/SITE AREA)					9.9

LEVELS (ABOVE GRADE)	FLOOR PLATE		No. OF FLOORS	GFA	
BUILDING B	ft²	m²		ft²	m²
GROUND	15,812	1,468	1	15,812	1,468
LEVELS 2-3	12,810	1,171	2	25,620	2,343
LEVELS 4-8	12,080	1,121	5	60,400	5,605
LEVEL 9	8,068	758	1	8,068	750
LEVELS 10-29	8,068	758	20	172,408	16,000
MECH. PH.	4,859	452	1	4,859	452
TOTAL RESIDENTIAL (ABOVE GRADE)			30	289,306	26,818

LEVELS (BELOW GRADE)	FLOOR PLATE		No. OF FLOORS	GFA	
	ft²	m²		ft²	m²
PARKING LEVEL P4	0	0	1	0	0
PARKING LEVEL P3	28,352	2,634	3	85,056	7,902
PARKING LEVEL P2	28,352	2,634	1	28,352	2,634
PARKING LEVEL 1	28,352	2,634	1	28,352	2,634
TOTAL RESIDENTIAL (ABOVE GRADE)			6	141,761	13,170

UNIT BREAKDOWN	BACHELOR	1BED	1BED+D	2BED	2BED+D	No. of Floors	TOTAL
BUILDING B	(400-450 SF)	(450-529 SF)	(530-624 SF)	(625-750 SF)	(751-899 SF)		
GROUND	0	0	0	0	0	1	0
LEVELS 2-3	0	4	10	1	3	2	36
LEVELS 4-8	0	3	9	2	2	5	45
LEVEL 9	0	1	5	3	0	1	10
LEVELS 10-29	0	3	9	3	1	20	260
TOTAL	0	61	184	77	34	29	356

AMENITY AREAS (*15 m²/EFFICIENCY UNIT, 20 m²/1B UNIT, 35 m²/2B or more UNIT)							
AMENITY REQUIRED - PHASE 02	BACHELOR	1BED	1BED+D	2BED	2BED+D		TOTAL
TOTAL	0	61	184	77	34		356
BUILDING B	0	4940		3,885			8,825

AMENITY PROVIDED - PHASE 02	INDOOR	OUTDOOR	BALCONY & TER.	PARK	RETAIL PLAZA		TOTAL
BUILDING B	464	403	4,442	-	216		5,525

BARRIER FREE UNITS			
	BACHELOR/1BED/1BED+D	2 BED/2BED+D	TOTAL
BARRIER FREE UNITS - REQUIRED (15%)	37	17	53.70
BARRIER FREE UNITS - PROPOSED	37	17	54
PERCENTAGE PROPOSED	15%	15%	

VEHICULAR PARKING - REQUIRED				
BUILDING B	RATIO	TYPICAL	BARRIER FREE	
RESIDENTIAL	0.89	319	(2SP+2%)	8
VISITOR /RETAIL	0.08	29	4%	1
TOTAL		347	9	347 *incl. B.F. parking

VEHICULAR PARKING - PROPOSED				
BUILDING B	RATIO	TYPICAL	BARRIER FREE	
RESIDENTIAL	0.89	317	(2SP+2%)	8
VISITOR /RETAIL	0.08	29	4%	1
TOTAL		346	9	346 *incl. B.F. parking. *to add 1 slot from P4/2

BICYCLE PARKING - REQUIRED					
	RESIDENTIAL LONG TERM (0.5/UNIT)	RESIDENTIAL SHORT TERM (0.05/UNIT)	RETAIL (LONG-TERM) 3+1 space/ 1000sq.m.	RETAIL (SHORT-TERM) 3+1 space/ 1000sq.m.	
BUILDING B	173	14	2	2	201

BICYCLE PARKING - PROPOSED					
	RESIDENTIAL LONG TERM	RESIDENTIAL SHORT TERM	RETAIL (LONG TERM)	RETAIL (SHORT TERM)	
BUILDING B	190	26	4	5	220

LOCKERS - PROVIDED			
BUILDING B (ABOVE GRADE)	NO. OF LOCKERS	NO. OF LEVELS	TOTAL
LEVEL 2-6	11	5	55
LEVEL 7	0		0
LEVEL 8-32	0	5	0
BUILDING B (BELOW GRADE)			
PARKING LEVEL P1	0	-	0
PARKING LEVEL P2	0	-	0
PARKING LEVEL P3-P5	0	3	27
PARKING LEVEL P6	0	-	0
TOTAL			82

2 STATISTICS - PHASE 2

PHASE 03 - BLDG C

BUILDING C	PERCENTAGE	m	ft²	m²	RATIO
NET SITE AREA			33,678.32	3128.73	
LOT COVERAGE	38%				
FSI (TOTAL GFA/SITE AREA)					8.3

LEVELS (ABOVE GRADE)	FLOOR PLATE		No. OF FLOORS	GFA	
BUILDING C	ft²	m²		ft²	m²
GROUND	12,925	1,201	1	12,925	1,201
LEVELS 2	10,802	1,004	1	10,802	1,004
LEVELS 3	10,802	1,004	1	10,802	1,004
LEVELS 4-6	10,802	1,004	3	32,406	3,013
LEVEL 7	8,068	750	1	8,068	750
LEVELS 8-31	8,068	750	24	193,631	17,989
MECH. PH.	4,859	451	1	4,859	451
TOTAL RESIDENTIAL (ABOVE GRADE)			32	273,497	25,409

LEVELS (BELOW GRADE)	FLOOR PLATE		No. OF FLOORS	GFA	
	m²	m²		ft²	m²
PARKING LEVEL 6	0	0	1	0	0
PARKING LEVEL P5	32,568	3,026	3	97,705	9,077
PARKING LEVEL P2	32,568	3,026	1	32,568	3,026
PARKING LEVEL 1	32,568	3,026	1	32,568	3,026
TOTAL RESIDENTIAL (ABOVE GRADE)			6	162,810	15,128

UNIT BREAKDOWN	BACHELOR	1BED	1BED+D	2BED	2BED+D	No. of Floors	TOTAL
BUILDING C	(400-450 SF)	(450-525 SF)	(530-624 SF)	(625-750 SF)	(751-899 SF)		
GROUND	0	0	0	0	0	1	0
LEVELS 2	1	2	6	4	1	1	14
LEVELS 3	1	2	6	5	1	1	15
LEVELS 4-6	1	2	6	1	1	3	45
LEVEL 7	1	3	1	3	1	1	9
LEVELS 8-31	6	1	3	0	0	24	288
TOTAL	9	133	103	123	9	31	371

AMENITY AREAS (*15 m²/EFFICIENCY UNIT, 20 m²/1B UNIT, 35 m²/2B or more UNIT)							
AMENITY REQUIRED - PHASE 03	BACHELOR	1BED	1BED+D	2BED	2BED+D		TOTAL
TOTAL	9	133	103	123	9		371
REQUIRED	90	4,720		4,515			9,325

AMENITY PROVIDED - PHASE 03	INDOOR	OUTDOOR	BALCONY & TEL.	PARK	RETAIL PLAZA		TOTAL
BUILDING C	300	498	4,213	-	216		5,277

BARRIER FREE UNITS			
	BACHELOR/1BED/1BED+D	2 BED/2BED+D	TOTAL
BARRIER FREE UNITS - REQUIRED (15%)	36	19	54.60
BARRIER FREE UNITS - PROPOSED	36	19	55
PERCENTAGE PROPOSED	15%	15%	

VEHICULAR PARKING - REQUIRED				
BUILDING C	RATIO	TYPICAL	BARRIER FREE	
RESIDENTIAL	0.85	330	(2SP+2%)	9
VISITOR /RETAIL	0.08	30	4%	1
TOTAL		360	10	360 *incl. B.F. parking

VEHICULAR PARKING - PROPOSED				
BUILDING C	RATIO	TYPICAL	BARRIER FREE	
RESIDENTIAL	0.87	331	(2SP+3%)	10
VISITOR /RETAIL	0.03	30	1%	1
TOTAL		361	11	361 *incl. B.F. parking

BICYCLE PARKING - REQUIRED					
	RESIDENTIAL LONG TERM (0.5/UNIT)	RESIDENTIAL SHORT TERM (0.05/UNIT)	RETAIL (LONG-TERM) 3+1 space/ 1000sq.m.	RETAIL (SHORT-TERM) 3+1 space/ 1000sq.m.	
BUILDING C	190	14	1	2	207

BICYCLE PARKING - PROPOSED					
	RESIDENTIAL LONG-TERM	RESIDENTIAL SHORT-TERM	RETAIL (LONG-TERM)	RETAIL (SHORT-TERM)	
BUILDING C	188	20	4	4	214

LOCKERS - PROVIDED			
BUILDING C (ABOVE GRADE)	NO. OF LOCKERS	NO. OF LEVELS	TOTAL
LEVEL 2-6	6	5	30
LEVEL 7	0	1	0
LEVEL 8-31	6	5	0
BUILDING C (BELOW GRADE)			
PARKING LEVEL P1	0	1	0
PARKING LEVEL P2	28	1	28
PARKING LEVEL P3-P5	44	3	132
PARKING LEVEL P6	0	1	0
TOTAL			202

3 STATISTICS - PHASE 3

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	05 JUNE 2023
02	RE-ISSUED FOR DP/ALDA	07 FEBRUARY 2023
01	ISSUED FOR DP/ALDA	27 OCTOBER 2021

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COREARCHITECTS
[illegible]
T +1 [illegible] F +1 [illegible]
[illegible]
WWW.[illegible]

1120 COOKE BLVD

PHASE 2
BURLINGTON ONTARIO

Drawn	Scale
TA	N.T.S.
Checked	Date
DL	05 JUNE 2023

Title: STATISTICS & ZONING

Project No.: 20-129

Drawing No.: A100



CONTEXT PLAN

LEGEND

HATCH DENOTES EXISTING PHASE 1

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	05 JUNE 2023
02	RE-ISSUED FOR CP/AZBA	07 FEBRUARY 2023
01	ISSUED FOR CP/AZBA	31 OCTOBER 2021

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COREARCHITECTS

1120 COOKE BLVD

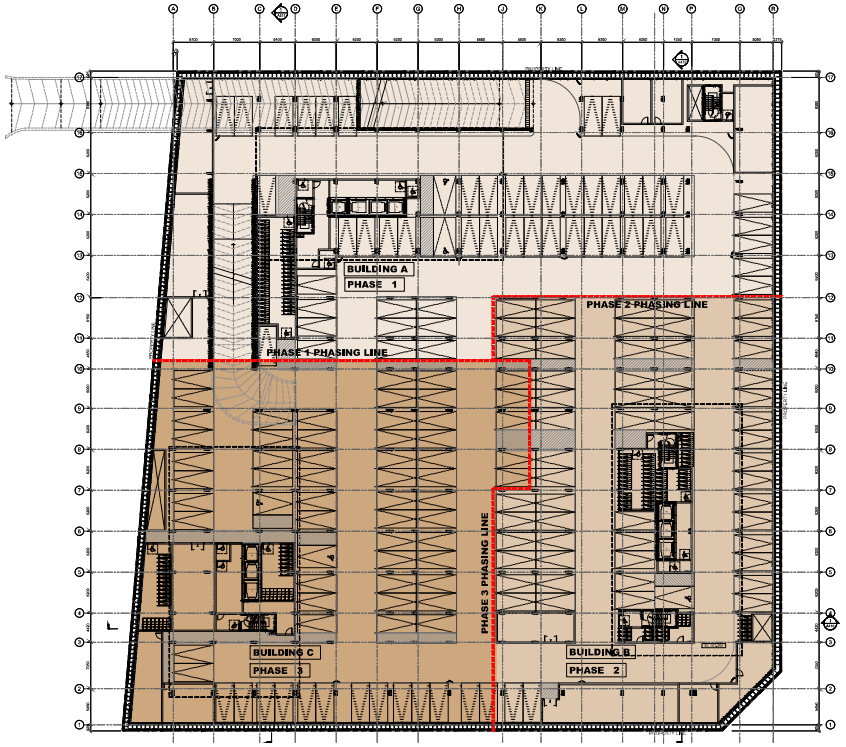
PHASE 2

BURLINGTON, ONTARIO

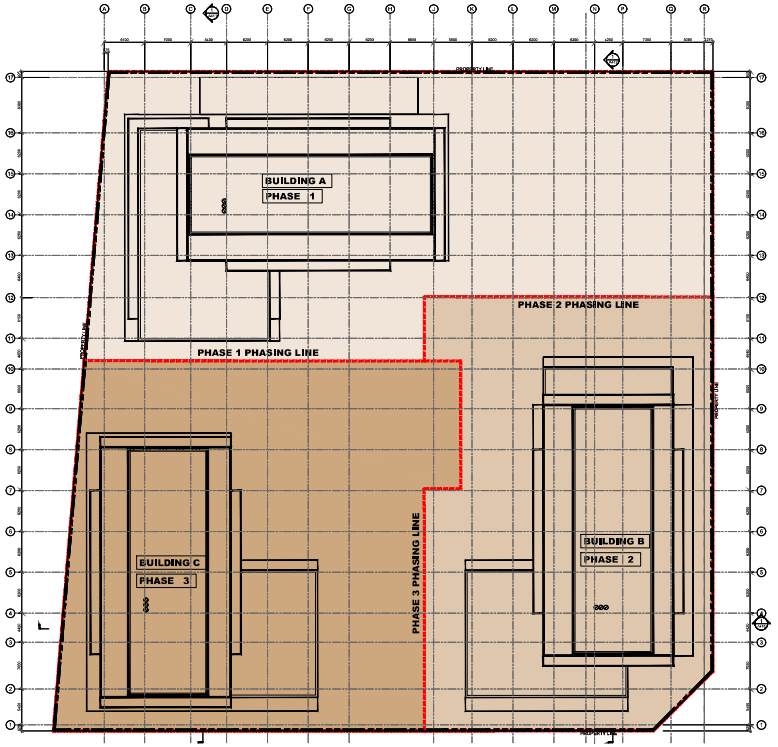
Drawn: CW	Scale: N.T.S.
Checked: DL	Date: 05 JUNE 2023

Title: CONTEXT PLAN

Project No.: 20-129	Drawing No.: A101



2 PHASING DIAGRAM BELOW GRADE



1 PHASING DIAGRAM ABOVE GRADE

LEGEND

HATCH DENOTES PHASE 1

HATCH DENOTES PHASE 2

HATCH DENOTES PHASE 3

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	05 JUNE 2023
02	RE-ISSUED FOR DP/ALDBA	07 FEBRUARY 2023
01	ISSUED FOR DP/ALDBA	31 OCTOBER 2022

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COREARCHITECTS

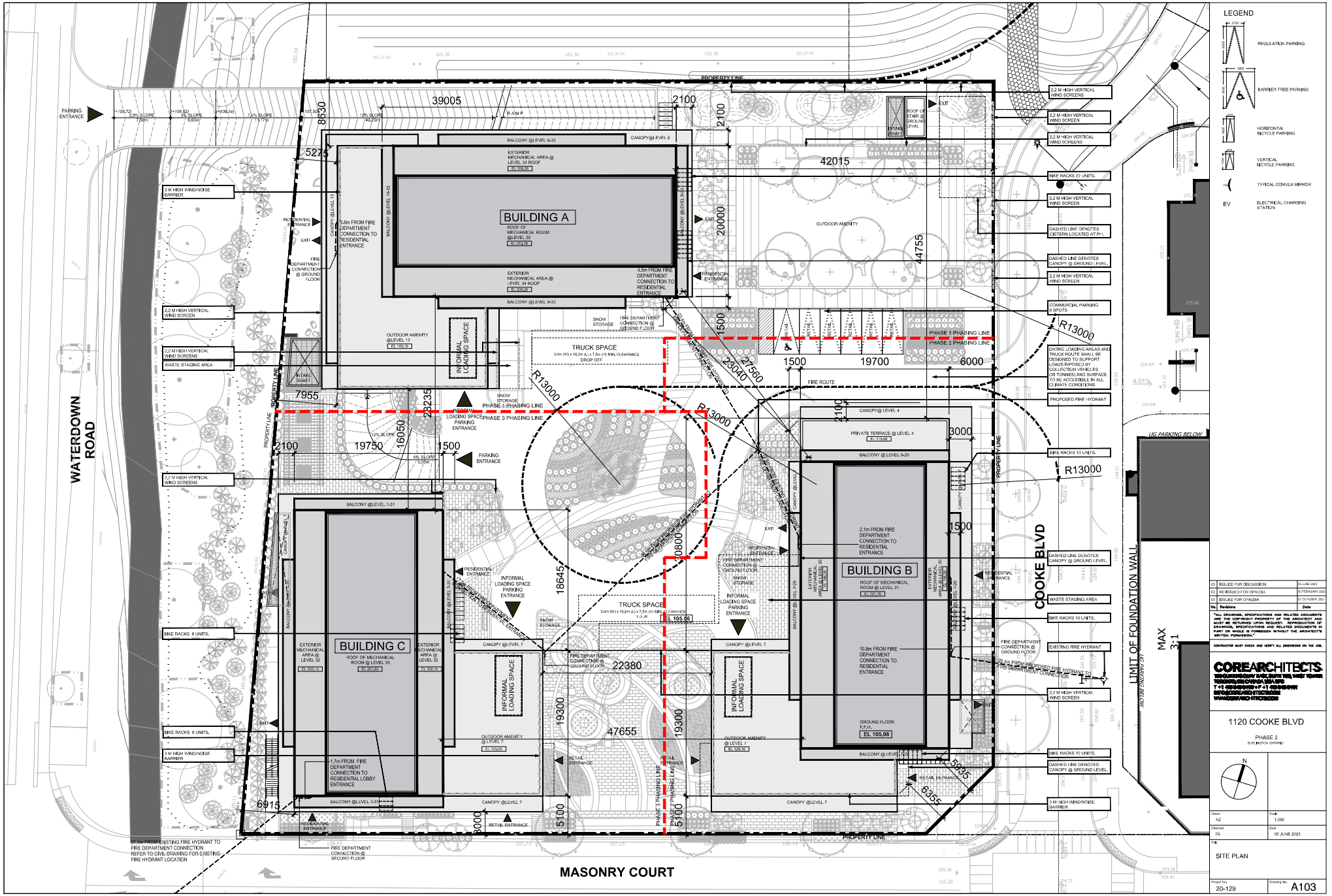
1120 COOKE BLVD

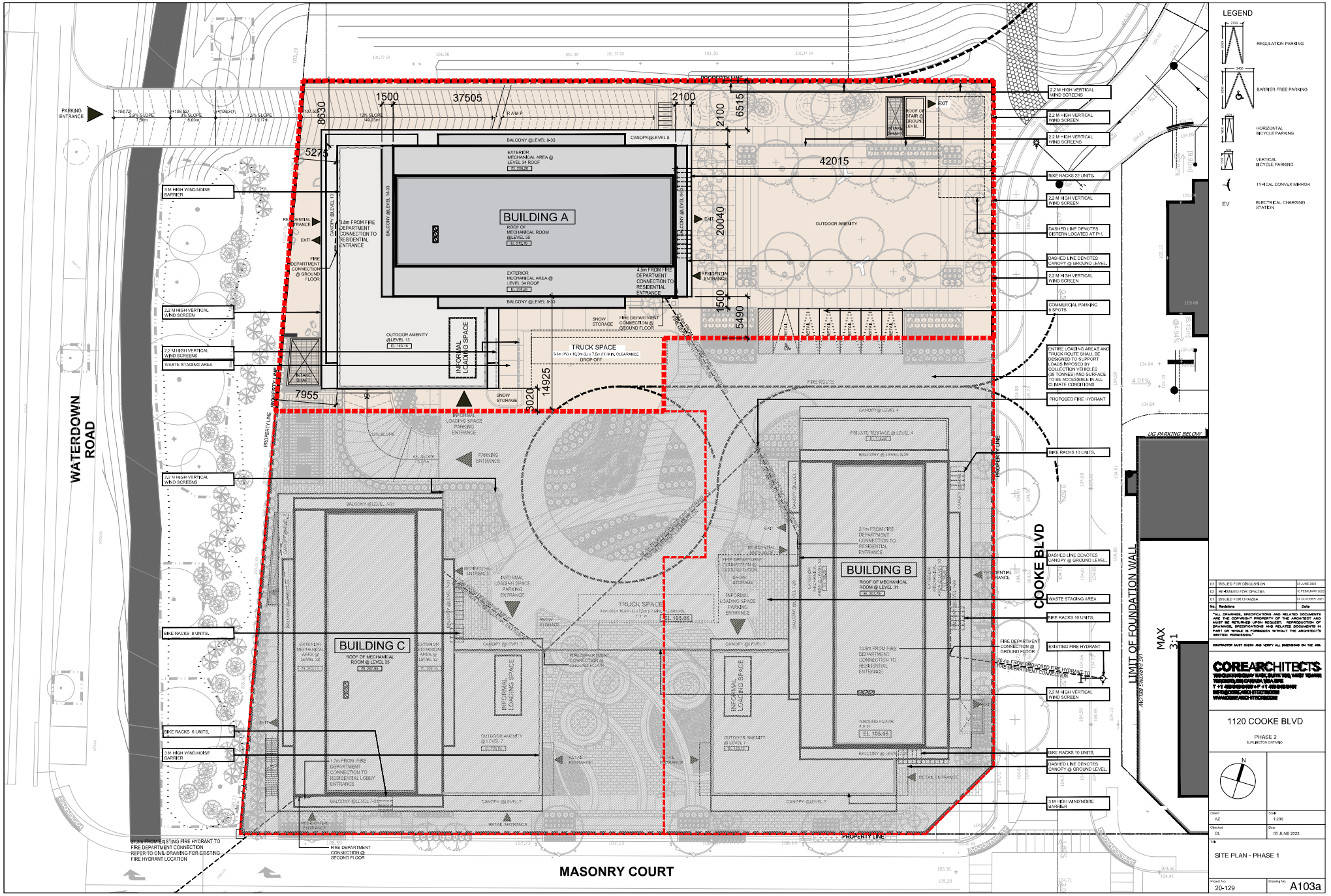
PHASE 2

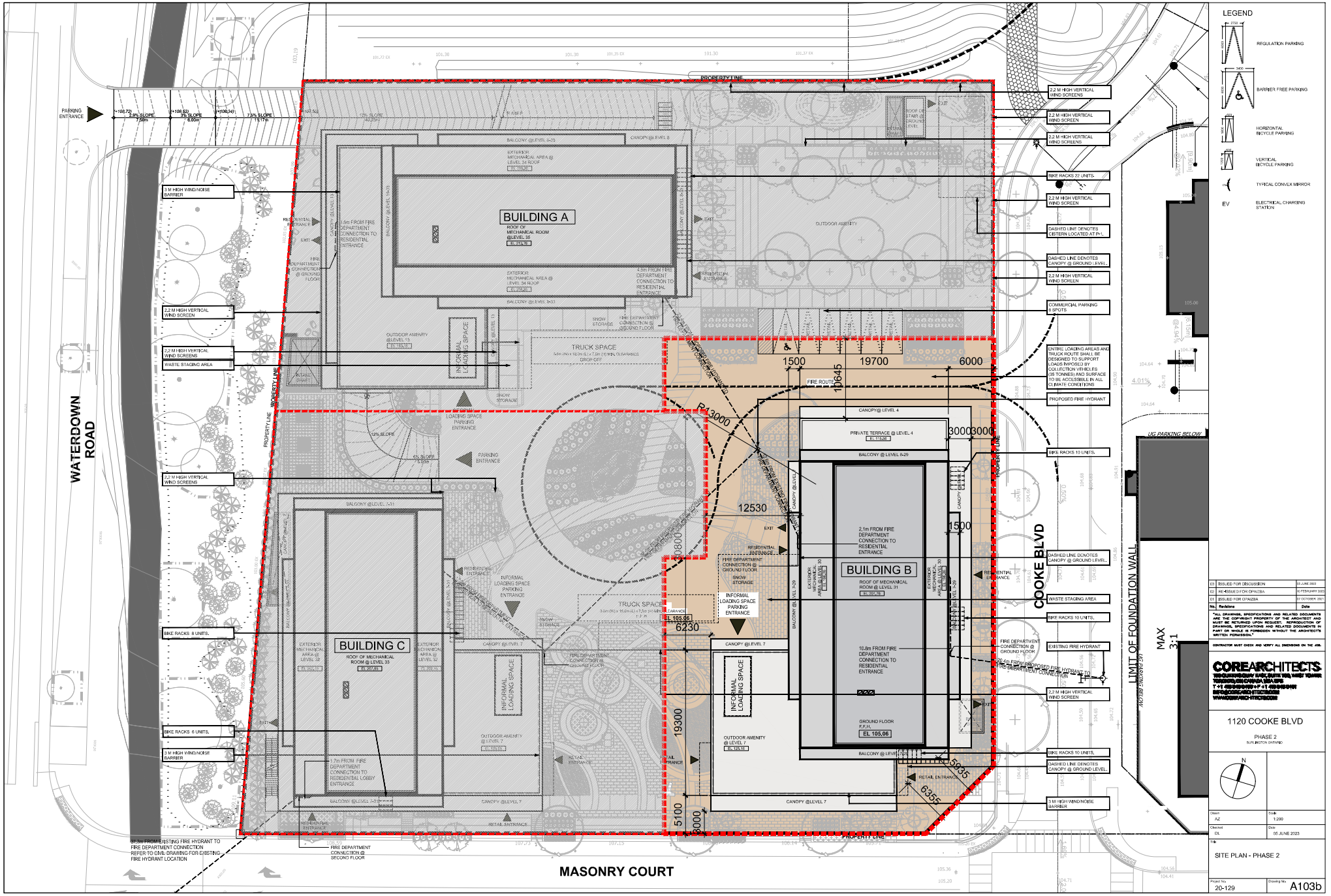
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Checked: DL	Date: 05 JUNE 2023

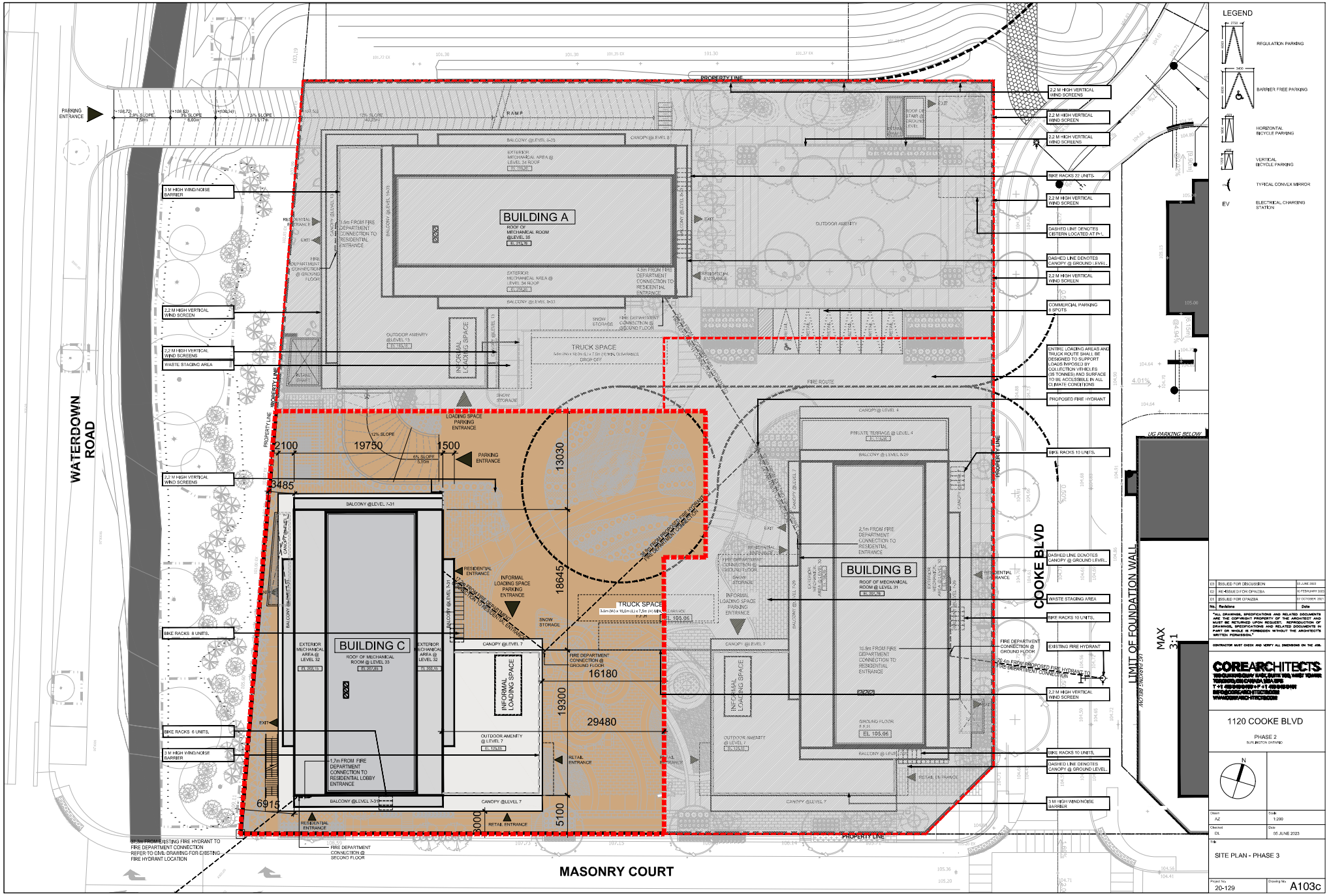
Title: PHASING DIAGRAM

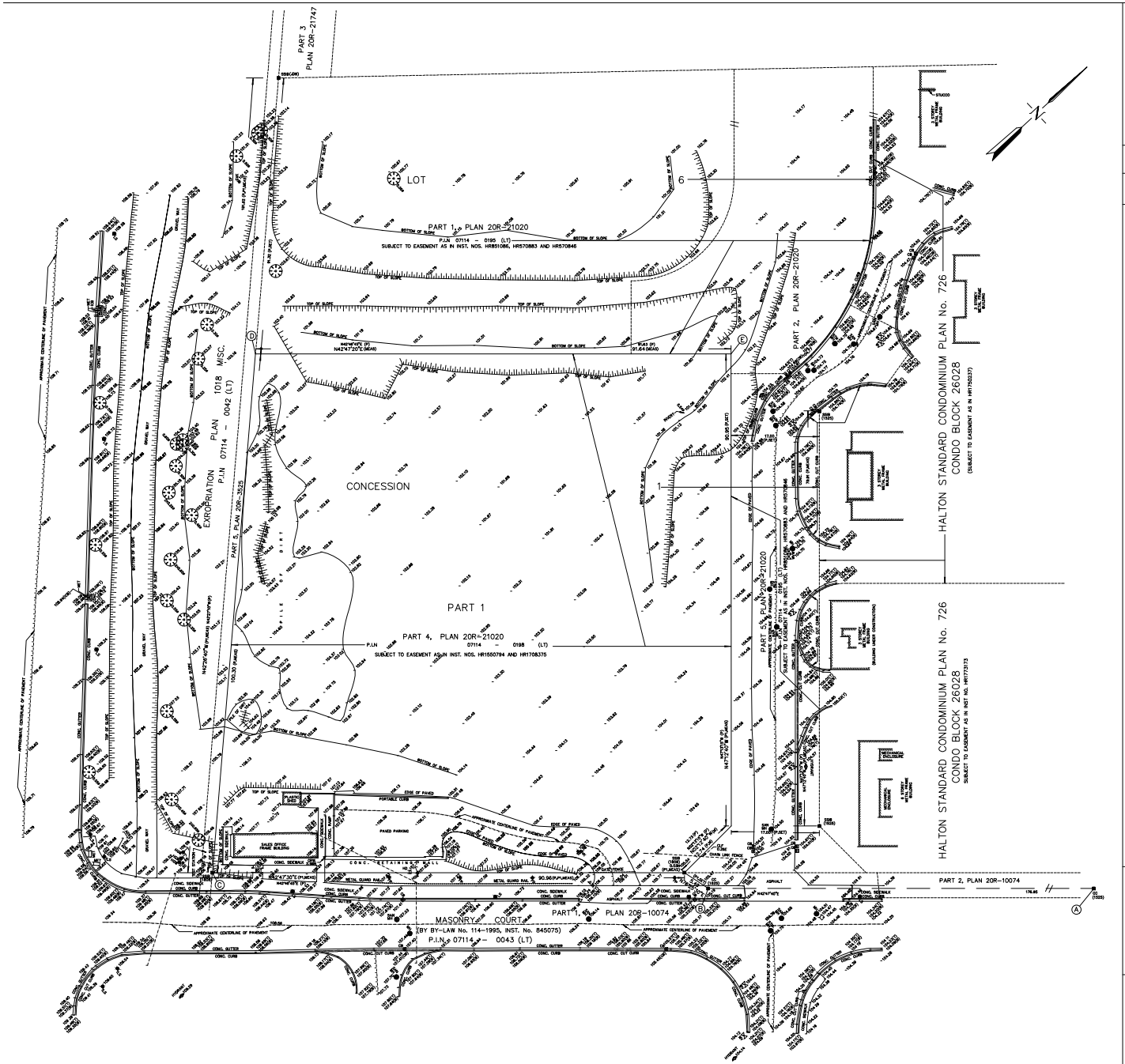
Project No.:	Drawing No.:
20-129	A102


LEGEND
REGULATION PARKING
BARRIER FREE PARKING
HORIZONTAL BICYCLE PARKING
VERTICAL BICYCLE PARKING
TYPICAL CONVEX MIRROR
EV ELECTRICAL CHARGING STATION
BUILDING A
BUILDING B
BUILDING C
WATERDOWN ROAD
COOKE BLVD
MASONRY COURT
LIMIT OF FOUNDATION WALL
MAX 3:1
PROPERTY LINE
PARKING ENTRANCE
TRUCK SPACE
INFORMAL LOADING SPACE
PHASE 1 PHASING LINE
PHASE 2 PHASING LINE
PHASE 3 PHASING LINE
FIRE ROUTE
OUTDOOR AMENITY
BIKE RACKS 22 UNITS.
BIKE RACKS 10 UNITS.
BIKE RACKS 8 UNITS.
BIKE RACKS 6 UNITS.
WASTE STAGING AREA
COMMERCIAL PARKING 8 SPOTS
PROPOSED FIRE HYDRANT
EXISTING FIRE HYDRANT
UG PARKING BELOW
1120 COOKE BLVD
PHASE 2
SITE PLAN
A103
20-129
1:200
05 JUNE 2023


LEGEND
REGULATION PARKING
BARRIER FREE PARKING
HORIZONTAL BICYCLE PARKING
VERTICAL BICYCLE PARKING
TYPICAL CONVEX MIRROR
EV ELECTRICAL CHARGING STATION
BUILDING A
BUILDING B
BUILDING C
OUTDOOR AMENITY
TRUCK SPACE
INFORMAL LOADING SPACE
WATERDOWN ROAD
COOKE BLVD
MASONRY COURT
LIMIT OF FOUNDATION WALL
PROPERTY LINE
1120 COOKE BLVD
PHASE 2
SITE PLAN - PHASE 1
A103a


LEGEND
REGULATION PARKING
BARRIER FREE PARKING
HORIZONTAL BICYCLE PARKING
VERTICAL BICYCLE PARKING
TYPICAL CONVEX MIRROR
EV ELECTRICAL CHARGING STATION
BUILDING A
BUILDING B
BUILDING C
WATERDOWN ROAD
COOKE BLVD
MASONRY COURT
PROPERTY LINE
PARKING ENTRANCE
TRUCK SPACE
INFORMAL LOADING SPACE
LOADING SPACE PARKING ENTRANCE
OUTDOOR AMENITY
WASTE STAGING AREA
BIKE RACKS 22 UNITS.
BIKE RACKS 10 UNITS.
BIKE RACKS 8 UNITS.
BIKE RACKS 6 UNITS.
COMMERCIAL PARKING 8 SPOTS
PROPOSED FIRE HYDRANT
EXISTING FIRE HYDRANT
3 M HIGH WIND/NOISE BARRIER
2.2 M HIGH VERTICAL WIND SCREEN
DASHED LINE DENOTES CANOPY @ GROUND LEVEL
DASHED LINE DENOTES CISTERN LOCATED AT P-1
ENTIRE LOADING AREAS AND TRUCK ROUTE SHALL BE DESIGNED TO SUPPORT LOADS IMPOSED BY COLLECTION VEHICLES (35 TONNES) AND SURFACE TO BE ACCESSIBLE IN ALL CLIMATE CONDITIONS
UG PARKING BELOW
LIMIT OF FOUNDATION WALL
MAX 3:1
1500
19700
6000
10645
R13000
3000
12530
6230
19300
5100
6000
5935
6355
01 ISSUED FOR DISCUSSION 02 JUNE 2023
02 RE-ISSUED FOR CPA/ZBA 10 FEBRUARY 2023
01 ISSUED FOR CPA/ZBA 31 OCTOBER 2022
No. Revisions Date
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COREARCHITECTS
1120 COOKE BLVD
PHASE 2
SITE PLAN - PHASE 2
Drawn AZ
Scale 1:200
Checked DL
Date 05 JUNE 2023
Project No. 20-129
Drawing No. A103b


LEGEND
REGULATION PARKING
BARRIER FREE PARKING
HORIZONTAL BICYCLE PARKING
VERTICAL BICYCLE PARKING
TYPICAL CONVEX MIRROR
EV ELECTRICAL CHARGING STATION
WATERDOWN ROAD
COOKE BLVD
MASONRY COURT
PROPERTY LINE
PARKING ENTRANCE
RAMP
BUILDING A
ROOF OF MECHANICAL ROOM @LEVEL 35
BUILDING B
ROOF OF MECHANICAL ROOM @ LEVEL 31
BUILDING C
ROOF OF MECHANICAL ROOM @ LEVEL 33
TRUCK SPACE
INFORMAL LOADING SPACE
LOADING SPACE PARKING ENTRANCE
RESIDENTIAL ENTRANCE
RETAIL ENTRANCE
FIRE DEPARTMENT CONNECTION @ GROUND FLOOR
FIRE DEPARTMENT CONNECTION @ SECOND FLOOR
OUTDOOR AMENITY @ LEVEL 7
OUTDOOR AMENITY @LEVEL 13
BALCONY @LEVEL 7-31
CANOPY @LEVEL 7
CANOPY @ LEVEL 8
PRIVATE TERRACE @ LEVEL 4
BALCONY @ LEVEL 5-30
3 M HIGH WIND/NOISE BARRIER
2.2 M HIGH VERTICAL WIND SCREEN
2.2 M HIGH VERTICAL WIND SCREENS
WASTE STAGING AREA
BIKE RACKS 22 UNITS.
BIKE RACKS 8 UNITS.
BIKE RACKS 6 UNITS.
BIKE RACKS 10 UNITS.
DASHED LINE DENOTES CISTERN LOCATED AT P-1
DASHED LINE DENOTES CANOPY @ GROUND LEVEL.
COMMERCIAL PARKING 8 SPOTS
ENTIRE LOADING AREAS AND TRUCK ROUTE SHALL BE DESIGNED TO SUPPORT LOADS IMPOSED BY COLLECTION VEHICLES (35 TONNES) AND SURFACE TO BE ACCESSIBLE IN ALL CLIMATE CONDITIONS
PROPOSED FIRE HYDRANT
EXISTING FIRE HYDRANT
UG PARKING BELOW
LIMIT OF FOUNDATION WALL
MAX 3:1
12100
19750
1500
13030
18645
16180
19300
29480
5100
6915
3485
12% SLOPE
6% SLOPE
7.5% SLOPE
2.1m FROM FIRE DEPARTMENT CONNECTION TO RESIDENTIAL ENTRANCE
1.7m FROM FIRE DEPARTMENT CONNECTION TO RESIDENTIAL LOBBY ENTRANCE
10.9m FROM FIRE DEPARTMENT CONNECTION TO RESIDENTIAL ENTRANCE
24.4m FROM PROPOSED FIRE HYDRANT TO FIRE DEPARTMENT CONNECTION
45.0m FROM PROPOSED FIRE HYDRANT TO FIRE DEPARTMENT CONNECTION
45.0m FROM EXISTING FIRE HYDRANT TO FIRE DEPARTMENT CONNECTION - REFER TO CIVIL DRAWING FOR EXISTING FIRE HYDRANT LOCATION
FIRE ROUTE
SNOW STORAGE
01 ISSUED FOR DISCUSSION 02 JUNE 2023
02 RE-ISSUE D FOR CPADRA 07 FEBRUARY 2023
01 ISSUED FOR CPADRA 31 OCTOBER 2022
No. Revisions Date
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COREARCHITECTS
1120 COOKE BLVD
PHASE 2
SUN PHOTON ENTAND
N
Drawn AZ
Scale 1:200
Checked DL
Date 05 JUNE 2023
Title SITE PLAN - PHASE 3
Project No. 20-129
Drawing No. A103c



TOPOGRAPHICAL SURVEY OF

PART OF LOT 6
CONCESSION 1

(GEOGRAPHIC TOWNSHIP OF EAST FLAMBOROUGH)
CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON

SCALE 1 : 300

0m 4 3 2 1 0 5 10 15 20m

R. AVIS SURVEYING INC.

METRIC : DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

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NOTES AND LEGEND

BEARINGS SHOWN HEREON ARE GRID BEARINGS AND ARE OBSERVED REFERENCE POINTS A AND B HAVING A BEARING OF N42°47'40"E BY REAL TIME NETWORK (RTK) OBSERVATION, UTM ZONE 17, CENTRAL MERIDIAN 81° 00' WEST LONGITUDE, (6° UNIVERSAL TRANSVERSE MERCATOR PROJECTION, NAD 83 (CSRS-2010)

6° UTM ZONE 17 COORDINATES
NAD83(CSRS-2010) (CENTRAL MERIDIAN 81°00' WEST LONGITUDE)

DERIVED OBSERVED REFERENCE POINTS A AND B		
	NORTHING	EASTING
A	4795993.73	593012.39
B	4795863.89	592892.17
C	4795795.85	592825.04
D	4795869.66	592757.35
E	4796037.11	592819.60

(1) THE UTM COORDINATES LISTED ABOVE ARE TO AN URBAN ACCURACY, PER SUBSECTION 14(2) OF ONTARIO REGULATION 216/10 FILED UNDER THE SURVEYORS ACT
(2) THE UTM COORDINATES LISTED ABOVE ARE TO BE USED FOR GEOGRAPHIC INFORMATION SYSTEM INTEGRATION ONLY AND CANNOT BE USED TO RE-ESTABLISH THE PROPERTY CORNERS OR BOUNDARIES SHOWN HEREON

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO THE CITY OF BIRLINGTON BENCHMARK No. 00119231/2445, HAVING AN ELEVATION = 100.718 metres.

DISTANCES SHOWN HEREON ARE ADJUSTED GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.9997108.3.

■	DENOTES	SURVEY MONUMENT FOUND
□	DENOTES	SURVEY MONUMENT PLANTED
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
IB	DENOTES	IRON BAR
CC	DENOTES	CUT CROSS
CP	DENOTES	CONCRETE PIN
NI	DENOTES	NOT IDENTIFIABLE
WIT	DENOTES	WITNESS
MEAS/M	DENOTES	MEASURED
N,S,E,W	DENOTES	NORTH, SOUTH, EAST, WEST
P	DENOTES	PLAN 20R-21020
P1	DENOTES	PLAN 20R-21774
180B	DENOTES	J.H. GELBLOOM SURVEYING LIMITED, O.L.S.
JDB	DENOTES	J.D. BARNES LIMITED, O.L.S.
1525	DENOTES	R. AVIS SURVEYING INC. O.L.S.
ORP	DENOTES	OBSERVED REFERENCE POINTS
ADS	DENOTES	ADVERTISEMENT SIGN
B	DENOTES	BOTTOM OF CONCRETE CURB
BTS	DENOTES	BOTTOM OF STEP
CB	DENOTES	CATCH BASIN
CD	DENOTES	COMMUNICATION DUCT
CLF	DENOTES	CHAIN LINK FENCE
CONC/C	DENOTES	CONCRETE
CRW	DENOTES	CONCRETE RETAINING WALL
FH	DENOTES	FIRE HYDRANT
GI	DENOTES	GAS METER
GI	DENOTES	GAS LINE INDICATOR
HD	DENOTES	HYDRO DUCT
HGW	DENOTES	HYDRO GUY WIRE
GVK	DENOTES	GAS VALVE KEY
ICB	DENOTES	INLET CATCH BASIN
LS	DENOTES	LIGHT STANDARD
MET	DENOTES	METAL
OH	DENOTES	OVERHEAD WIRE
SMH	DENOTES	SANITARY MANHOLE
STMH	DENOTES	STORM MANHOLE
T	DENOTES	TOP OF CONCRETE CURB
TLS	DENOTES	TRAFFIC LIGHT STANDARD
TS	DENOTES	TRAFFIC SIGN
WV	DENOTES	WATER VALVE
0.10m	DENOTES	CONIFEROUS TREE WITH TRUNK DIAMETER 0.10 metres
0.10m	DENOTES	DECIDUOUS TREE WITH TRUNK DIAMETER 0.10 metres
100.00	DENOTES	SPOT ELEVATION

AREA : 9535.9 sq. m.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

2. THE SURVEY WAS COMPLETED ON THE 27th DAY OF MARCH, 2021.

APRIL 23, 2021
DATE

PIRATHEEPAN RAMACHANDRAN
Ontario Land Surveyor

R. AVIS SURVEYING INC.
SUITE 203
235 YORKLAND BOULEVARD
TORONTO, ONTARIO
M2J 4Y8
TEL: (416) 490-8352 FAX: (416) 491-6206
EMAIL : office@ravissurveying.com

CHECKED BY : P.R., O.L.S.
CALCULATED BY : HT/SR | PROJECT No. : 3211-8
DRAWN BY : GN/S.S./SR/F.M. | DRAWING No. : 3211-8T.DWG

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	02 JUNE 2023
02	RE-ISSUED FOR CP/AZ/BA	07 FEBRUARY 2023
01	ISSUED FOR CP/AZ/BA	27 OCTOBER 2021

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COREARCHITECTS
TEL: +1 416 [illegible]
EMAIL: [illegible]
WWW.[illegible]

1120 COOKE BLVD

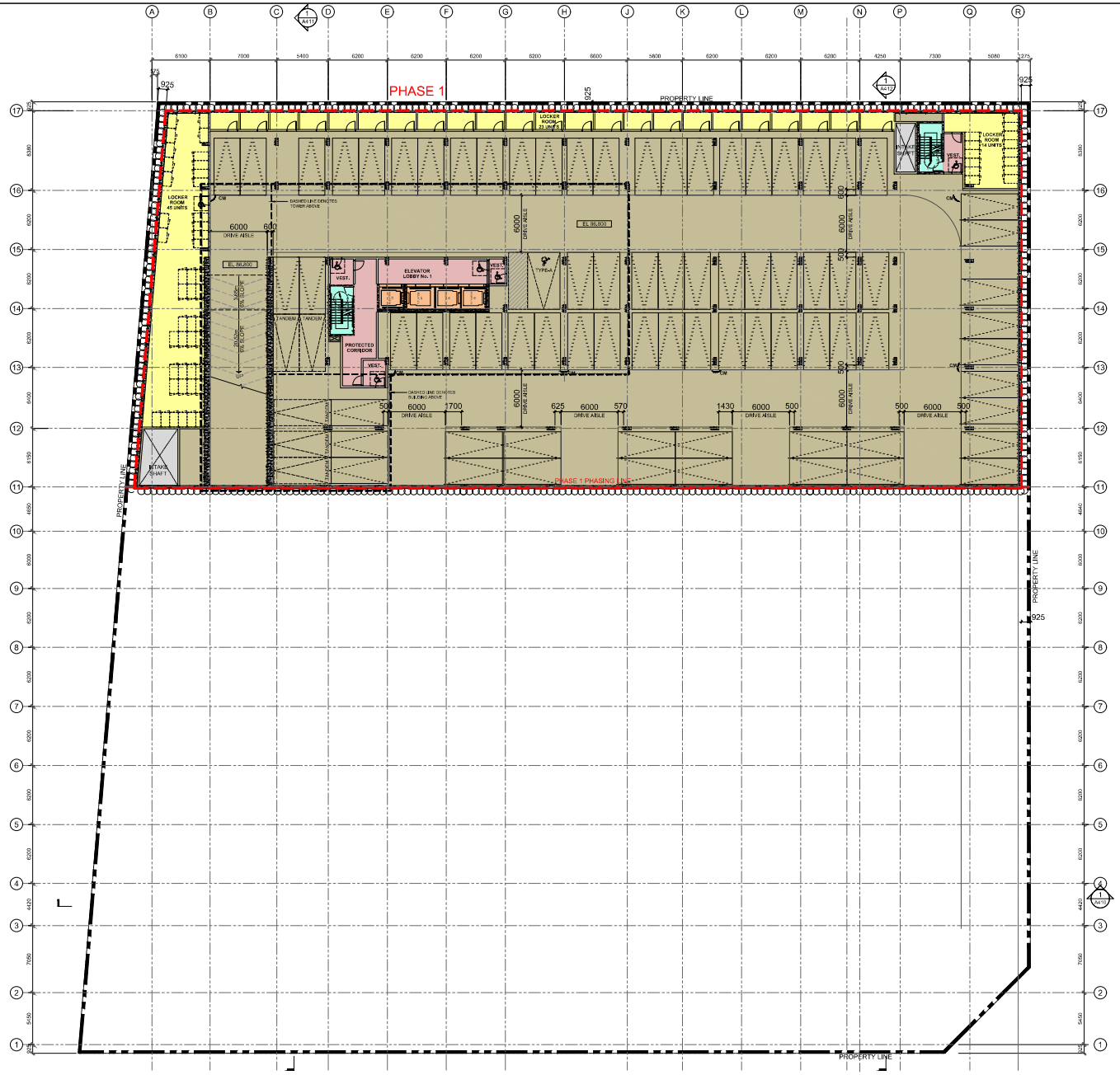
PHASE 2
BURLINGTON, ONTARIO

N

Drawn
Scale: N.T.S.
Checked
Date: 05 JUNE 2023

Title: SURVEY PLAN

Project No.: 20-129
Drawing No.: A104



LEGEND

- REGULATION PARKING
- BARRIER FREE PARKING
- HORIZONTAL BICYCLE PARKING
- VERTICAL BICYCLE PARKING
- TYPICAL CONVEX MIRROR
- EV — ELECTRICAL CHARGING STATION
- NON-SALABLE GFA
- SALABLE GFA
- DEDUCTABLE - STORAGE
- DEDUCTABLE - STAIRWAY
- DEDUCTABLE - AIR HANDLING
- DEDUCTABLE - ELEVATOR SHAFT
- DEDUCTABLE - FOYER AND LOBBY
- DEDUCTABLE - PARKING

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	05 JUNE 2023
02	RE-ISSUED FOR DP/ALDBA	07 FEBRUARY 2023
01	ISSUED FOR DP/ALDBA	31 OCTOBER 2021

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1120 COOKE BLVD

PHASE 2
BURLINGTON ONTARIO

Drawn: TA	Scale: 1:200
Checked: DL	Date: 05 JUNE 2023

Title: PARKING LEVEL 6

Project No.	Drawing No.
20-129	A200



LEGEND

- REGULATION PARKING
- BARRIER FREE PARKING
- HORIZONTAL BICYCLE PARKING
- VERTICAL BICYCLE PARKING
- TYPICAL CONVEX MIRROR
- EV ELECTRICAL CHARGING STATION
- NON-SALABLE GFA
- SALABLE GFA
- DEDUCTABLE - STORAGE
- DEDUCTABLE - STAIRWAY
- DEDUCTABLE - AIR HANDLING
- DEDUCTABLE - ELEVATOR SHAFT
- DEDUCTABLE - FOYER AND LOBBY
- DEDUCTABLE - PARKING

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	02 JUNE 2023
02	RE-ISSUE OF ON OPA/ZBA	07 FEBRUARY 2023
01	ISSUED FOR OPA/ZBA	27 OCTOBER 2021

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1120 COOKE BLVD

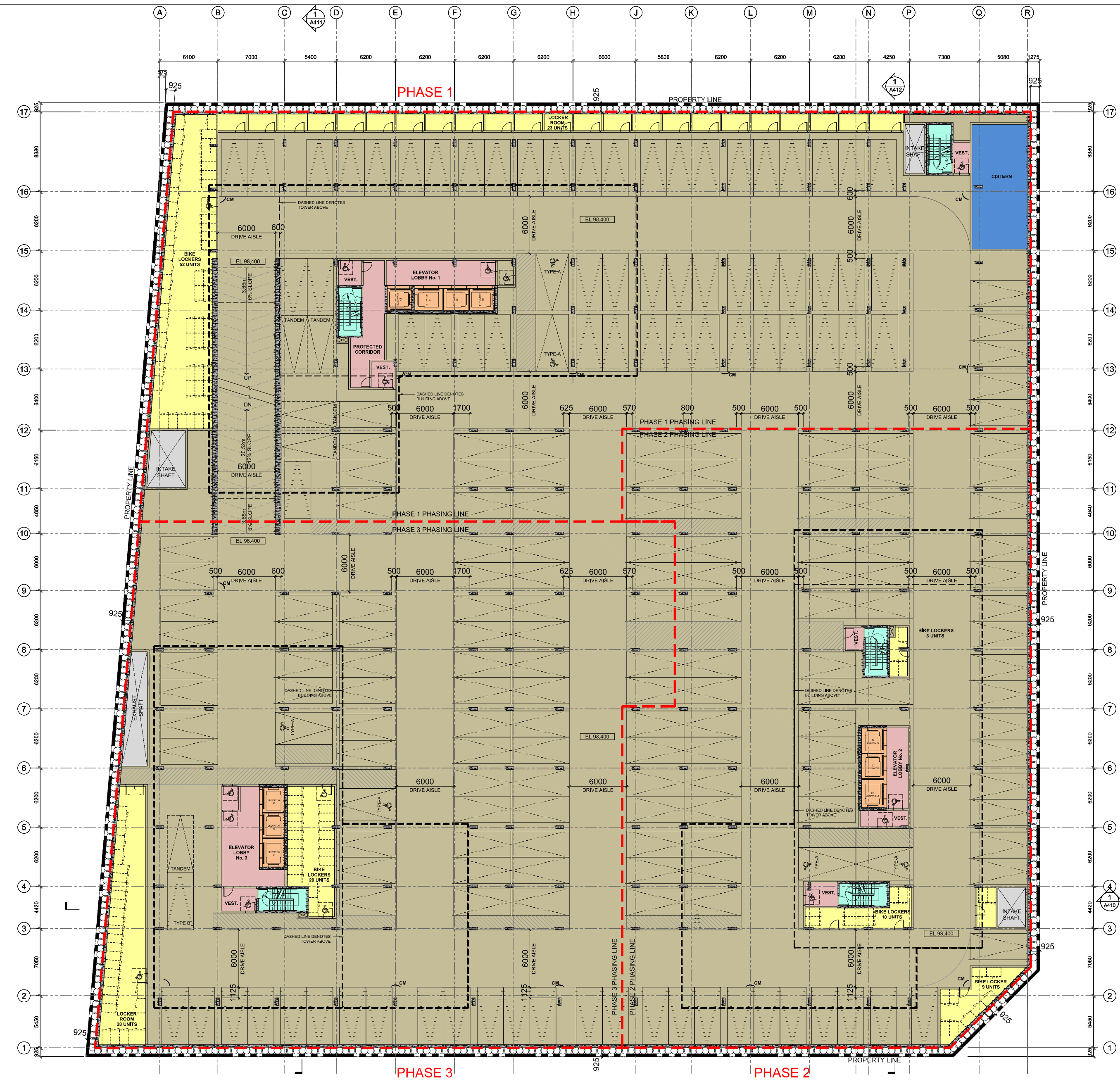
PHASE 2

BURLINGTON, ONTARIO

Drawn: TA	Scale: 1:200
Checked: DL	Date: 05 JUNE 2023

Title: PARKING LEVELS 3-5

Project No.: 20-129	Drawing No.: A201



LEGEND

- REGULATION PARKING
- BARRIER FREE PARKING
- HORIZONTAL BICYCLE PARKING
- VERTICAL BICYCLE PARKING
- TYPICAL CONVEX MIRROR
- EV — ELECTRICAL CHARGING STATION
- NON-SALABLE GFA
- SALABLE GFA
- DEDUCTABLE - STORAGE
- DEDUCTABLE - STAIRWAY
- DEDUCTABLE - AIR HANDLING
- DEDUCTABLE - ELEVATOR SHAFT
- DEDUCTABLE - FOYER AND LOBBY
- DEDUCTABLE - PARKING

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	05 JUNE 2023
02	RE-ISSUED FOR OPA/ZBA	10 FEBRUARY 2023
01	ISSUED FOR OPA/ZBA	07 OCTOBER 2021

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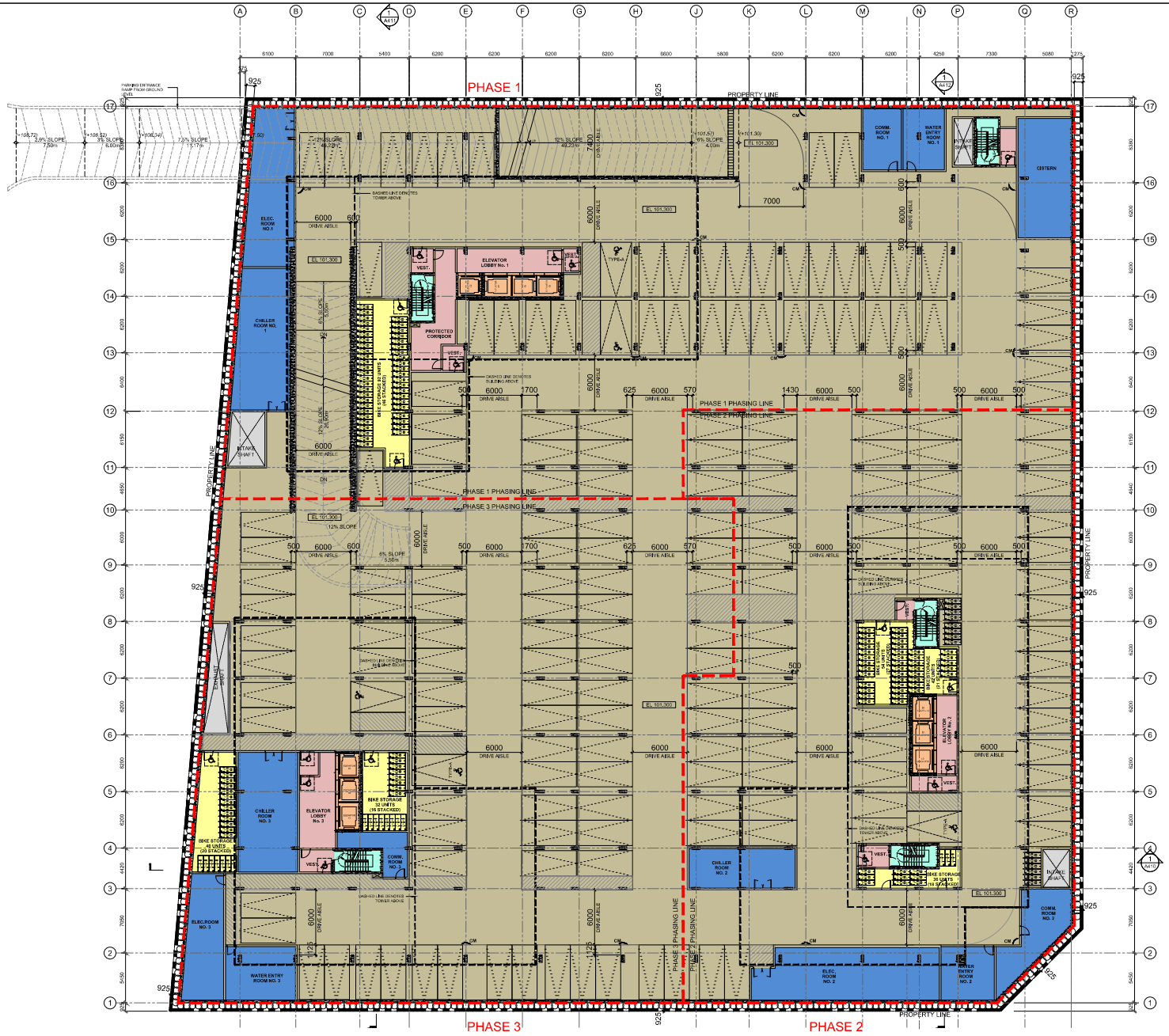
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1120 COOKE BLVD

PHASE 2
BURLINGTON ONTARIO

Drawn: TA	Scale: 1:200
Checked: DL	Date: 05 JUNE 2023
Title: PARKING LEVEL 2	
Project No.: 20-129	Drawing No.: A202



LEGEND

- REGULATION PARKING
- BARRIER FREE PARKING
- HORIZONTAL BICYCLE PARKING
- VERTICAL BICYCLE PARKING
- TYPICAL CONVEX MIRROR
- EV — ELECTRICAL CHARGING STATION
- NON-SALABLE GFA
- SALABLE GFA
- DEDUCTABLE - STORAGE
- DEDUCTABLE - STAIRWAY
- DEDUCTABLE - AIR HANDLING
- DEDUCTABLE - FOYER AND LOBBY
- DEDUCTABLE - PARKING

No.	Revisions	Date
03	ISSUED FOR DISCUSSION	05 JUNE 2023
02	RE-ISSUE OF CP/AZBA	07 FEBRUARY 2023
01	ISSUED FOR CP/AZBA	31 OCTOBER 2022

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1120 COOKE BLVD

PHASE 2

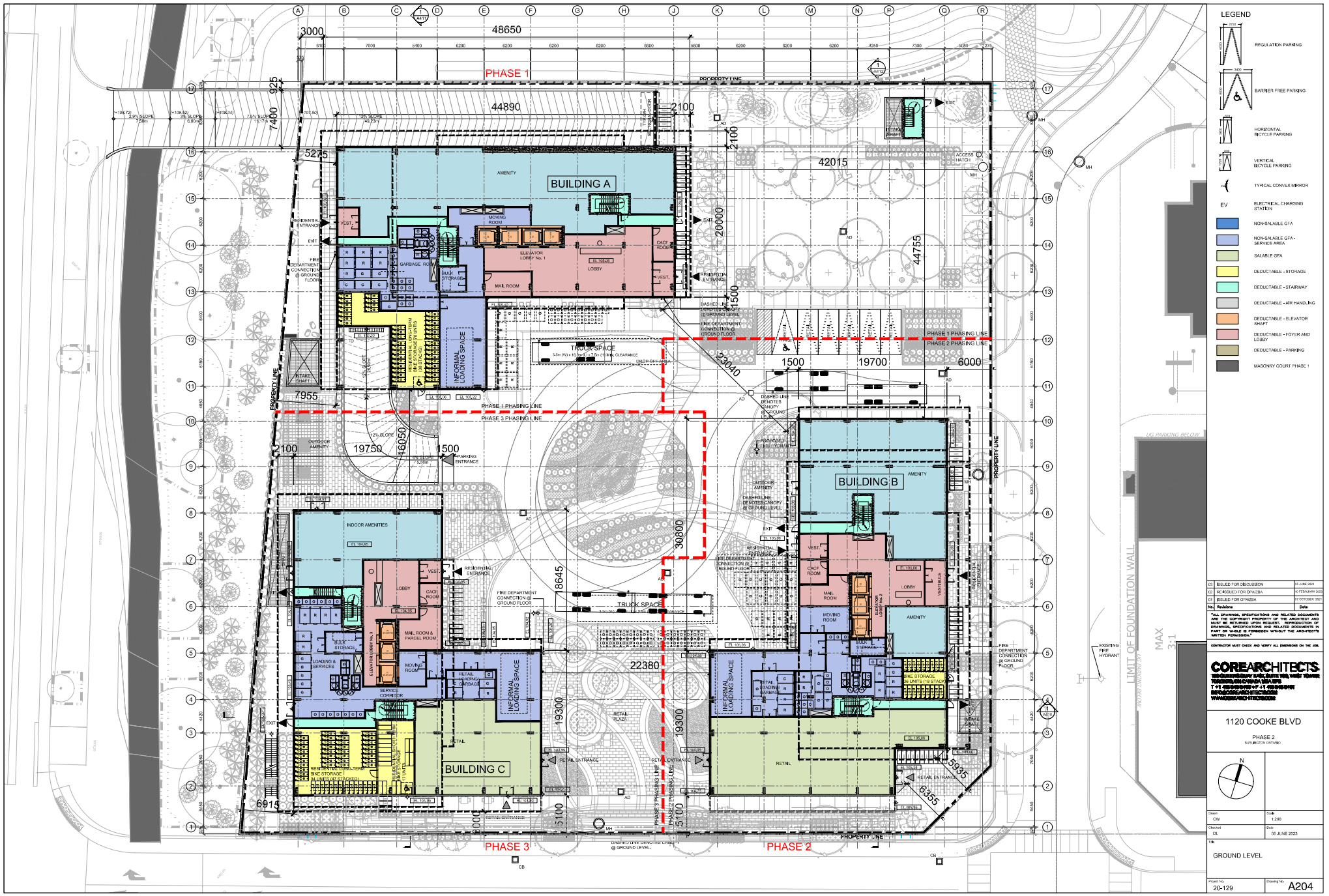
BURLINGTON, ONTARIO

Drawn: TA	Scale: 1:200
Checked: DL	Date: 05 JUNE 2023

Title: PARKING LEVEL 1

Project No.: 20-129

Drawing No.: A203



No.	Revisions	Date
03	ISSUED FOR DISCUSSION	05 JUNE 2023
02	RE-ISSUE D FOR OPA/ZBA	07 FEBRUARY 2023
01	ISSUED FOR OPA/ZBA	07 OCTOBER 2021

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1120 COOKE BLVD

PHASE 2

BURLINGTON ONTARIO

Drawn: CW	Scale: 1:200
Checked: DL	Date: 05 JUNE 2023

Title: GROUND LEVEL

Project No.	Drawing No.
20-129	A204

Appendix D:
E-mail from the City

Andrea Camina-Medina

From: Clark, Trevor <Trevor.Clark@burlington.ca>
Sent: November 23, 2022 2:10 PM
To: Andrea Camina-Medina
Cc: Emily J. Ecker; Tony Chao-Wei Shih; Edgcumbe, Kaylan; Ozimkovic , Danijel
Subject: RE: 1120 Cooke Boulevard - Stationwest Phase 2 - Parking Study Document

Good Afternoon Andrea,

After some internal discussions, we will not be able to pass on the data from the parking study at this time as the City is still working on its analysis of the collected data. The rate of 1.07 was based off of data collected during covid and since then, the City has been supplementing the data gathered at that time with additional field observations. Once the analysis of all the data together is complete, staff will bring an update to City Council for approval and implementation of the new rates. In recognition of the settled rate at nearby developments and nearby recently proposed rates, staff are willing to accept a reduced overall parking rate of 0.97 spaces per unit combined. It is expected that this reduction for 1120 Cooke Boulevard will be accompanied by a robust TDM plan that will be reviewed in the future by City staff. For further questions, please contact Kaylan Edgcumbe, Manager of Transportation Planning, who is copied on this email.

Thanks,
Trevor

From: Andrea Camina-Medina <Andrea.Camina-Medina@bagroup.com>
Sent: Thursday, November 17, 2022 10:39 AM
To: Clark, Trevor <Trevor.Clark@burlington.ca>
Cc: Emily J. Ecker <Ecker@bagroup.com>; Tony Chao-Wei Shih <shih@bagroup.com>
Subject: RE: 1120 Cooke Boulevard - Stationwest Phase 2 - Parking Study Document

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 Trevor,

Following up with the e-mail I sent in October. Please let me know about the supplemental study of the parking demands.

Thank you,
Andrea

From: Andrea Camina-Medina
Sent: November 4, 2022 1:26 PM
To: trevor.clark@burlington.ca
Cc: Emily J. Ecker <ecker@bagroup.com>; Tony Chao-Wei Shih <shih@bagroup.com>
Subject: RE: 1120 Cooke Boulevard - Stationwest Phase 2 - Parking Study Document

Hi Trevor,

I'm just following up with this e-mail.

Thanks!

Andrea

From: Andrea Camina-Medina
Sent: October 28, 2022 11:03 AM
To: 'trevor.clark@burlington.ca' <trevor.clark@burlington.ca>
Cc: Emily J. Ecker <ecker@bagroup.com>; Tony Chao-Wei Shih <shih@bagroup.com>
Subject: 1120 Cooke Boulevard - Stationwest Phase 2 - Parking Study Document

Hi Trevor,

BA Group is the traffic consultant for the proposed development located at 1120 Cooke Boulevard, known as "Stationwest Phase 2". We have received your comments from the Transportation Services Department at the City of Burlington dated September 26, 2022 and you made a reference about a supplemental study of the parking demands of residential uses in intensification areas. Can you kindly provide us with this study please?

Thank you in advance!

Andrea Camina-Medina
Transportation Analyst

BA Consulting Group Ltd.
300 - 45 St. Clair Ave. W.
Toronto, ON M4V 1K9

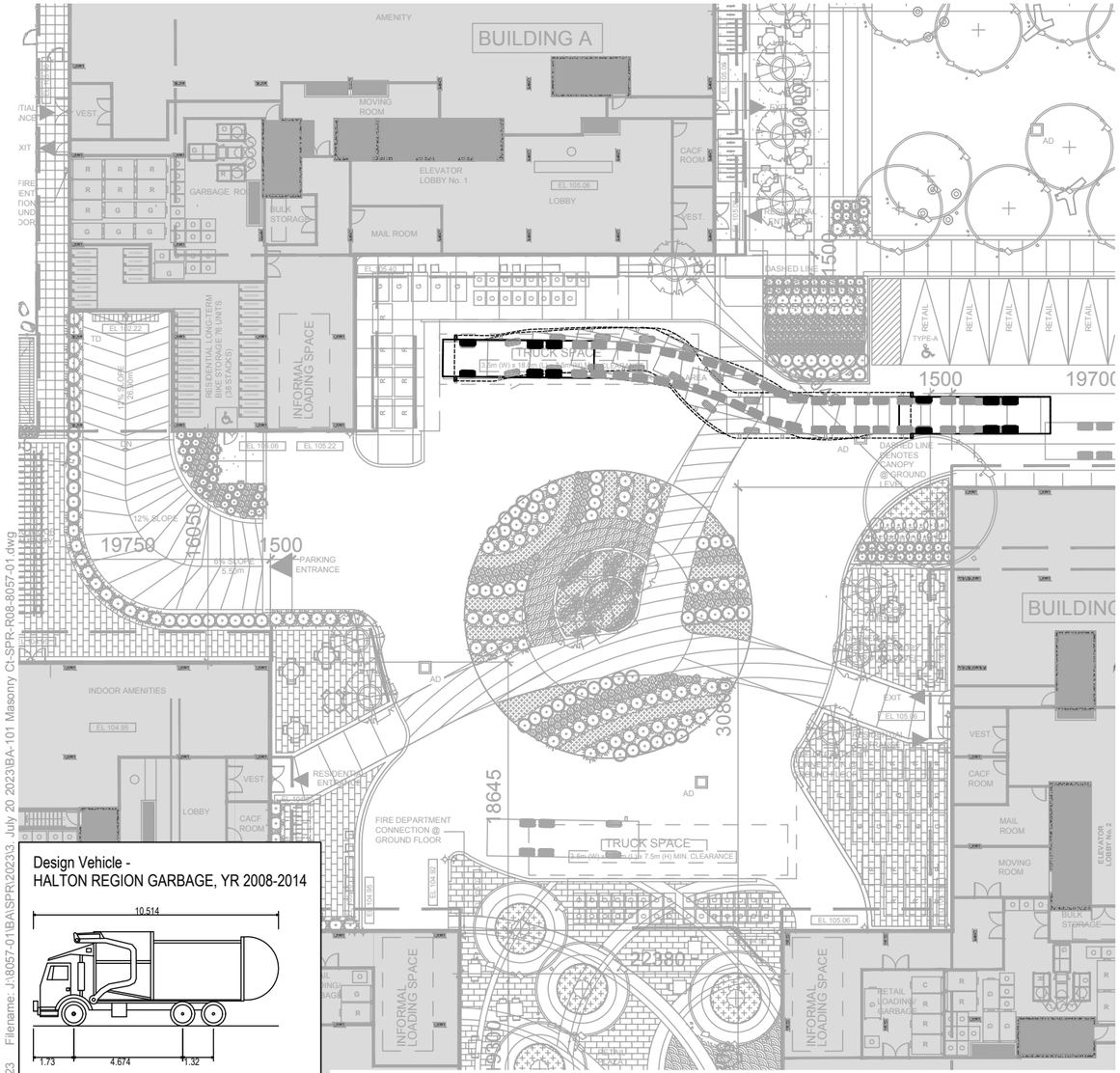
TEL 416 961 7110 x173
EMAIL Andrea.Camina-Medina@bagroup.com

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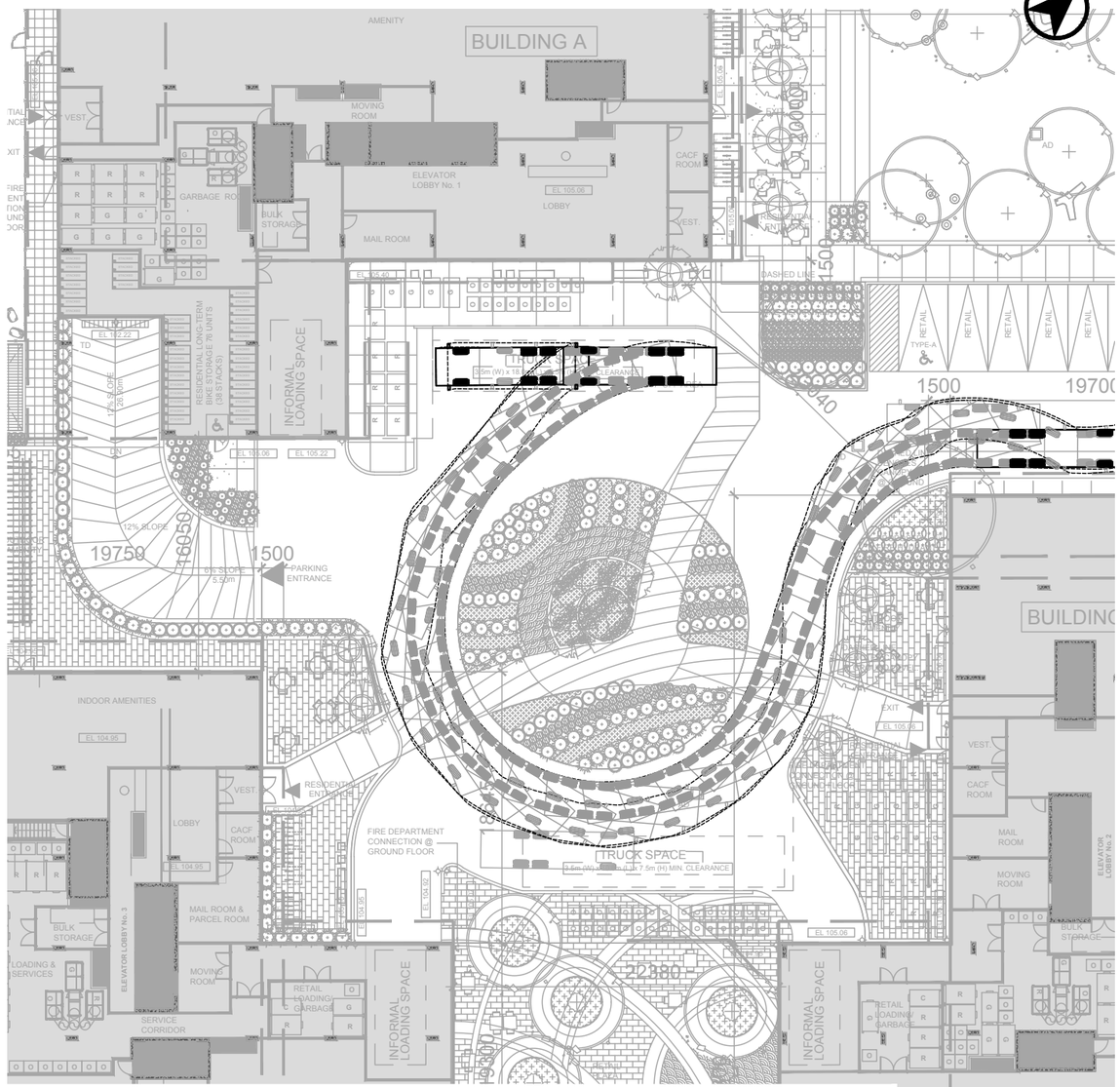
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Appendix E:
Vehicle Manoeuvring Diagrams (VMDs)

INBOUND



OUTBOUND



Design Vehicle -
HALTON REGION GARBAGE, YR 2008-2014

Overall Length	10.514m
Overall Width	2.570m
Overall Body Height	4.040m
Min Body Ground Clearance	0.391m
Track Width	2.570m
Lock-to-lock time	5.00s
Wall to Wall Turning Radius	13.715m

*THE DIMENSIONS AND MANOEUVRABILITY OF THE HALTON REGION FRONT-LOADING GARBAGE TRUCK USED HERE EXCEED THE DIMENSIONS AND MANOEUVRABILITY OF THE SIDE LOADING RECYCLING COLLECTION VEHICLE OUTLINED IN THE HALTON REGION DEVELOPMENT DESIGN GUIDELINES FOR SOURCE SEPARATION OF SOLID WASTE

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BA Group

101 MASONRY CT

VEHICLE MANOEUVRING DIAGRAM
HALTON REGION GARBAGE TRUCK
NORTH TRUCK SPACE

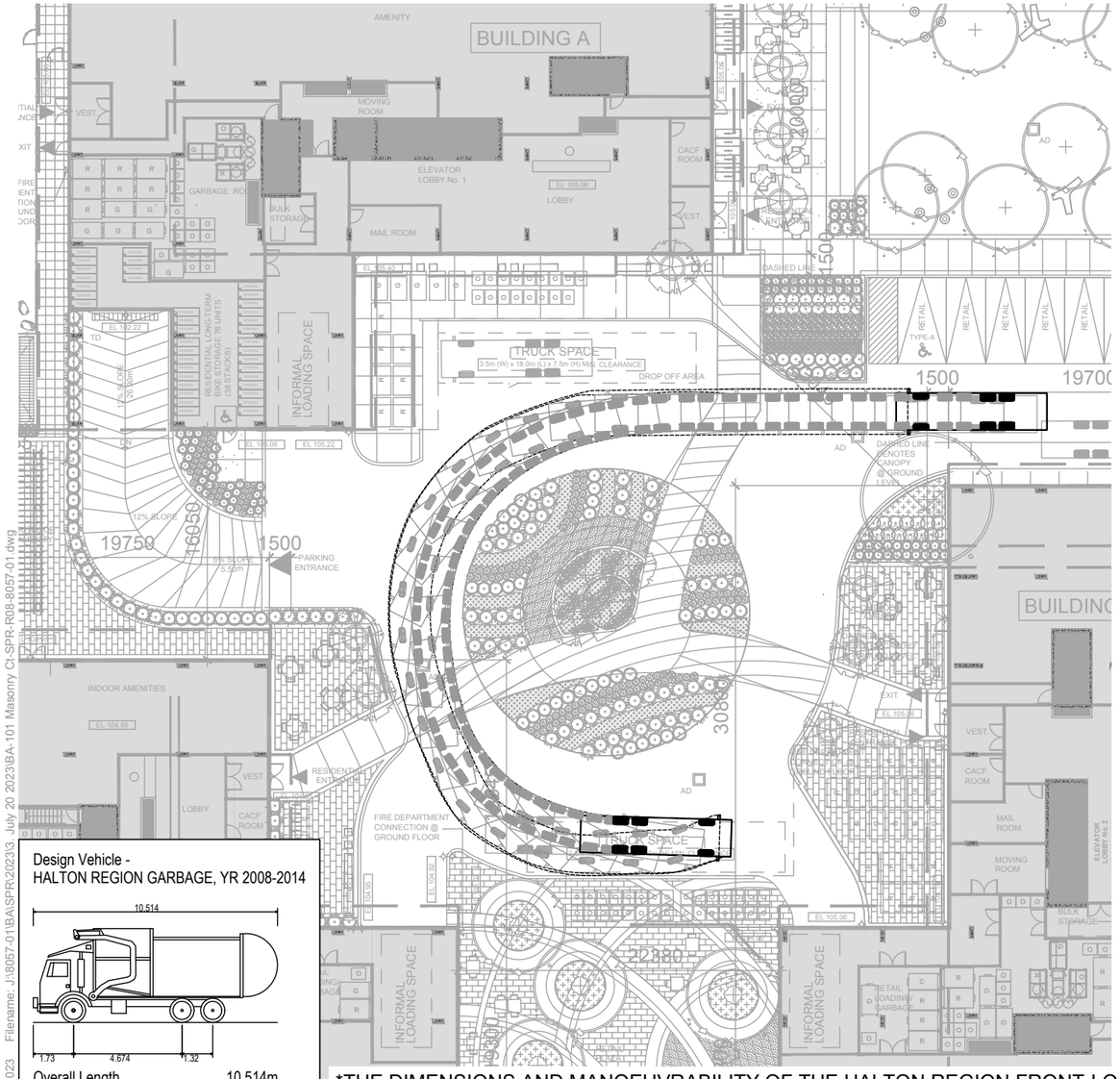
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Project No.	8057-01
Date:	July 20, 2023
Revised:	--

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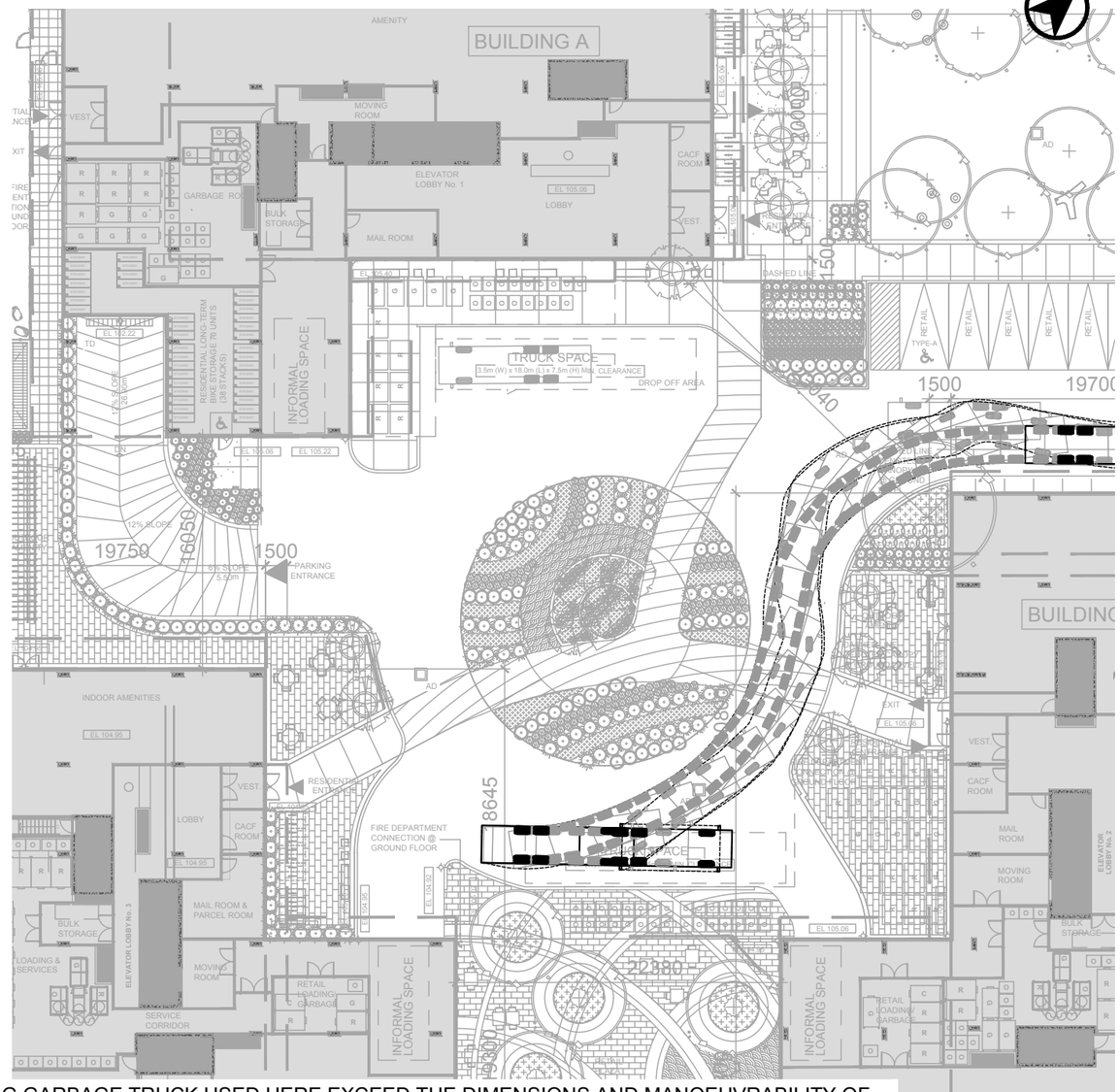
Drawing No. VMD-01

Date Plotted: July 20, 2023 Filename: J:\8057-01BA\SPR\20231\3_July 20 2023\BA-101 Masonry Ct-SPR-R08-8057-01.dwg

INBOUND



OUTBOUND



Design Vehicle -
HALTON REGION GARBAGE, YR 2008-2014

Overall Length	10.514m
Overall Width	2.570m
Overall Body Height	4.040m
Min Body Ground Clearance	0.391m
Track Width	2.570m
Lock-to-lock time	5.00s
Wall to Wall Turning Radius	13.715m

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VEHICLE MANOEUVRING DIAGRAM
HALTON REGION GARBAGE TRUCK
SOUTH TRUCK SPACE

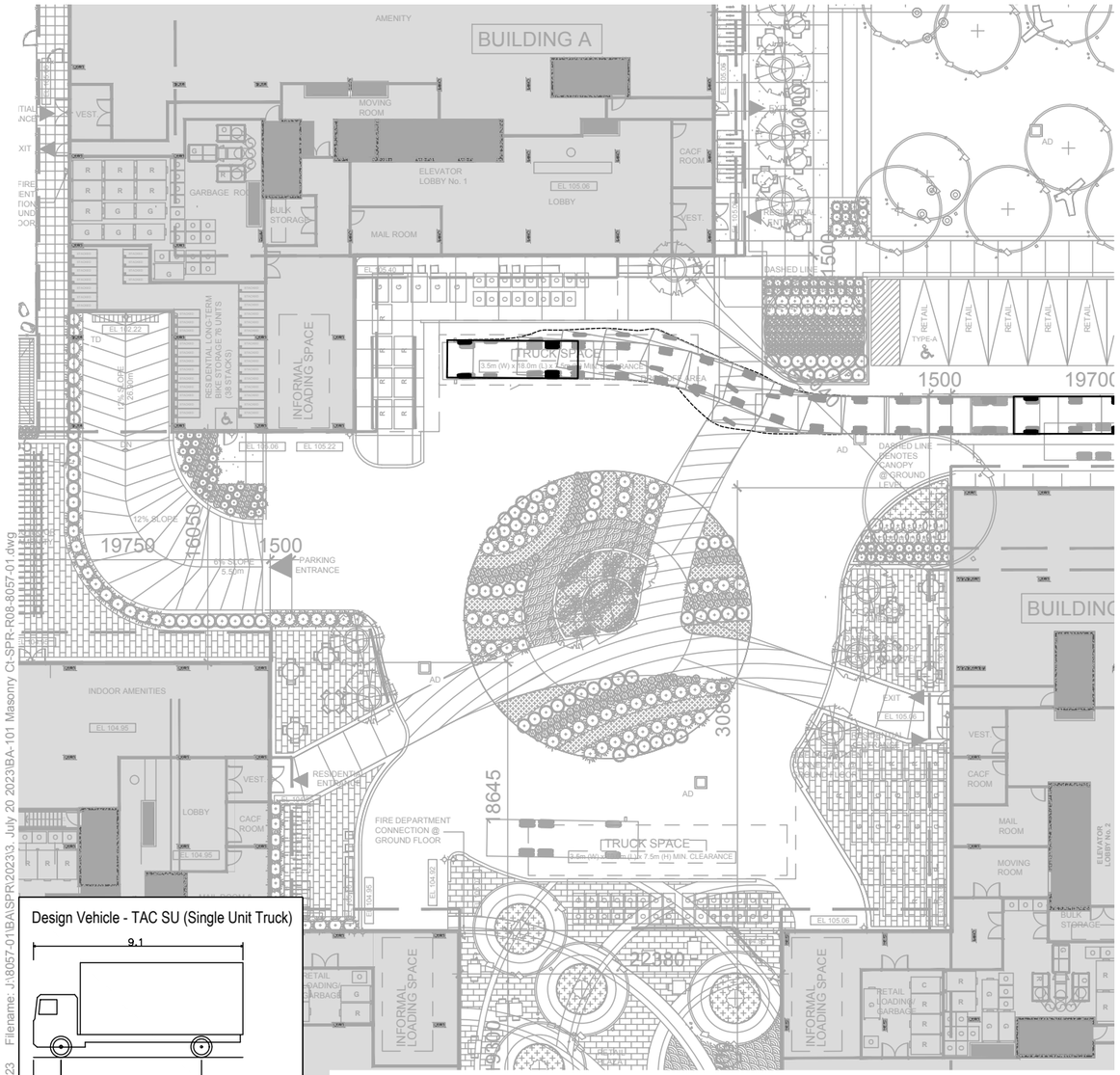
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Project No.	8057-01
Date:	July 20, 2023
Revised:	--

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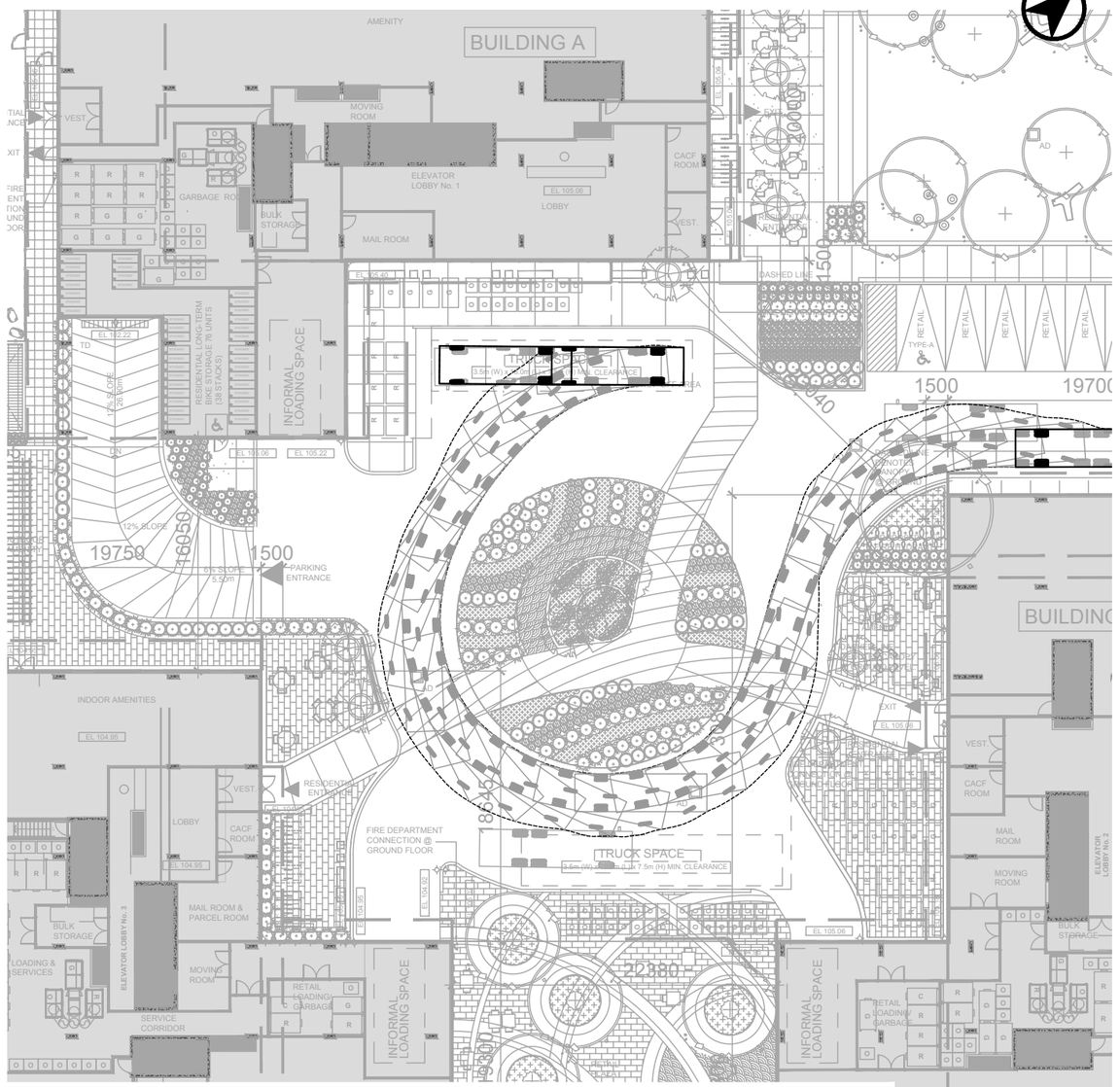
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Date Plotted: July 20, 2023 Filename: J:\8057-01\BA\SPR\20231\3_July 20 2023\BA-101 Masonry Ct-SPR-R08-8057-01.dwg

INBOUND



OUTBOUND



Design Vehicle - TAC SU (Single Unit Truck)

Overall Length	9.10m
Overall Width	2.60m
Overall Body Height	4.11m
Outside Turning Radius	13.40m
Inside Turning Radius	8.60m

*THE DIMENSIONS AND MANOEUVRABILITY OF THE HALTON REGION FRONT-LOADING GARBAGE TRUCK USED HERE EXCEED THE DIMENSIONS AND MANOEUVRABILITY OF THE SIDE LOADING RECYCLING COLLECTION VEHICLE OUTLINED IN THE HALTON REGION DEVELOPMENT DESIGN GUIDELINES FOR SOURCE SEPARATION OF SOLID WASTE

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BA Group

101 MASONRY CT

VEHICLE MANOEUVRING DIAGRAM
SINGLE UNIT TRUCK
NORTH TRUCK SPACE

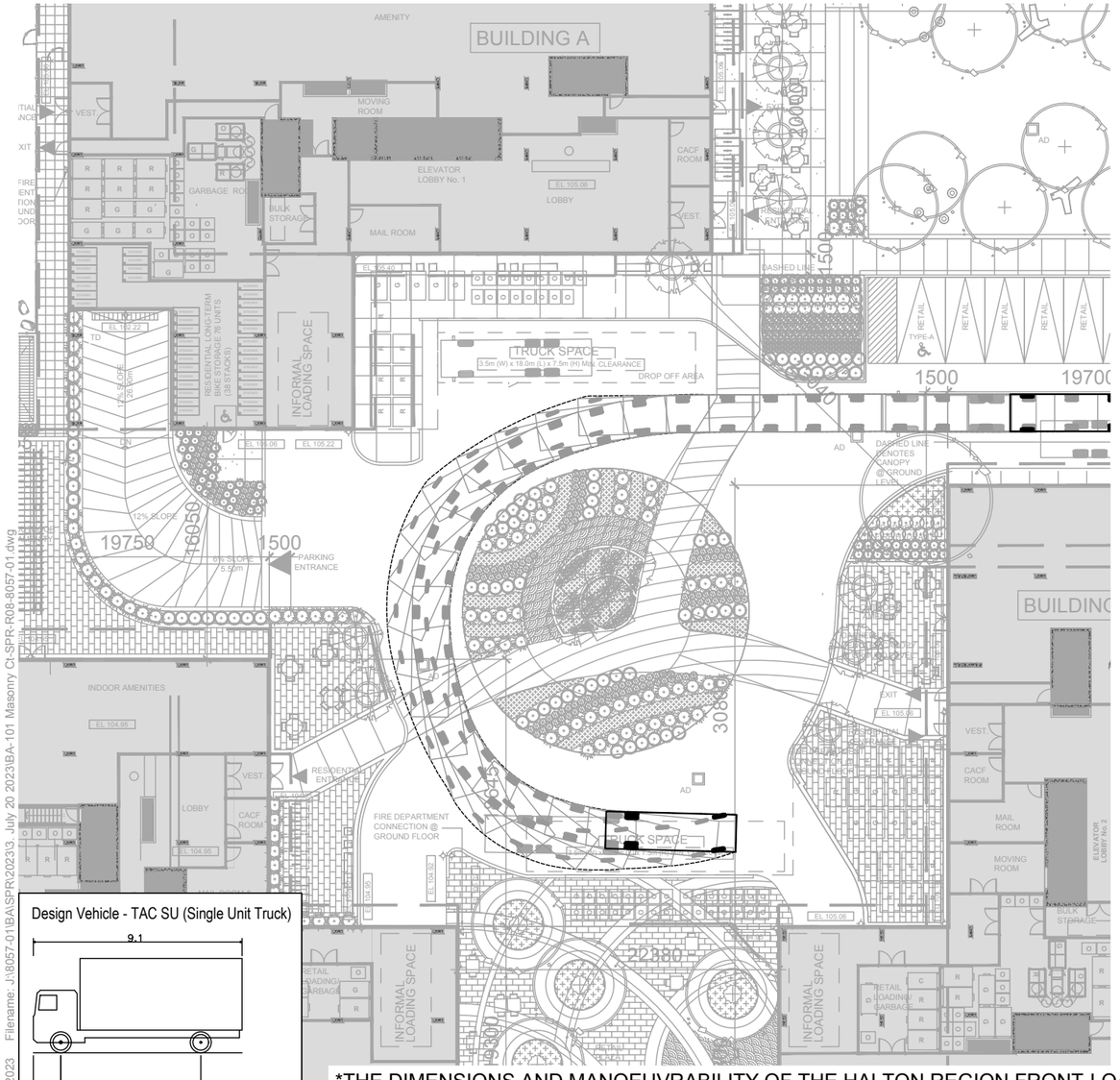
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Project No.	8057-01
Date:	July 20, 2023
Revised:	--

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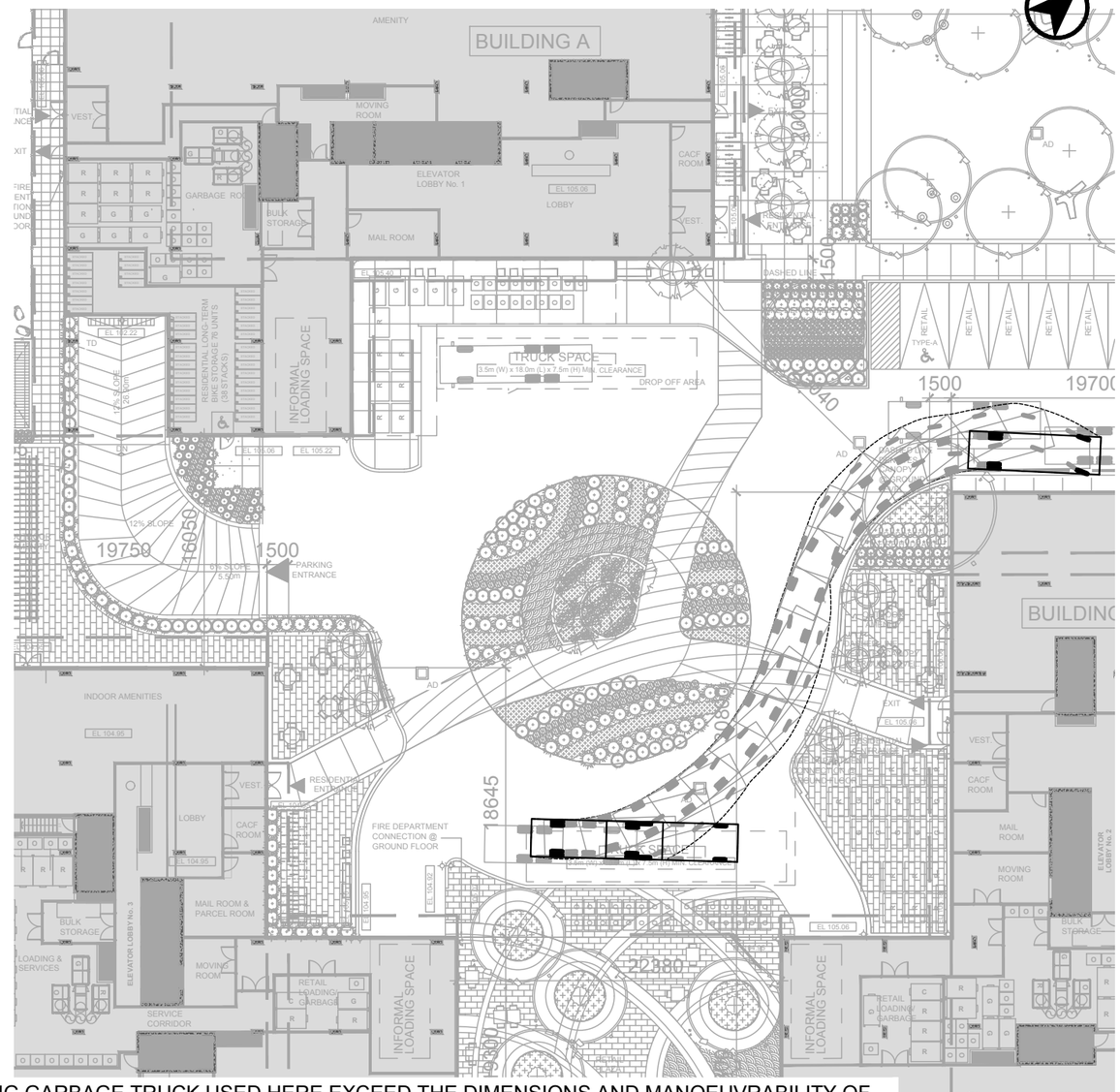
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INBOUND



OUTBOUND



Design Vehicle - TAC SU (Single Unit Truck)

Overall Length	9.10m
Overall Width	2.60m
Overall Body Height	4.11m
Outside Turning Radius	13.40m
Inside Turning Radius	8.60m

*THE DIMENSIONS AND MANOEUVRABILITY OF THE HALTON REGION FRONT-LOADING GARBAGE TRUCK USED HERE EXCEED THE DIMENSIONS AND MANOEUVRABILITY OF THE SIDE LOADING RECYCLING COLLECTION VEHICLE OUTLINED IN THE HALTON REGION DEVELOPMENT DESIGN GUIDELINES FOR SOURCE SEPARATION OF SOLID WASTE

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VEHICLE MANOEUVRING DIAGRAM
SINGLE UNIT TRUCK
SOUTH TRUCK SPACE

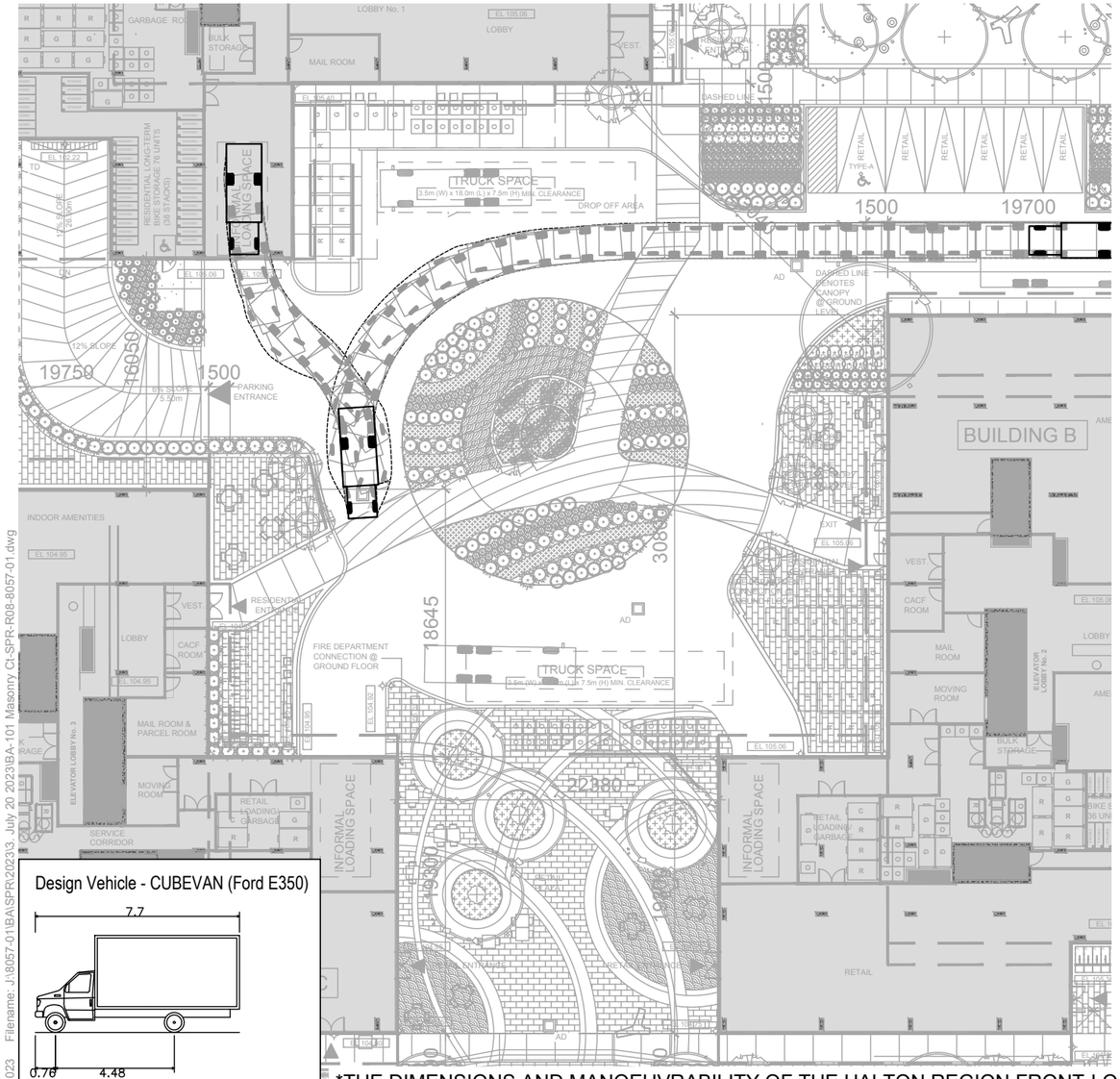
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Date:	July 20, 2023
Revised:	--

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Drawing No. VMD-04

Date Plotted: July 20, 2023 Filename: J:\8057-01\BA\SPR\20231\3. July 20 2023\BA-101 Masonry Ct-SPR-R08-8057-01.dwg

INBOUND



Design Vehicle - CUBEVAN (Ford E350)

Overall Length	7.70m
Overall Width	2.45m
Overall Body Height	3.66m
Outside Turning Radius	9.49m
Inside Turning Radius	5.68m

*THE DIMENSIONS AND MANOEUVRABILITY OF THE HALTON REGION FRONT-LOADING GARBAGE TRUCK USED HERE EXCEED THE DIMENSIONS AND MANOEUVRABILITY OF THE SIDE LOADING RECYCLING COLLECTION VEHICLE OUTLINED IN THE HALTON REGION DEVELOPMENT DESIGN GUIDELINES FOR SOURCE SEPARATION OF SOLID WASTE

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Date Plotted: July 20, 2023 Filename: J:\8057-01\BA\SPR\202313 - July 20 2023\BA-101 Masonry Ct-SPR-R08-8057-01.dwg

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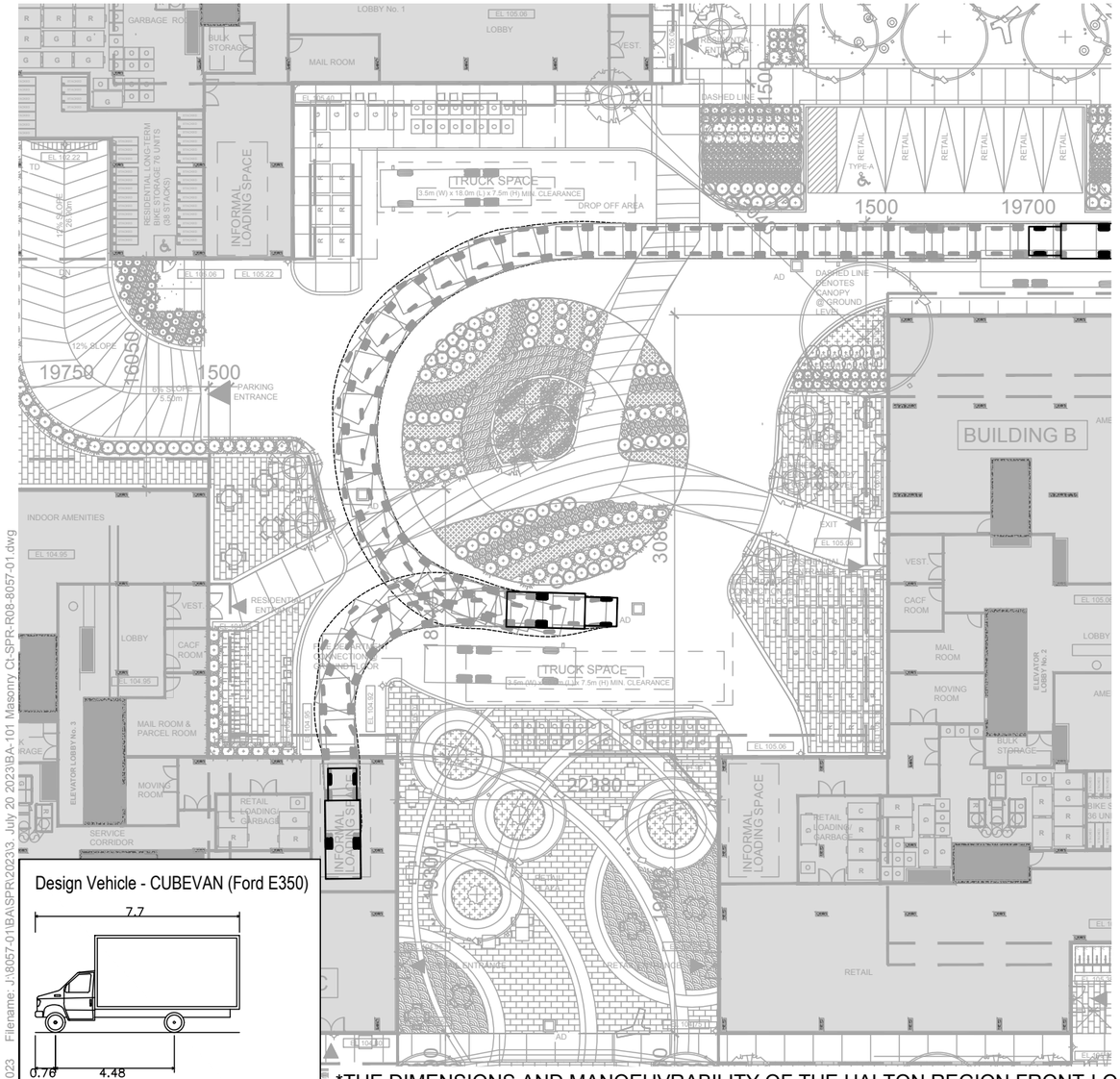
VEHICLE MANOEUVRING DIAGRAM
FORD 350 CUBE VAN
BUILDING A

Project:	101 Masonry Ct
Project No.	8057-01
Date:	July 20, 2023
Revised:	--

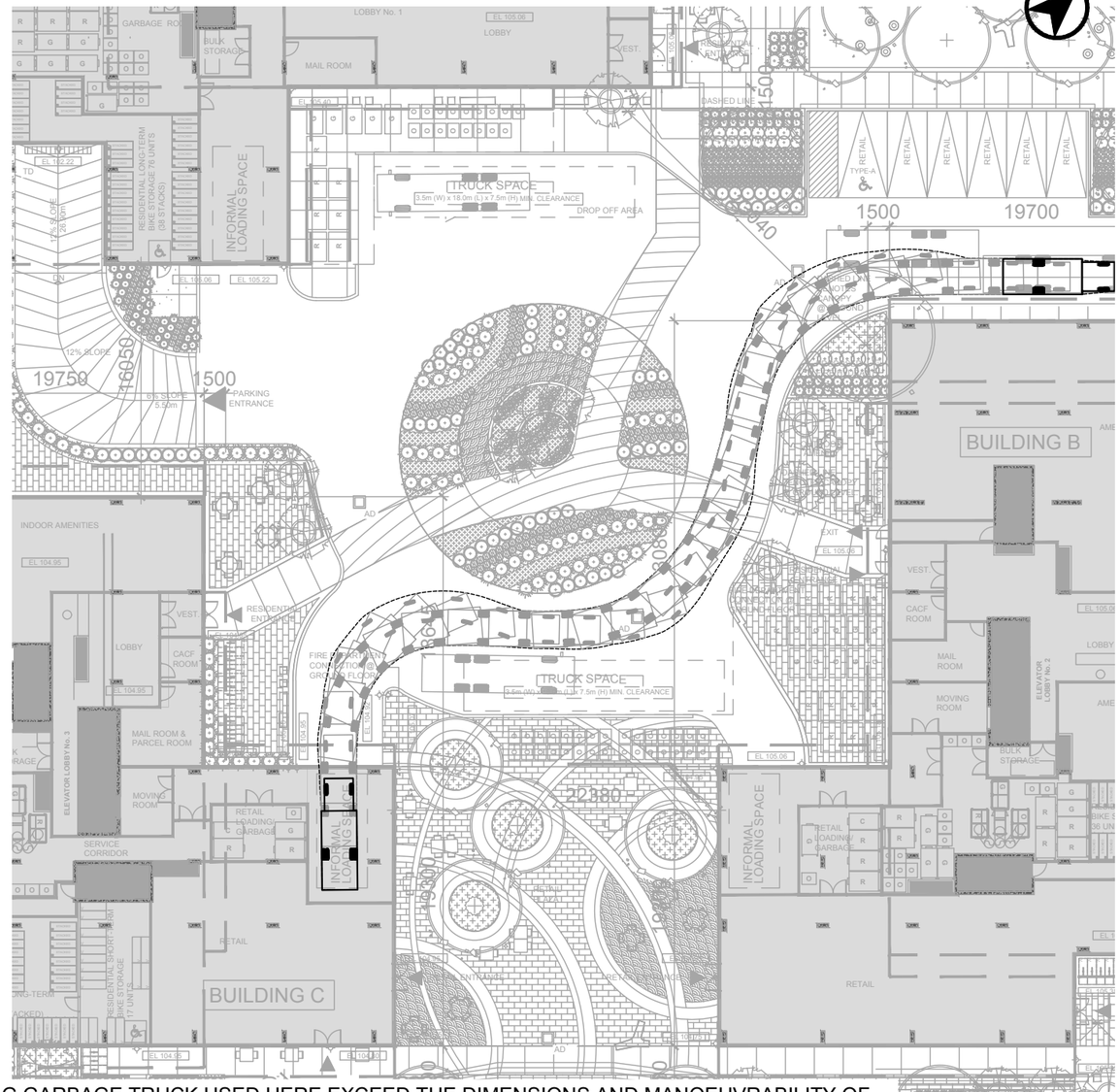
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Drawing No. VMD-05

INBOUND



OUTBOUND



Design Vehicle - CUBEVAN (Ford E350)

Overall Length	7.70m
Overall Width	2.45m
Overall Body Height	3.66m
Outside Turning Radius	9.49m
Inside Turning Radius	5.68m

*THE DIMENSIONS AND MANOEUVRABILITY OF THE HALTON REGION FRONT-LOADING GARBAGE TRUCK USED HERE EXCEED THE DIMENSIONS AND MANOEUVRABILITY OF THE SIDE LOADING RECYCLING COLLECTION VEHICLE OUTLINED IN THE HALTON REGION DEVELOPMENT DESIGN GUIDELINES FOR SOURCE SEPARATION OF SOLID WASTE

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BA Group

101 MASONRY CT

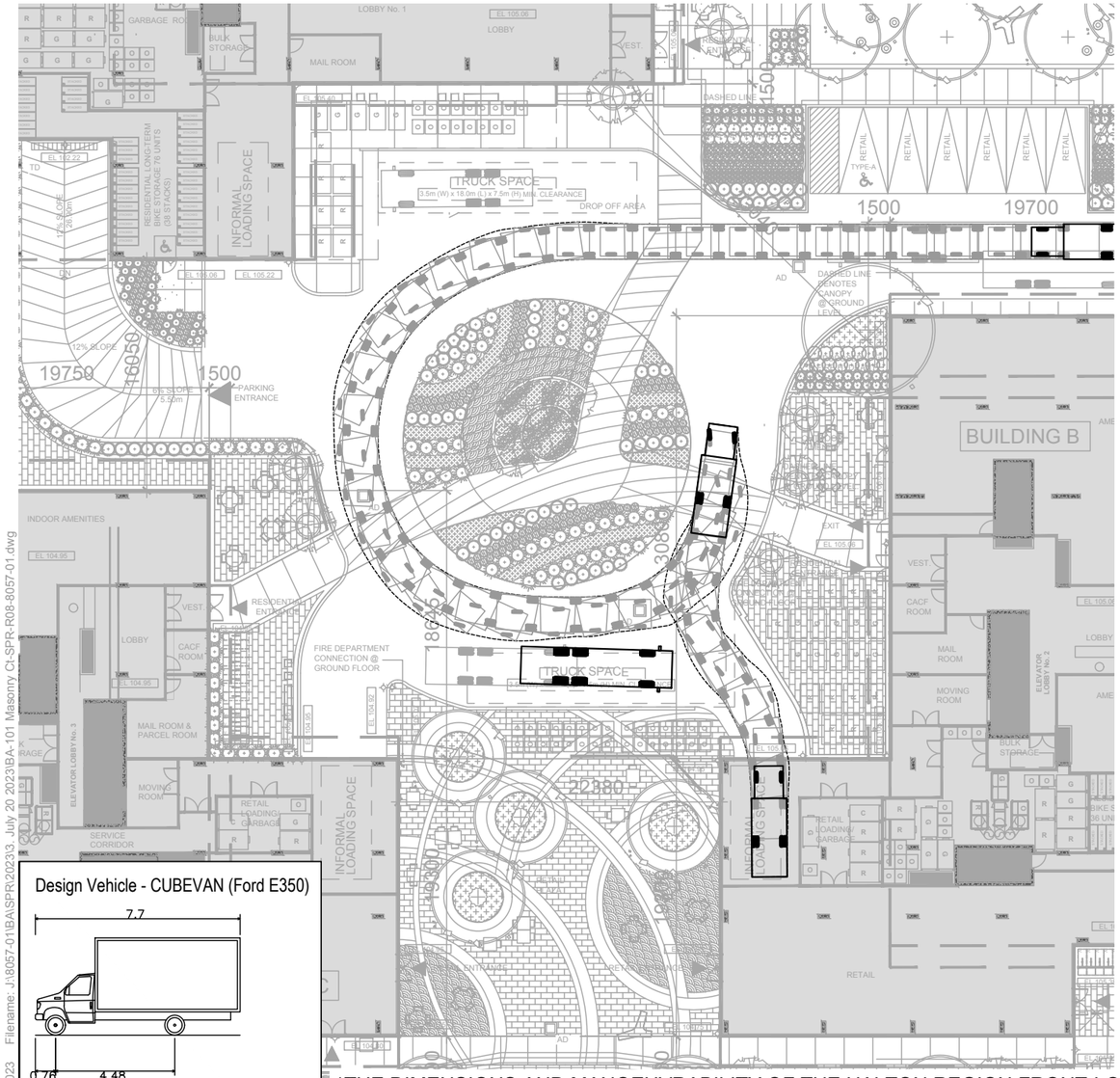
VEHICLE MANOEUVRING DIAGRAM
FORD 350 CUBE VAN
BUILDING C

Project:	101 Masonry Ct
Project No.	8057-01
Date:	July 20, 2023
Revised:	--

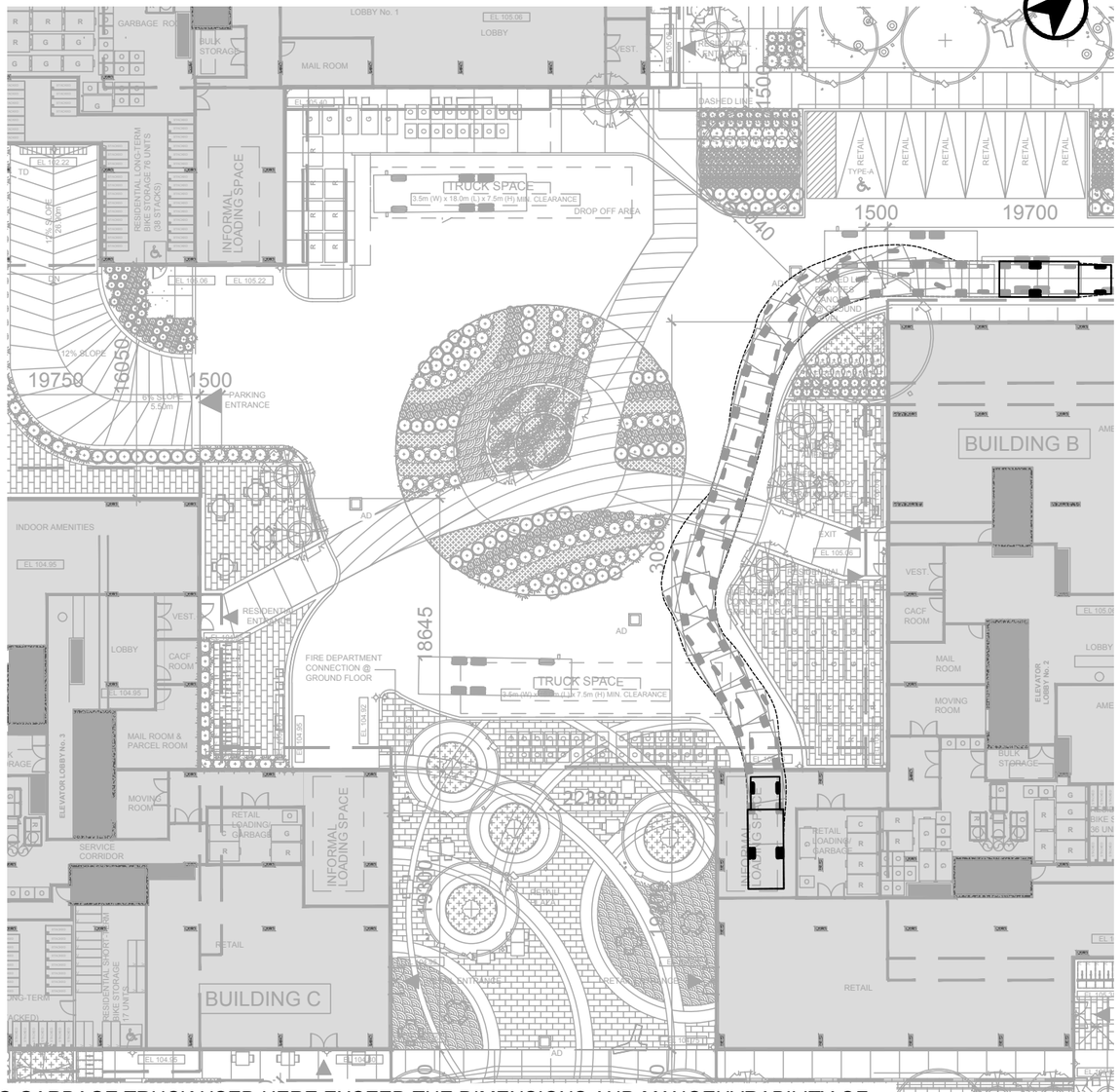
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Drawing No. VMD-06

INBOUND



OUTBOUND



Design Vehicle - CUBEVAN (Ford E350)

Overall Length	7.70m
Overall Width	2.45m
Overall Body Height	3.66m
Outside Turning Radius	9.49m
Inside Turning Radius	5.68m

*THE DIMENSIONS AND MANOEUVRABILITY OF THE HALTON REGION FRONT-LOADING GARBAGE TRUCK USED HERE EXCEED THE DIMENSIONS AND MANOEUVRABILITY OF THE SIDE LOADING RECYCLING COLLECTION VEHICLE OUTLINED IN THE HALTON REGION DEVELOPMENT DESIGN GUIDELINES FOR SOURCE SEPARATION OF SOLID WASTE

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BA Group

101 MASONRY CT

VEHICLE MANOEUVRING DIAGRAM
FORD 350 CUBE VAN
BUILDING B

Project:	101 Masonry Ct
Project No.	8057-01
Date:	July 20, 2023
Revised:	--

Scale 1:400 (0 2 4 6 8 10 20m)

Drawing No. VMD-07

Appendix F:
Turning Movement Counts (TMCs)

Spectrum

Turning Movement Count
Location Name: WATERDOWN RD & N SERVICE ROAD / HIGHWAY 403 WB ON-RAMP
Date: Tue, May 30, 2023 Deployment Lead: Walter Fugaj

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Turning Movement Count (2 . WATERDOWN RD & N SERVICE ROAD / HIGHWAY 403 WB ON-RAMP)

Start Time	N Approach WATERDOWN RD						E Approach NORTH SERVICE RD						S Approach WATERDOWN RD						W Approach NORTH SERVICE RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	10	65	25	0	0	100	2	14	5	0	0	21	76	45	45	0	0	166	0	0	0	0	0	0	287	
07:15:00	13	90	18	0	0	121	8	19	8	0	0	35	113	63	61	0	0	237	0	0	0	0	0	0	393	
07:30:00	22	87	32	0	0	141	9	22	11	0	0	42	125	49	79	0	0	253	0	0	0	0	0	0	436	
07:45:00	21	95	19	0	0	135	10	15	25	0	0	50	112	65	57	0	0	234	0	0	0	0	0	0	419	1535
08:00:00	21	82	27	0	0	130	5	27	23	0	0	55	105	75	55	0	0	235	0	0	0	0	0	0	420	1668
08:15:00	19	82	31	0	0	132	13	25	18	0	0	56	128	68	56	0	0	252	0	0	0	0	0	0	440	1715
08:30:00	24	69	31	0	1	124	14	30	20	0	0	64	108	54	56	0	0	218	0	0	0	0	1	0	406	1685
08:45:00	17	87	33	0	0	137	14	34	20	0	0	68	109	74	36	0	0	219	0	0	0	0	0	0	424	1690
BREAK																										
16:00:00	35	85	16	0	0	136	34	92	40	0	0	166	39	84	82	0	0	205	0	0	0	0	0	0	507	
16:15:00	40	73	15	0	0	128	32	117	29	0	0	178	48	77	90	0	0	215	0	0	0	0	1	0	521	
16:30:00	36	83	22	0	1	141	30	118	53	0	0	201	45	97	153	0	0	295	0	0	0	0	2	0	637	
16:45:00	31	86	24	0	0	141	37	115	61	0	0	213	54	97	122	0	0	273	0	0	0	0	1	0	627	2292
17:00:00	19	89	15	0	1	123	22	131	46	0	0	199	62	85	103	1	0	251	0	0	0	0	1	0	573	2358
17:15:00	27	100	17	0	0	144	24	118	80	0	0	222	56	93	136	2	0	287	0	0	0	0	0	0	653	2490
17:30:00	19	97	16	0	0	132	21	117	64	0	0	202	40	100	118	0	0	258	0	0	0	0	0	0	592	2445
17:45:00	24	61	14	0	0	99	30	98	59	0	0	187	37	96	144	1	0	278	0	0	0	0	1	0	564	2382
Grand Total	378	1331	355	0	3	2064	305	1092	562	0	0	1959	1257	1222	1393	4	0	3876	0	0	0	0	7	0	**7899**	-
Approach%	18.3%	64.5%	17.2%	0%		-	15.6%	55.7%	28.7%	0%		-	32.4%	31.5%	35.9%	0.1%		-	0%	0%	0%	0%		-	**-**	-
Totals %	4.8%	16.9%	4.5%	0%		26.1%	3.9%	13.8%	7.1%	0%		24.8%	15.9%	15.5%	17.6%	0.1%		49.1%	0%	0%	0%	0%		0%	**-**	-
Heavy	10	24	6	0		-	8	27	33	0		-	46	33	79	0		-	0	0	0	0		-	**-**	-
Heavy %	2.6%	1.8%	1.7%	0%		-	2.6%	2.5%	5.9%	0%		-	3.7%	2.7%	5.7%	0%		-	0%	0%	0%	0%		-	**-**	-
Bicycles	0	1	1	0		-	1	0	1	0		-	2	2	0	0		-	0	0	0	0		-	**-**	-
Bicycle %	0%	0.1%	0.3%	0%		-	0.3%	0%	0.2%	0%		-	0.2%	0.2%	0%	0%		-	0%	0%	0%	0%		-	**-**	-

Spectrum

Turning Movement Count
Location Name: WATERDOWN RD & N SERVICE ROAD / HIGHWAY 403 WB ON-RAMP
Date: Tue, May 30, 2023 Deployment Lead: Walter Fugaj

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 07:30 AM - 08:30 AM Weather: Few Clouds (13.86 °C)

Start Time	N Approach WATERDOWN RD						E Approach NORTH SERVICE RD						S Approach WATERDOWN RD						W Approach NORTH SERVICE RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:30:00	22	87	32	0	0	141	9	22	11	0	0	42	125	49	79	0	0	253	0	0	0	0	0	0	436
07:45:00	21	95	19	0	0	135	10	15	25	0	0	50	112	65	57	0	0	234	0	0	0	0	0	0	419
08:00:00	21	82	27	0	0	130	5	27	23	0	0	55	105	75	55	0	0	235	0	0	0	0	0	0	420
08:15:00	19	82	31	0	0	132	13	25	18	0	0	56	128	68	56	0	0	252	0	0	0	0	0	0	440
Grand Total	83	346	109	0	0	538	37	89	77	0	0	203	470	257	247	0	0	974	0	0	0	0	0	0	**1715**
Approach%	15.4%	64.3%	20.3%	0%		-	18.2%	43.8%	37.9%	0%		-	48.3%	26.4%	25.4%	0%		-	0%	0%	0%	0%		-	**-**
Totals %	4.8%	20.2%	6.4%	0%		31.4%	2.2%	5.2%	4.5%	0%		11.8%	27.4%	15%	14.4%	0%		56.8%	0%	0%	0%	0%		0%	**-**
PHF	0.94	0.91	0.85	0		0.95	0.71	0.82	0.77	0		0.91	0.92	0.86	0.78	0		0.96	0	0	0	0		0	**-**
Heavy	2	8	2	0		12	3	8	10	0		21	13	9	23	0		45	0	0	0	0		0	**-**
Heavy %	2.4%	2.3%	1.8%	0%		2.2%	8.1%	9%	13%	0%		10.3%	2.8%	3.5%	9.3%	0%		4.6%	0%	0%	0%	0%		0%	**-**
Lights	81	338	107	0		526	34	81	67	0		182	457	248	224	0		929	0	0	0	0		0	**-**
Lights %	97.6%	97.7%	98.2%	0%		97.8%	91.9%	91%	87%	0%		89.7%	97.2%	96.5%	90.7%	0%		95.4%	0%	0%	0%	0%		0%	**-**
Single-Unit Trucks	2	2	1	0		5	2	3	3	0		8	10	3	11	0		24	0	0	0	0		0	**-**
Single-Unit Trucks %	2.4%	0.6%	0.9%	0%		0.9%	5.4%	3.4%	3.9%	0%		3.9%	2.1%	1.2%	4.5%	0%		2.5%	0%	0%	0%	0%		0%	**-**
Buses	0	6	1	0		7	1	2	2	0		5	1	5	5	0		11	0	0	0	0		0	**-**
Buses %	0%	1.7%	0.9%	0%		1.3%	2.7%	2.2%	2.6%	0%		2.5%	0.2%	1.9%	2%	0%		1.1%	0%	0%	0%	0%		0%	**-**
Articulated Trucks	0	0	0	0		0	0	3	5	0		8	2	1	7	0		10	0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	3.4%	6.5%	0%		3.9%	0.4%	0.4%	2.8%	0%		1%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**
Bicycles on Road	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	**-**
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Few Clouds (26.65 °C)

Start Time	N Approach WATERDOWN RD						E Approach NORTH SERVICE RD						S Approach WATERDOWN RD						W Approach NORTH SERVICE RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:30:00	36	83	22	0	1	141	30	118	53	0	0	201	45	97	153	0	0	295	0	0	0	0	2	0	637
16:45:00	31	86	24	0	0	141	37	115	61	0	0	213	54	97	122	0	0	273	0	0	0	0	1	0	627
17:00:00	19	89	15	0	1	123	22	131	46	0	0	199	62	85	103	1	0	251	0	0	0	0	1	0	573
17:15:00	27	100	17	0	0	144	24	118	80	0	0	222	56	93	136	2	0	287	0	0	0	0	0	0	653
Grand Total	113	358	78	0	2	549	113	482	240	0	0	835	217	372	514	3	0	1106	0	0	0	0	4	0	**2490**
Approach%	20.6%	65.2%	14.2%	0%		-	13.5%	57.7%	28.7%	0%		-	19.6%	33.6%	46.5%	0.3%		-	0%	0%	0%	0%		-	**-**
Totals %	4.5%	14.4%	3.1%	0%		22%	4.5%	19.4%	9.6%	0%		33.5%	8.7%	14.9%	20.6%	0.1%		44.4%	0%	0%	0%	0%		0%	**-**
PHF	0.78	0.9	0.81	0		0.95	0.76	0.92	0.75	0		0.94	0.88	0.96	0.84	0.38		0.94	0	0	0	0		0	**-**
Heavy	2	7	1	0		10	0	4	7	0		11	10	5	13	0		28	0	0	0	0		0	**-**
Heavy %	1.8%	2%	1.3%	0%		1.8%	0%	0.8%	2.9%	0%		1.3%	4.6%	1.3%	2.5%	0%		2.5%	0%	0%	0%	0%		0%	**-**
Lights	111	351	77	0		539	113	478	233	0		824	207	367	501	3		1078	0	0	0	0		0	**-**
Lights %	98.2%	98%	98.7%	0%		98.2%	100%	99.2%	97.1%	0%		98.7%	95.4%	98.7%	97.5%	100%		97.5%	0%	0%	0%	0%		0%	**-**
Single-Unit Trucks	0	4	1	0		5	0	2	3	0		5	2	2	1	0		5	0	0	0	0		0	**-**
Single-Unit Trucks %	0%	1.1%	1.3%	0%		0.9%	0%	0.4%	1.3%	0%		0.6%	0.9%	0.5%	0.2%	0%		0.5%	0%	0%	0%	0%		0%	**-**
Buses	2	3	0	0		5	0	1	2	0		3	2	3	9	0		14	0	0	0	0		0	**-**
Buses %	1.8%	0.8%	0%	0%		0.9%	0%	0.2%	0.8%	0%		0.4%	0.9%	0.8%	1.8%	0%		1.3%	0%	0%	0%	0%		0%	**-**
Articulated Trucks	0	0	0	0		0	0	1	2	0		3	6	0	3	0		9	0	0	0	0		0	**-**
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0.2%	0.8%	0%		0.4%	2.8%	0%	0.6%	0%		0.8%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	**-**
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	16.7%		**-**
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	**-**
Bicycles on Crosswalk%	-	-	-	-	33.3%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	50%		**-**
Bicycles on Road	0	1	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	0	0	0	0	0	-	**-**
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

Peak Hour: 07:30 AM - 08:30 AM **Weather: Few Clouds (13.86 °C)**



BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 04:30 PM - 05:30 PM **Weather: Few Clouds (26.65 °C)**



Spectrum

Turning Movement Count
Location Name: WATERDOWN RD & MASONRY COURT / RAILWAY RD
Date: Tue, May 30, 2023 Deployment Lead: Walter Fugaj

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Turning Movement Count (5 . WATERDOWN RD & MASONRY COURT / RAILWAY RD)

Start Time	N Approach WATERDOWN RD						E Approach MASONRY CT						S Approach WATERDOWN RD						W Approach RAILWAY RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	4	73	29	0	0	106	23	1	0	0	0	24	15	240	1	0	0	256	1	0	9	0	1	10	396	
07:15:00	2	87	40	0	0	129	15	0	2	0	1	17	17	215	5	0	1	237	1	0	1	0	0	2	385	
07:30:00	1	130	47	0	1	178	22	0	3	0	2	25	11	192	4	0	1	207	1	0	5	0	0	6	416	
07:45:00	5	142	28	0	0	175	16	0	2	0	2	18	10	191	1	0	0	202	3	0	5	0	0	8	403	1600
08:00:00	1	152	24	0	0	177	34	0	2	0	0	36	11	216	0	0	0	227	1	0	4	0	0	5	445	1649
08:15:00	7	127	23	0	0	157	23	0	2	0	0	25	8	217	4	0	0	229	1	0	2	0	2	3	414	1678
08:30:00	5	114	12	0	0	131	17	0	1	0	1	18	2	207	0	0	0	209	4	0	9	0	1	13	371	1633
08:45:00	2	139	20	0	0	161	11	0	4	0	2	15	5	144	2	0	0	151	1	0	4	0	0	5	332	1562
BREAK																										
16:00:00	2	152	16	0	0	170	27	0	2	0	2	29	6	147	2	0	0	155	1	0	6	0	0	7	361	
16:15:00	5	143	27	0	0	175	31	0	5	0	2	36	6	176	0	0	3	182	2	0	6	0	0	8	401	
16:30:00	5	154	19	0	3	178	66	0	5	0	0	71	6	171	2	0	0	179	4	0	1	0	2	5	433	
16:45:00	2	195	25	0	0	222	45	0	7	0	0	52	5	146	1	0	0	152	1	1	4	0	0	6	432	1627
17:00:00	3	161	21	0	0	185	75	1	9	0	2	85	4	143	3	0	0	150	3	0	1	0	1	4	424	1690
17:15:00	2	186	18	0	0	206	75	1	8	0	2	84	7	111	2	0	1	120	1	0	5	0	2	6	416	1705
17:30:00	1	216	27	0	2	244	30	0	2	0	2	32	5	152	0	0	1	157	6	0	1	0	2	7	440	1712
17:45:00	0	170	13	0	0	183	76	0	15	0	1	91	7	124	1	0	0	132	2	0	1	0	1	3	409	1689
Grand Total	47	2341	389	0	6	2777	586	3	69	0	19	658	125	2792	28	0	7	2945	33	1	64	0	12	98	**6478**	-
Approach%	1.7%	84.3%	14%	0%		-	89.1%	0.5%	10.5%	0%		-	4.2%	94.8%	1%	0%		-	33.7%	1%	65.3%	0%		-	**-**	-
Totals %	0.7%	36.1%	6%	0%		42.9%	9%	0%	1.1%	0%		10.2%	1.9%	43.1%	0.4%	0%		45.5%	0.5%	0%	1%	0%		1.5%	**-**	-
Heavy	28	85	11	0		-	4	1	3	0		-	2	105	10	0		-	0	0	36	0		-	**-**	-
Heavy %	59.6%	3.6%	2.8%	0%		-	0.7%	33.3%	4.3%	0%		-	1.6%	3.8%	35.7%	0%		-	0%	0%	56.3%	0%		-	**-**	-
Bicycles	0	1	0	0		-	0	0	0	0		-	0	6	0	0		-	1	0	0	0		-	**-**	-
Bicycle %	0%	0%	0%	0%		-	0%	0%	0%	0%		-	0%	0.2%	0%	0%		-	3%	0%	0%	0%		-	**-**	-

Spectrum

Turning Movement Count
Location Name: WATERDOWN RD & MASONRY COURT / RAILWAY RD
Date: Tue, May 30, 2023 Deployment Lead: Walter Fugaj

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 07:30 AM - 08:30 AM Weather: Few Clouds (13.86 °C)

Start Time	N Approach WATERDOWN RD						E Approach MASONRY CT						S Approach WATERDOWN RD						W Approach RAILWAY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:30:00	1	130	47	0	1	178	22	0	3	0	2	25	11	192	4	0	1	207	1	0	5	0	0	6	416
07:45:00	5	142	28	0	0	175	16	0	2	0	2	18	10	191	1	0	0	202	3	0	5	0	0	8	403
08:00:00	1	152	24	0	0	177	34	0	2	0	0	36	11	216	0	0	0	227	1	0	4	0	0	5	445
08:15:00	7	127	23	0	0	157	23	0	2	0	0	25	8	217	4	0	0	229	1	0	2	0	2	3	414
Grand Total	14	551	122	0	1	687	95	0	9	0	4	104	40	816	9	0	1	865	6	0	16	0	2	22	**1678**
Approach%	2%	80.2%	17.8%	0%		-	91.3%	0%	8.7%	0%		-	4.6%	94.3%	1%	0%		-	27.3%	0%	72.7%	0%		-	**-**
Totals %	0.8%	32.8%	7.3%	0%		40.9%	5.7%	0%	0.5%	0%		6.2%	2.4%	48.6%	0.5%	0%		51.5%	0.4%	0%	1%	0%		1.3%	**-**
PHF	0.5	0.91	0.65	0		0.96	0.7	0	0.75	0		0.72	0.91	0.94	0.56	0		0.94	0.5	0	0.8	0		0.69	**-**
Heavy	10	28	3	0		41	0	0	1	0		1	0	33	5	0		38	0	0	14	0		14	**-**
Heavy %	71.4%	5.1%	2.5%	0%		6%	0%	0%	11.1%	0%		1%	0%	4%	55.6%	0%		4.4%	0%	0%	87.5%	0%		63.6%	**-**
Lights	4	523	119	0		646	95	0	8	0		103	40	783	4	0		827	6	0	2	0		8	**-**
Lights %	28.6%	94.9%	97.5%	0%		94%	100%	0%	88.9%	0%		99%	100%	96%	44.4%	0%		95.6%	100%	0%	12.5%	0%		36.4%	**-**
Single-Unit Trucks	9	7	1	0		17	0	0	0	0		0	0	19	5	0		24	0	0	11	0		11	**-**
Single-Unit Trucks %	64.3%	1.3%	0.8%	0%		2.5%	0%	0%	0%	0%		0%	0%	2.3%	55.6%	0%		2.8%	0%	0%	68.8%	0%		50%	**-**
Buses	0	12	1	0		13	0	0	1	0		1	0	6	0	0		6	0	0	0	0		0	**-**
Buses %	0%	2.2%	0.8%	0%		1.9%	0%	0%	11.1%	0%		1%	0%	0.7%	0%	0%		0.7%	0%	0%	0%	0%		0%	**-**
Articulated Trucks	1	9	1	0		11	0	0	0	0		0	0	8	0	0		8	0	0	3	0		3	**-**
Articulated Trucks %	7.1%	1.6%	0.8%	0%		1.6%	0%	0%	0%	0%		0%	0%	1%	0%	0%		0.9%	0%	0%	18.8%	0%		13.6%	**-**
Pedestrians	-	-	-	-	1	-	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	2	-	**-**
Pedestrians%	-	-	-	-	12.5%		-	-	-	-	50%		-	-	-	-	12.5%		-	-	-	-	25%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	0	0	0	0	0	-	**-**
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

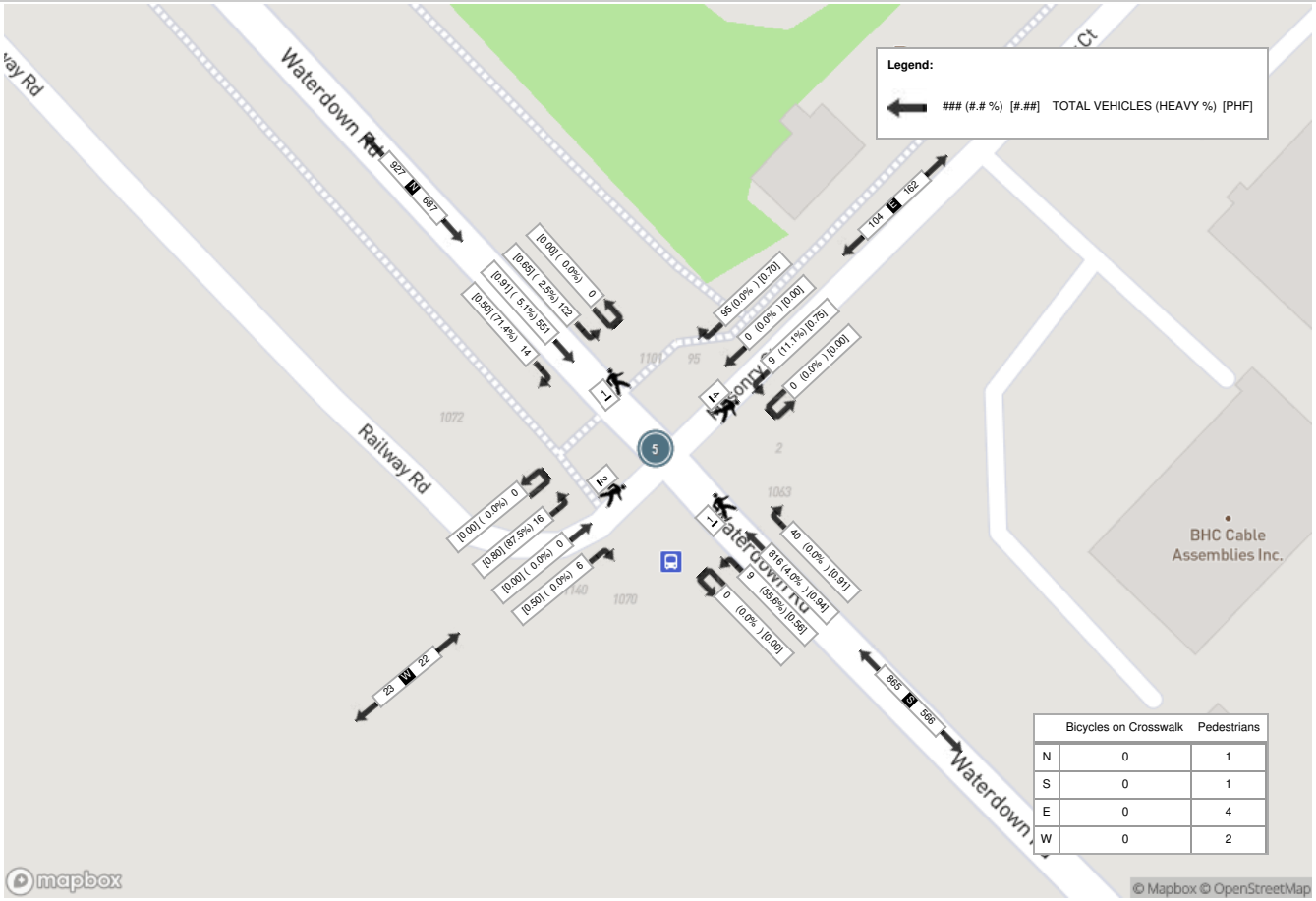
BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 04:45 PM - 05:45 PM Weather: Few Clouds (26.65 °C)

Start Time	N Approach WATERDOWN RD						E Approach MASONRY CT						S Approach WATERDOWN RD						W Approach RAILWAY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	2	195	25	0	0	222	45	0	7	0	0	52	5	146	1	0	0	152	1	1	4	0	0	6	432
17:00:00	3	161	21	0	0	185	75	1	9	0	2	85	4	143	3	0	0	150	3	0	1	0	1	4	424
17:15:00	2	186	18	0	0	206	75	1	8	0	2	84	7	111	2	0	1	120	1	0	5	0	2	6	416
17:30:00	1	216	27	0	2	244	30	0	2	0	2	32	5	152	0	0	1	157	6	0	1	0	2	7	440
Grand Total	8	758	91	0	2	857	225	2	26	0	6	253	21	552	6	0	2	579	11	1	11	0	5	23	**1712**
Approach%	0.9%	88.4%	10.6%	0%		-	88.9%	0.8%	10.3%	0%		-	3.6%	95.3%	1%	0%		-	47.8%	4.3%	47.8%	0%		-	**-**
Totals %	0.5%	44.3%	5.3%	0%		50.1%	13.1%	0.1%	1.5%	0%		14.8%	1.2%	32.2%	0.4%	0%		33.8%	0.6%	0.1%	0.6%	0%		1.3%	**-**
PHF	0.67	0.88	0.84	0		0.88	0.75	0.5	0.72	0		0.74	0.75	0.91	0.5	0		0.92	0.46	0.25	0.55	0		0.82	**-**
Heavy	6	16	2	0		24	2	0	0	0		2	0	21	2	0		23	0	0	2	0		2	**-**
Heavy %	75%	2.1%	2.2%	0%		2.8%	0.9%	0%	0%	0%		0.8%	0%	3.8%	33.3%	0%		4%	0%	0%	18.2%	0%		8.7%	**-**
Lights	2	742	89	0		833	223	2	26	0		251	21	531	4	0		556	11	1	9	0		21	**-**
Lights %	25%	97.9%	97.8%	0%		97.2%	99.1%	100%	100%	0%		99.2%	100%	96.2%	66.7%	0%		96%	100%	100%	81.8%	0%		91.3%	**-**
Single-Unit Trucks	4	11	0	0		15	1	0	0	0		1	0	7	1	0		8	0	0	2	0		2	**-**
Single-Unit Trucks %	50%	1.5%	0%	0%		1.8%	0.4%	0%	0%	0%		0.4%	0%	1.3%	16.7%	0%		1.4%	0%	0%	18.2%	0%		8.7%	**-**
Buses	0	2	2	0		4	0	0	0	0		0	0	8	0	0		8	0	0	0	0		0	**-**
Buses %	0%	0.3%	2.2%	0%		0.5%	0%	0%	0%	0%		0%	0%	1.4%	0%	0%		1.4%	0%	0%	0%	0%		0%	**-**
Articulated Trucks	2	3	0	0		5	1	0	0	0		1	0	6	1	0		7	0	0	0	0		0	**-**
Articulated Trucks %	25%	0.4%	0%	0%		0.6%	0.4%	0%	0%	0%		0.4%	0%	1.1%	16.7%	0%		1.2%	0%	0%	0%	0%		0%	**-**
Pedestrians	-	-	-	-	2	-	-	-	-	-	6	-	-	-	-	-	2	-	-	-	-	-	3	-	**-**
Pedestrians%	-	-	-	-	13.3%		-	-	-	-	40%		-	-	-	-	13.3%		-	-	-	-	20%		**-**
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	**-**
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	13.3%		**-**
Bicycles on Road	0	1	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	**-**
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		**-**

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 07:30 AM - 08:30 AM **Weather: Few Clouds (13.86 °C)**



Peak Hour: 04:45 PM - 05:45 PM **Weather: Few Clouds (26.65 °C)**



BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Turning Movement Count (4 . WATERDOWN RD & HIGHWAY 403 EB OFF-RAMP / ALAYNE BRYK WAY)

Start Time	N Approach WATERDOWN ROAD					E Approach SOUTH SERVICE ROAD					S Approach WATERDOWN ROAD					W Approach HIGHWAY 403 EB OFF-RAMP						Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	46	49	0	0	95	16	2	0	0	18	185	86	0	2	271	56	85	49	0	1	190	574	
07:15:00	69	58	0	0	127	22	5	0	0	27	112	117	0	0	229	59	89	85	0	0	233	616	
07:30:00	86	60	0	0	146	20	9	0	0	29	103	124	0	0	227	76	82	86	0	0	244	646	
07:45:00	131	76	0	0	207	17	6	0	0	23	95	119	0	1	214	53	63	51	0	1	167	611	2447
08:00:00	116	52	0	0	168	13	2	0	0	15	116	135	0	1	251	47	57	50	0	1	154	588	2461
08:15:00	99	67	0	0	166	16	3	0	0	19	102	138	0	0	240	47	32	70	0	1	149	574	2419
08:30:00	82	52	0	0	134	12	2	0	0	14	115	116	0	2	231	48	16	52	0	0	116	495	2268
08:45:00	109	56	0	0	165	8	3	0	0	11	81	84	0	0	165	46	23	64	0	0	133	474	2131
BREAK																							
16:00:00	106	68	0	0	174	20	5	0	0	25	65	106	0	0	171	57	40	31	0	0	128	498	
16:15:00	92	72	0	0	164	12	18	0	0	30	72	139	0	0	211	69	34	30	0	1	133	538	
16:30:00	115	62	0	0	177	69	16	0	0	85	77	165	0	1	242	56	46	31	0	1	133	637	
16:45:00	132	72	0	0	204	69	7	0	0	76	71	133	0	2	204	68	44	34	0	2	146	630	2303
17:00:00	120	64	0	0	184	53	18	0	0	71	75	143	0	1	218	59	36	44	0	1	139	612	2417
17:15:00	143	71	0	0	214	92	13	0	0	105	68	127	0	1	195	56	36	26	0	0	118	632	2511
17:30:00	156	73	0	0	229	36	10	0	0	46	64	118	0	0	182	66	44	24	0	0	134	591	2465
17:45:00	124	68	0	0	192	99	11	0	0	110	50	147	0	2	197	54	28	14	0	1	96	595	2430
Grand Total	1726	1020	0	0	2746	574	130	0	0	704	1451	1997	0	13	3448	917	755	741	0	10	2413	**9311**	-
Approach%	62.9%	37.1%	0%		-	81.5%	18.5%	0%		-	42.1%	57.9%	0%		-	38%	31.3%	30.7%	0%		-	**-**	-
Totals %	18.5%	11%	0%		29.5%	6.2%	1.4%	0%		7.6%	15.6%	21.4%	0%		37%	9.8%	8.1%	8%	0%		25.9%	**-**	-
Heavy	77	47	0		-	35	14	0		-	72	69	0		-	33	26	23	0		-	**-**	-
Heavy %	4.5%	4.6%	0%		-	6.1%	10.8%	0%		-	5%	3.5%	0%		-	3.6%	3.4%	3.1%	0%		-	**-**	-
Bicycles	2	1	0		-	2	0	0		-	0	3	0		-	0	0	0	0		-	**-**	-
Bicycle %	0.1%	0.1%	0%		-	0.3%	0%	0%		-	0%	0.2%	0%		-	0%	0%	0%	0%		-	**-**	-

Spectrum

Turning Movement Count
Location Name: WATERDOWN RD & HIGHWAY 403 EB OFF-RAMP / ALAYNE BRYK WAY
Date: Tue, May 30, 2023 Deployment Lead: Walter Fugaj

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 07:15 AM - 08:15 AM Weather: Few Clouds (13.86 °C)

Start Time	N Approach WATERDOWN ROAD					E Approach SOUTH SERVICE ROAD					S Approach WATERDOWN ROAD					W Approach HIGHWAY 403 EB OFF-RAMP						Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:15:00	69	58	0	0	127	22	5	0	0	27	112	117	0	0	229	59	89	85	0	0	233	616
07:30:00	86	60	0	0	146	20	9	0	0	29	103	124	0	0	227	76	82	86	0	0	244	646
07:45:00	131	76	0	0	207	17	6	0	0	23	95	119	0	1	214	53	63	51	0	1	167	611
08:00:00	116	52	0	0	168	13	2	0	0	15	116	135	0	1	251	47	57	50	0	1	154	588
Grand Total	402	246	0	0	648	72	22	0	0	94	426	495	0	2	921	235	291	272	0	2	798	**2461**
Approach%	62%	38%	0%		-	76.6%	23.4%	0%		-	46.3%	53.7%	0%		-	29.4%	36.5%	34.1%	0%		-	**-**
Totals %	16.3%	10%	0%		26.3%	2.9%	0.9%	0%		3.8%	17.3%	20.1%	0%		37.4%	9.5%	11.8%	11.1%	0%		32.4%	**-**
PHF	0.77	0.81	0		0.78	0.82	0.61	0		0.81	0.92	0.92	0		0.92	0.77	0.82	0.79	0		0.82	**-**
Heavy	25	13	0		38	8	4	0		12	18	22	0		40	11	7	8	0		26	**-**
Heavy %	6.2%	5.3%	0%		5.9%	11.1%	18.2%	0%		12.8%	4.2%	4.4%	0%		4.3%	4.7%	2.4%	2.9%	0%		3.3%	**-**
Lights	377	233	0		610	64	18	0		82	408	473	0		881	224	284	264	0		772	**-**
Lights %	93.8%	94.7%	0%		94.1%	88.9%	81.8%	0%		87.2%	95.8%	95.6%	0%		95.7%	95.3%	97.6%	97.1%	0%		96.7%	**-**
Single-Unit Trucks	8	2	0		10	0	0	0		0	11	14	0		25	5	1	4	0		10	**-**
Single-Unit Trucks %	2%	0.8%	0%		1.5%	0%	0%	0%		0%	2.6%	2.8%	0%		2.7%	2.1%	0.3%	1.5%	0%		1.3%	**-**
Buses	8	4	0		12	8	4	0		12	6	1	0		7	0	6	0	0		6	**-**
Buses %	2%	1.6%	0%		1.9%	11.1%	18.2%	0%		12.8%	1.4%	0.2%	0%		0.8%	0%	2.1%	0%	0%		0.8%	**-**
Articulated Trucks	9	7	0		16	0	0	0		0	1	7	0		8	6	0	4	0		10	**-**
Articulated Trucks %	2.2%	2.8%	0%		2.5%	0%	0%	0%		0%	0.2%	1.4%	0%		0.9%	2.6%	0%	1.5%	0%		1.3%	**-**
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-	-	-	-	2	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	50%		-	-	-	-	50%		**-**
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-	0	-	**-**
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-	-	-	-	0%		**-**
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	1	0	0	-	0	0	0	0	0	-	**-**
Bicycles on Road%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-	-	-	-	0%		**-**

Spectrum

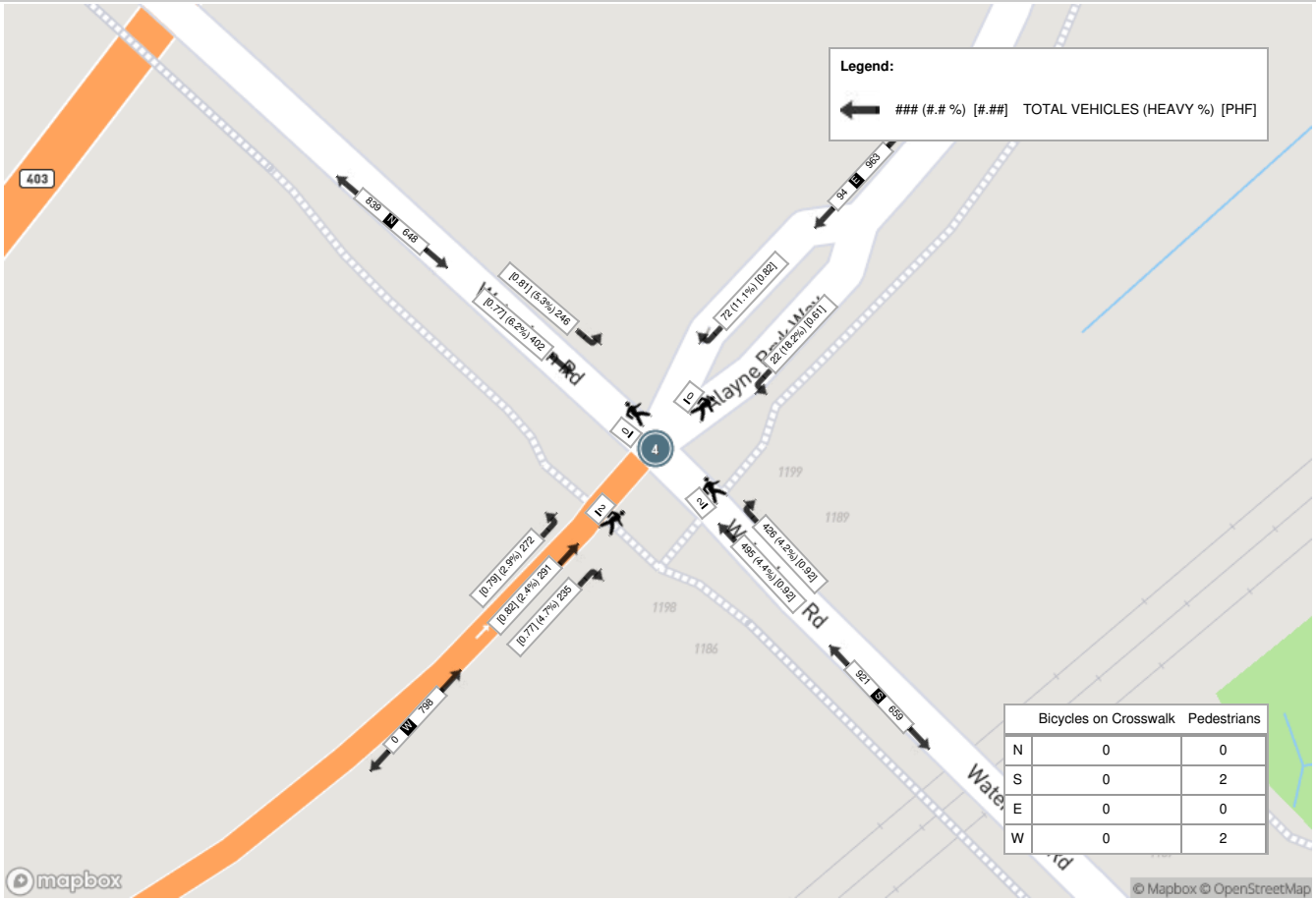
Turning Movement Count
Location Name: WATERDOWN RD & HIGHWAY 403 EB OFF-RAMP / ALAYNE BRYK WAY
Date: Tue, May 30, 2023 Deployment Lead: Walter Fugaj

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 04:30 PM - 05:30 PM Weather: Few Clouds (26.65 °C)

Start Time	N Approach WATERDOWN ROAD					E Approach SOUTH SERVICE ROAD					S Approach WATERDOWN ROAD					W Approach HIGHWAY 403 EB OFF-RAMP						Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:30:00	115	62	0	0	177	69	16	0	0	85	77	165	0	1	242	56	46	31	0	1	133	637
16:45:00	132	72	0	0	204	69	7	0	0	76	71	133	0	2	204	68	44	34	0	2	146	630
17:00:00	120	64	0	0	184	53	18	0	0	71	75	143	0	1	218	59	36	44	0	1	139	612
17:15:00	143	71	0	0	214	92	13	0	0	105	68	127	0	1	195	56	36	26	0	0	118	632
Grand Total	510	269	0	0	779	283	54	0	0	337	291	568	0	5	859	239	162	135	0	4	536	**2511**
Approach%	65.5%	34.5%	0%		-	84%	16%	0%		-	33.9%	66.1%	0%		-	44.6%	30.2%	25.2%	0%		-	**-**
Totals %	20.3%	10.7%	0%		31%	11.3%	2.2%	0%		13.4%	11.6%	22.6%	0%		34.2%	9.5%	6.5%	5.4%	0%		21.3%	**-**
PHF	0.89	0.93	0		0.91	0.77	0.75	0		0.8	0.94	0.86	0		0.89	0.88	0.88	0.77	0		0.92	**-**
Heavy	18	10	0		28	10	4	0		14	19	8	0		27	6	5	6	0		17	**-**
Heavy %	3.5%	3.7%	0%		3.6%	3.5%	7.4%	0%		4.2%	6.5%	1.4%	0%		3.1%	2.5%	3.1%	4.4%	0%		3.2%	**-**
Lights	492	259	0		751	273	50	0		323	272	560	0		832	233	157	129	0		519	**-**
Lights %	96.5%	96.3%	0%		96.4%	96.5%	92.6%	0%		95.8%	93.5%	98.6%	0%		96.9%	97.5%	96.9%	95.6%	0%		96.8%	**-**
Single-Unit Trucks	13	4	0		17	0	1	0		1	9	2	0		11	3	0	1	0		4	**-**
Single-Unit Trucks %	2.5%	1.5%	0%		2.2%	0%	1.9%	0%		0.3%	3.1%	0.4%	0%		1.3%	1.3%	0%	0.7%	0%		0.7%	**-**
Buses	2	4	0		6	10	3	0		13	7	2	0		9	1	5	1	0		7	**-**
Buses %	0.4%	1.5%	0%		0.8%	3.5%	5.6%	0%		3.9%	2.4%	0.4%	0%		1%	0.4%	3.1%	0.7%	0%		1.3%	**-**
Articulated Trucks	3	2	0		5	0	0	0		0	3	4	0		7	2	0	4	0		6	**-**
Articulated Trucks %	0.6%	0.7%	0%		0.6%	0%	0%	0%		0%	1%	0.7%	0%		0.8%	0.8%	0%	3%	0%		1.1%	**-**
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	3	-	-	-	-	-	2	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	33.3%		-	-	-	-	22.2%		**-**
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-	-	-	-	2	-	**-**
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	22.2%		-	-	-	-	22.2%		**-**
Bicycles on Road	1	1	0	0	-	1	0	0	0	-	0	0	0	0	-	0	0	0	0	0	-	**-**
Bicycles on Road%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-	-	-	-	0%		**-**

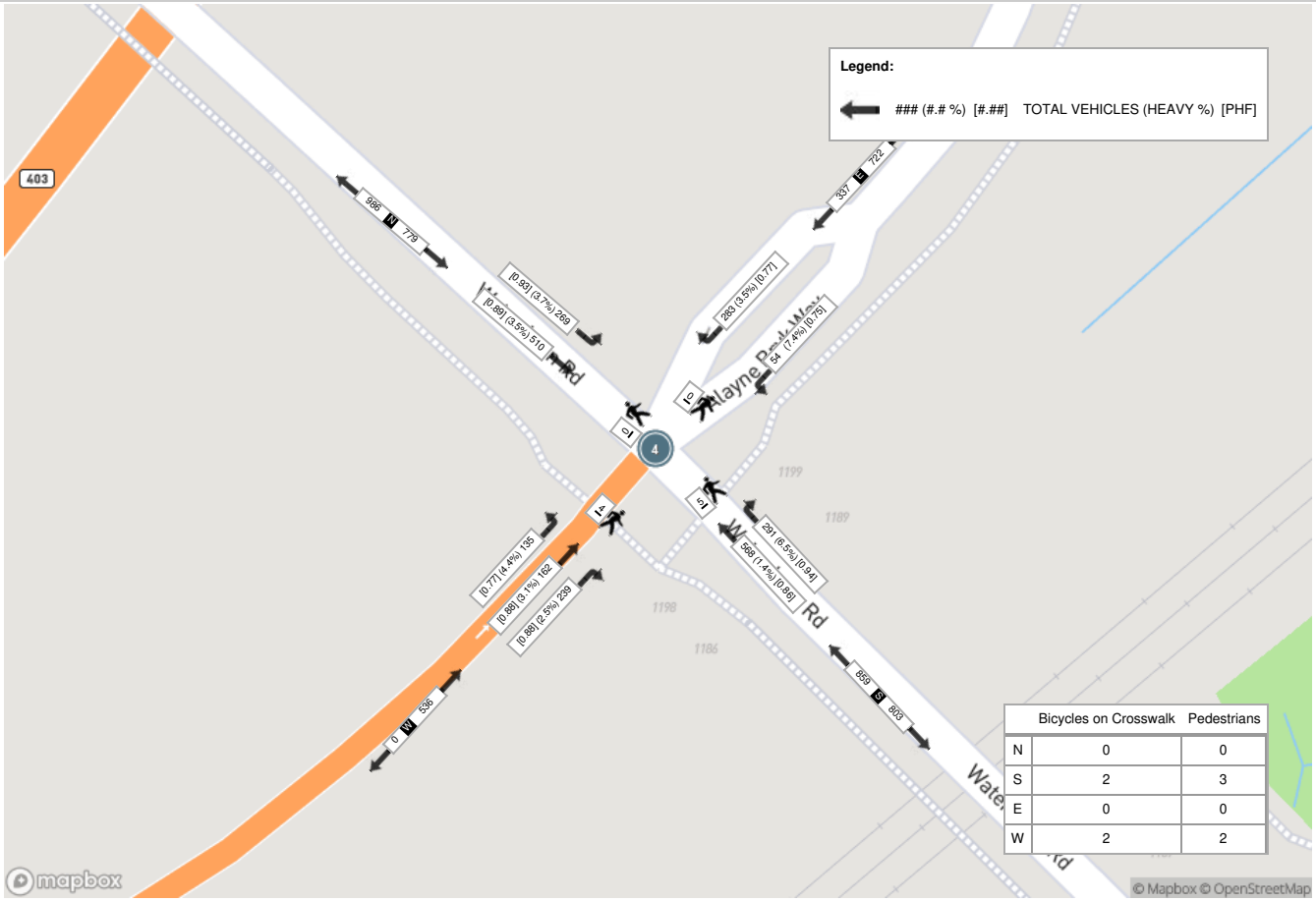
Peak Hour: 07:15 AM - 08:15 AM **Weather: Few Clouds (13.86 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	0
S	0	2
E	0	0
W	0	2

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 04:30 PM - 05:30 PM **Weather: Few Clouds (26.65 °C)**



	Bicycles on Crosswalk	Pedestrians
N	0	0
S	2	3
E	0	0
W	2	2

Spectrum

Turning Movement Count
Location Name: ALAYNE BRYK WAY & HIGHWAY 403 EB ON-RAMP & GO STATION LOT ENTRANCE
Date: Tue, May 30, 2023 Deployment Lead: Walter Fugaj

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Turning Movement Count (1 . ALAYNE BRYK WAY & HIGHWAY 403 EB ON-RAMP & GO STATION LOT ENTRANCE)

Start Time	N Approach HIGHWAY 403 EB ON-RAMP					S Approach PRIVATE DRIVEWAY					W Approach SOUTH SERVICE ROAD					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	UTurn N:N	Peds N:	Approach Total	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	0	0	0	0	0	5	4	0	0	9	28	199	0	0	227	236	
07:15:00	0	0	0	0	0	6	5	0	0	11	57	115	0	0	172	183	
07:30:00	0	0	0	0	0	6	4	0	0	10	54	123	0	0	177	187	
07:45:00	0	0	0	0	0	6	3	0	0	9	42	135	0	0	177	186	792
08:00:00	0	0	0	0	0	4	2	0	1	6	31	159	0	0	190	196	752
08:15:00	0	0	0	0	0	6	3	0	0	9	19	148	0	0	167	176	745
08:30:00	0	0	0	0	0	3	1	0	0	4	9	155	0	0	164	168	726
08:45:00	0	0	0	0	0	0	2	0	0	2	15	128	0	0	143	145	685
BREAK																	
16:00:00	0	0	0	0	0	5	12	0	0	17	4	128	0	0	132	149	
16:15:00	0	0	0	0	0	11	15	0	0	26	5	115	0	0	120	146	
16:30:00	0	0	0	0	0	7	37	0	0	44	4	119	0	0	123	167	
16:45:00	0	0	0	0	0	7	39	0	0	46	8	122	0	0	130	176	638
17:00:00	0	0	0	0	0	11	50	0	0	61	7	118	0	0	125	186	675
17:15:00	0	0	0	0	0	11	48	0	0	59	4	121	0	0	125	184	713
17:30:00	0	0	0	0	0	3	16	0	0	19	4	122	0	0	126	145	691
17:45:00	0	0	0	0	0	10	87	0	0	97	3	94	0	0	97	194	709
Grand Total	0	0	0	0	0	101	328	0	1	429	294	2101	0	0	2395	**2824**	-
Approach%	0%	0%	0%		-	23.5%	76.5%	0%		-	12.3%	87.7%	0%		-	**-**	-
Totals %	0%	0%	0%		0%	3.6%	11.6%	0%		15.2%	10.4%	74.4%	0%		84.8%	**-**	-
Heavy	0	0	0		-	0	0	0		-	0	94	0		-	**-**	-
Heavy %	0%	0%	0%		-	0%	0%	0%		-	0%	4.5%	0%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

Peak Hour: 07:00 AM - 08:00 AM Weather: Few Clouds (13.86 °C)

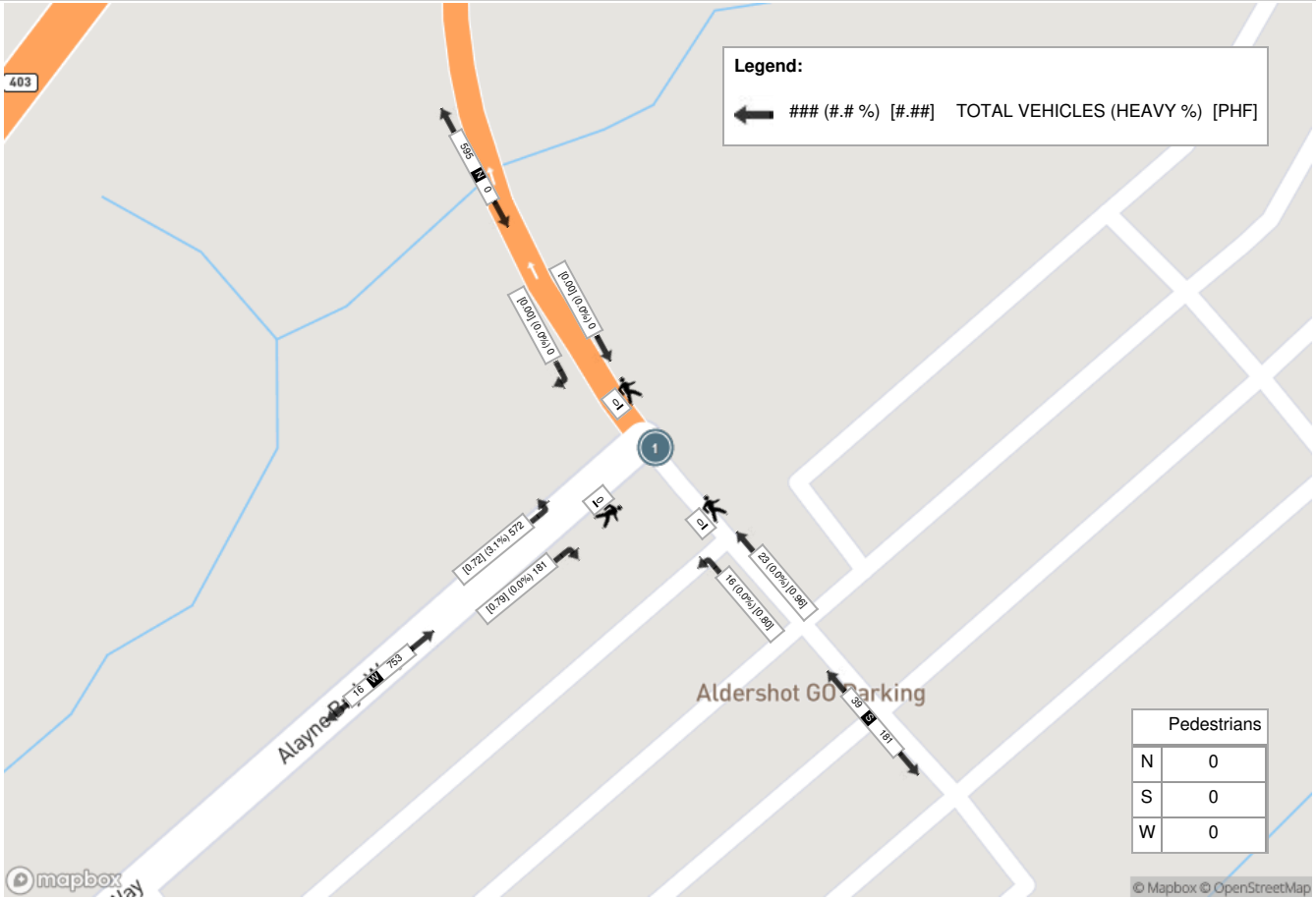
Start Time	N Approach HIGHWAY 403 EB ON-RAMP					S Approach PRIVATE DRIVEWAY					W Approach SOUTH SERVICE ROAD					Int. Total (15 min)
	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	
07:00:00	0	0	0	0	0	5	4	0	0	9	28	199	0	0	227	236
07:15:00	0	0	0	0	0	6	5	0	0	11	57	115	0	0	172	183
07:30:00	0	0	0	0	0	6	4	0	0	10	54	123	0	0	177	187
07:45:00	0	0	0	0	0	6	3	0	0	9	42	135	0	0	177	186
Grand Total	0	0	0	0	0	23	16	0	0	39	181	572	0	0	753	**792**
Approach%	0%	0%	0%		-	59%	41%	0%		-	24%	76%	0%		-	**-**
Totals %	0%	0%	0%		0%	2.9%	2%	0%		4.9%	22.9%	72.2%	0%		95.1%	**-**
PHF	0	0	0		0	0.96	0.8	0		0.89	0.79	0.72	0		0.83	**-**
Heavy	0	0	0		0	0	0	0		0	0	18	0		18	**-**
Heavy %	0%	0%	0%		0%	0%	0%	0%		0%	0%	3.1%	0%		2.4%	**-**
Lights	0	0	0		0	23	16	0		39	181	554	0		735	**-**
Lights %	0%	0%	0%		0%	100%	100%	0%		100%	100%	96.9%	0%		97.6%	**-**
Single-Unit Trucks	0	0	0		0	0	0	0		0	0	11	0		11	**-**
Single-Unit Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	1.9%	0%		1.5%	**-**
Buses	0	0	0		0	0	0	0		0	0	3	0		3	**-**
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0.5%	0%		0.4%	**-**
Articulated Trucks	0	0	0		0	0	0	0		0	0	4	0		4	**-**
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0.7%	0%		0.5%	**-**
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**

BA Group
300 45 ST. CLAIR AVE W
TORONTO ONTARIO, M4V 1K9
CANADA

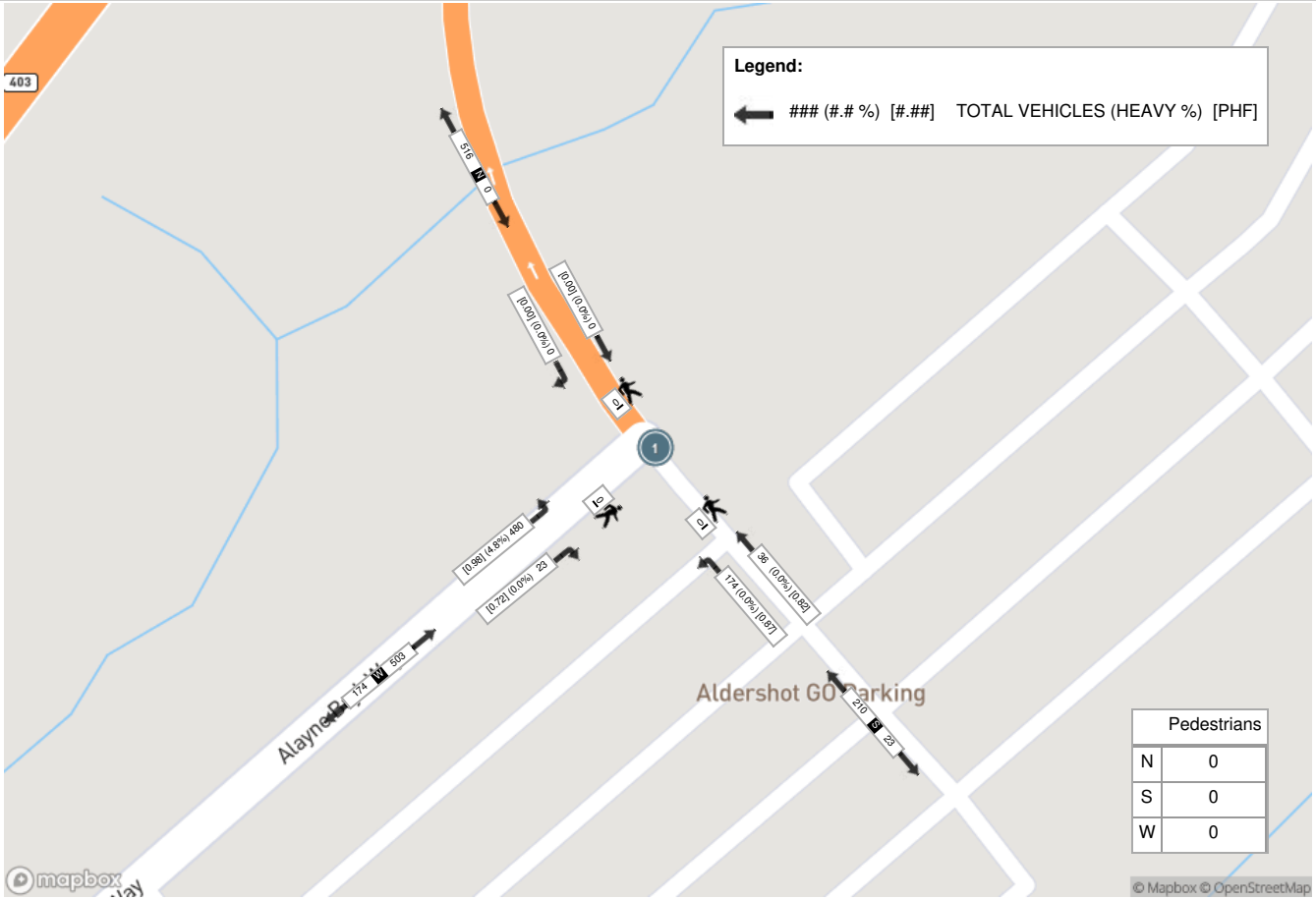
Peak Hour: 04:30 PM - 05:30 PM Weather: Few Clouds (26.65 °C)

Start Time	N Approach HIGHWAY 403 EB ON-RAMP					S Approach PRIVATE DRIVEWAY					W Approach SOUTH SERVICE ROAD					Int. Total (15 min)
	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	
16:30:00	0	0	0	0	0	7	37	0	0	44	4	119	0	0	123	167
16:45:00	0	0	0	0	0	7	39	0	0	46	8	122	0	0	130	176
17:00:00	0	0	0	0	0	11	50	0	0	61	7	118	0	0	125	186
17:15:00	0	0	0	0	0	11	48	0	0	59	4	121	0	0	125	184
Grand Total	0	0	0	0	0	36	174	0	0	210	23	480	0	0	503	**713**
Approach%	0%	0%	0%		-	17.1%	82.9%	0%		-	4.6%	95.4%	0%		-	**-**
Totals %	0%	0%	0%		0%	5%	24.4%	0%		29.5%	3.2%	67.3%	0%		70.5%	**-**
PHF	0	0	0		0	0.82	0.87	0		0.86	0.72	0.98	0		0.97	**-**
Heavy	0	0	0		0	0	0	0		0	0	23	0		23	**-**
Heavy %	0%	0%	0%		0%	0%	0%	0%		0%	0%	4.8%	0%		4.6%	**-**
Lights	0	0	0		0	36	174	0		210	23	457	0		480	**-**
Lights %	0%	0%	0%		0%	100%	100%	0%		100%	100%	95.2%	0%		95.4%	**-**
Single-Unit Trucks	0	0	0		0	0	0	0		0	0	14	0		14	**-**
Single-Unit Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	2.9%	0%		2.8%	**-**
Buses	0	0	0		0	0	0	0		0	0	5	0		5	**-**
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0%	1%	0%		1%	**-**
Articulated Trucks	0	0	0		0	0	0	0		0	0	4	0		4	**-**
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0.8%	0%		0.8%	**-**
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**

Peak Hour: 07:00 AM - 08:00 AM Weather: Few Clouds (13.86 °C)



Peak Hour: 04:30 PM - 05:30 PM Weather: Few Clouds (26.65 °C)



Appendix G:
Transportation Tomorrow Survey (TTS) Queries

AM Peak Hour
Outbound
2023-07-16

Zone	Trips	%	Traffic Volume Allocation: North Waterdown Rd	East N Service Rd	East Highway 403	West Highway 403	East Plains Rd E	West Plains Rd W	South Lasalle Park Rd	TOTAL	Route Split Totals: North Waterdown Rd	East N Service Rd	East Highway 403	West Highway 403	East Plains Rd E	West Plains Rd W	South Lasalle Park Rd	TOTAL
PD 1 of Toronto	5	0%			5%	90%		5%		100.00%	0.00%	0.01%	0.09%	0.00%	0.01%	0.00%	0.00%	0.1%
PD 2 of Toronto	30	1%			5%	90%		5%		100.00%	0.00%	0.03%	0.55%	0.00%	0.03%	0.00%	0.00%	0.6%
PD 4 of Toronto	26	1%			5%	90%		5%		100.00%	0.00%	0.03%	0.48%	0.00%	0.03%	0.00%	0.00%	0.5%
PD 8 of Toronto	10	0%			5%	90%		5%		100.00%	0.00%	0.01%	0.18%	0.00%	0.01%	0.00%	0.00%	0.2%
PD 9 of Toronto	71	1%			5%	90%		5%		100.00%	0.00%	0.07%	1.30%	0.00%	0.07%	0.00%	0.00%	1.4%
Caledon	40	1%	5%	5%	85%			5%		100.00%	0.04%	0.04%	0.69%	0.00%	0.04%	0.00%	0.00%	0.8%
Brampton	54	1%	5%	5%	85%			5%		100.00%	0.06%	0.06%	0.94%	0.00%	0.06%	0.00%	0.00%	1.1%
Mississauga	294	6%			5%	90%		5%		100.00%	0.00%	0.30%	5.40%	0.00%	0.30%	0.00%	0.00%	6.0%
Halton Hills	35	1%	10%	5%	80%			5%		100.00%	0.07%	0.04%	0.57%	0.00%	0.04%	0.00%	0.00%	0.7%
Milton	43	1%	20%	5%	70%			5%		100.00%	0.18%	0.04%	0.61%	0.00%	0.04%	0.00%	0.00%	0.9%
Oakville	641	13%	15%	5%	75%			5%		100.00%	1.96%	0.65%	9.81%	0.00%	0.65%	0.00%	0.00%	13.1%
Burlington	2122	43%									0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.0%
4050	20	0%						80%	20%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.33%	0.08%	0.4%
4051	162	3%					20%	30%	50%	100.00%	0.00%	0.00%	0.00%	0.00%	0.66%	0.99%	1.65%	3.3%
4052	100	2%					25%	75%		100.00%	0.00%	0.00%	0.00%	0.00%	0.51%	1.53%	0.00%	2.0%
4053	391	8%			20%	10%		70%		100.00%	0.00%	1.60%	0.80%	0.00%	5.59%	0.00%	0.00%	8.0%
4054	11	0%			10%			90%		100.00%	0.00%	0.02%	0.00%	0.00%	0.20%	0.00%	0.00%	0.2%
4056	42	1%			5%	55%		40%		100.00%	0.00%	0.04%	0.47%	0.00%	0.34%	0.00%	0.00%	0.9%
4057	71	1%			15%	40%		45%		100.00%	0.00%	0.22%	0.58%	0.00%	0.65%	0.00%	0.00%	1.4%
4059	165	3%			10%	45%		45%		100.00%	0.00%	0.34%	1.52%	0.00%	1.52%	0.00%	0.00%	3.4%
4061	27	1%			5%	55%		40%		100.00%	0.00%	0.03%	0.30%	0.00%	0.22%	0.00%	0.00%	0.6%
4062	26	1%			5%	60%		35%		100.00%	0.00%	0.03%	0.32%	0.00%	0.19%	0.00%	0.00%	0.5%
4063	72	1%			15%	65%		20%		100.00%	0.00%	0.22%	0.96%	0.00%	0.29%	0.00%	0.00%	1.5%
4065	45	1%			10%	50%		40%		100.00%	0.00%	0.09%	0.46%	0.00%	0.37%	0.00%	0.00%	0.9%
4068	100	2%			15%	70%		15%		100.00%	0.00%	0.31%	1.43%	0.00%	0.31%	0.00%	0.00%	2.0%
4069	38	1%			10%	75%		15%		100.00%	0.00%	0.08%	0.58%	0.00%	0.12%	0.00%	0.00%	0.8%
4075	74	2%			5%	85%		10%		100.00%	0.00%	0.08%	1.28%	0.00%	0.15%	0.00%	0.00%	1.5%
4076	47	1%			5%	80%		15%		100.00%	0.00%	0.05%	0.77%	0.00%	0.14%	0.00%	0.00%	1.0%
4078	81	2%	10%	5%	75%			10%		100.00%	0.17%	0.08%	1.24%	0.00%	0.17%	0.00%	0.00%	1.7%
4079	56	1%	20%	10%	65%			5%		100.00%	0.23%	0.11%	0.74%	0.00%	0.06%	0.00%	0.00%	1.1%
4080	80	2%	25%	10%	60%			5%		100.00%	0.41%	0.16%	0.98%	0.00%	0.08%	0.00%	0.00%	1.6%
4081	75	2%	10%	20%	65%			5%		100.00%	0.15%	0.31%	0.99%	0.00%	0.08%	0.00%	0.00%	1.5%
4082	53	1%	5%	25%	65%			5%		100.00%	0.05%	0.27%	0.70%	0.00%	0.05%	0.00%	0.00%	1.1%
4084	25	1%	30%	15%	50%			5%		100.00%	0.15%	0.08%	0.26%	0.00%	0.03%	0.00%	0.00%	0.5%
4086	13	0%		25%	60%			15%		100.00%	0.00%	0.07%	0.16%	0.00%	0.04%	0.00%	0.00%	0.3%
4088	58	1%		60%	30%			10%		100.00%	0.00%	0.71%	0.36%	0.00%	0.12%	0.00%	0.00%	1.2%
4089	67	1%	30%	35%	30%			5%		100.00%	0.41%	0.48%	0.41%	0.00%	0.07%	0.00%	0.00%	1.4%
4091	127	3%	50%	40%				10%		100.00%	1.30%	1.04%	0.00%	0.00%	0.26%	0.00%	0.00%	2.6%
4093	27	1%	60%	10%	30%					100.00%	0.33%	0.08%	0.17%	0.00%	0.00%	0.00%	0.00%	0.6%
4097	12	0%	65%	10%	25%					100.00%	0.16%	0.02%	0.06%	0.00%	0.00%	0.00%	0.00%	0.2%
4190	56	1%		25%	60%			15%		100.00%	0.00%	0.29%	0.69%	0.00%	0.17%	0.00%	0.00%	1.1%
Flamborough	120	2%	20%				70%		10%	100.00%	0.49%	0.00%	0.00%	1.71%	0.00%	0.24%	0.00%	2.4%
Ancaster	99	2%					95%		5%	100.00%	0.00%	0.00%	0.00%	1.92%	0.00%	0.10%	0.00%	2.0%
Stoney Creek	140	3%				65%	25%	10%		100.00%	0.00%	0.00%	1.86%	0.71%	0.29%	0.00%	0.00%	2.9%
Hamilton	822	17%				20%	70%	5%	5%	100.00%	0.00%	0.00%	3.36%	11.74%	0.84%	0.84%	0.00%	16.8%
Lincoln	33	1%				90%		10%		100.00%	0.00%	0.00%	0.61%	0.00%	0.07%	0.00%	0.00%	0.7%
St. Catharines	44	1%				90%		10%		100.00%	0.00%	0.00%	0.81%	0.00%	0.09%	0.00%	0.00%	0.9%
Port Colborne	34	1%				85%	5%	10%		100.00%	0.00%	0.00%	0.59%	0.03%	0.07%	0.00%	0.00%	0.7%
Cambridge	34	1%	15%				75%		10%	100.00%	0.10%	0.00%	0.00%	0.52%	0.00%	0.07%	0.00%	0.7%
City of Guelph	44	1%	15%				75%		10%	100.00%	0.13%	0.00%	0.00%	0.67%	0.00%	0.09%	0.00%	0.9%
Perth	13	0%			5%	90%		5%		100.00%	0.00%	0.01%	0.24%	0.00%	0.01%	0.00%	0.00%	0.3%
Oxford	29	1%	5%				85%		10%	100.00%	0.03%	0.00%	0.00%	0.50%	0.00%	0.06%	0.00%	0.6%
External	118	2%				40%	40%	10%	10%	100.00%	0.00%	0.00%	0.96%	0.96%	0.24%	0.24%	0.00%	2.4%
TOTAL TRIPS	4900	100%									**6%**	**8%**	**45%**	**19%**	**15%**	**4%**	**2%**	100.0%
										Assumed Split	**5%**	**10%**	**45%**	**20%**	**15%**	**5%**	**0%**	100%

PM Peak Hour
Inbound
2023-07-16

Zone	Trips	%	Traffic Volume Allocation: North Waterdown Rd	East N Service Rd	East Highway 403	West Highway 403	East Plains Rd E	West Plains Rd W	South Lasalle Park Rd	TOTAL	Route Split Totals: North Waterdown Rd	East N Service Rd	East Highway 403	West Highway 403	East Plains Rd E	West Plains Rd W	South Lasalle Park Rd	TOTAL
PD 1 of Toronto	32	1%	0%	5%	90%	0%	5%	0%	0%	100.00%	0.00%	0.03%	0.54%	0.00%	0.03%	0.00%	0.00%	0.6%
PD 8 of Toronto	26	0%	0%	5%	90%	0%	5%	0%	0%	100.00%	0.00%	0.02%	0.44%	0.00%	0.02%	0.00%	0.00%	0.5%
PD 9 of Toronto	74	1%	0%	5%	90%	0%	5%	0%	0%	100.00%	0.00%	0.07%	1.24%	0.00%	0.07%	0.00%	0.00%	1.4%
PD 11 of Toronto	14	0%	0%	5%	90%	0%	5%	0%	0%	100.00%	0.00%	0.01%	0.23%	0.00%	0.01%	0.00%	0.00%	0.3%
PD 13 of Toronto	13	0%	0%	5%	90%	0%	5%	0%	0%	100.00%	0.00%	0.01%	0.22%	0.00%	0.01%	0.00%	0.00%	0.2%
Vaughan	13	0%	0%	5%	90%	0%	5%	0%	0%	100.00%	0.00%	0.01%	0.22%	0.00%	0.01%	0.00%	0.00%	0.2%
Brampton	16	0%	5%	5%	85%	0%	5%	0%	0%	100.00%	0.01%	0.01%	0.25%	0.00%	0.01%	0.00%	0.00%	0.3%
Mississauga	264	5%	0%	5%	90%	0%	5%	0%	0%	100.00%	0.00%	0.25%	4.42%	0.00%	0.25%	0.00%	0.00%	4.9%
Milton	92	2%	15%	5%	75%	0%	5%	0%	0%	100.00%	0.26%	0.09%	1.28%	0.00%	0.09%	0.00%	0.00%	1.7%
Oakville	447	8%	25%	5%	65%	0%	5%	0%	0%	100.00%	2.08%	0.42%	5.41%	0.00%	0.42%	0.00%	0.00%	8.3%
Burlington	3018	56%	0%	0%	0%	0%	0%	0%	0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.0%
4051	52	1%	0%	0%	0%	0%	20%	30%	50%	100.00%	0.00%	0.00%	0.00%	0.00%	0.19%	0.29%	0.48%	1.0%
4052	196	4%	0%	0%	0%	0%	25%	75%	0%	100.00%	0.00%	0.00%	0.00%	0.00%	0.91%	2.74%	0.00%	3.6%
4053	719	13%	0%	25%	5%	0%	70%	0%	0%	100.00%	0.00%	3.34%	0.67%	0.00%	9.37%	0.00%	0.00%	13.4%
4054	71	1%	0%	10%	0%	0%	90%	0%	0%	100.00%	0.00%	0.13%	0.00%	0.00%	1.19%	0.00%	0.00%	1.3%
4055	122	2%	0%	5%	10%	0%	85%	0%	0%	100.00%	0.00%	0.11%	0.23%	0.00%	1.93%	0.00%	0.00%	2.3%
4056	47	1%	0%	5%	50%	0%	45%	0%	0%	100.00%	0.00%	0.04%	0.44%	0.00%	0.39%	0.00%	0.00%	0.9%
4057	334	6%	0%	10%	35%	0%	55%	0%	0%	100.00%	0.00%	0.62%	2.18%	0.00%	3.42%	0.00%	0.00%	6.2%
4059	69	1%	0%	10%	35%	0%	55%	0%	0%	100.00%	0.00%	0.13%	0.45%	0.00%	0.71%	0.00%	0.00%	1.3%
4060	109	2%	0%	5%	35%	0%	60%	0%	0%	100.00%	0.00%	0.10%	0.71%	0.00%	1.22%	0.00%	0.00%	2.0%
4061	29	1%	0%	5%	35%	0%	60%	0%	0%	100.00%	0.00%	0.03%	0.19%	0.00%	0.32%	0.00%	0.00%	0.5%
4062	123	2%	0%	5%	40%	0%	55%	0%	0%	100.00%	0.00%	0.11%	0.92%	0.00%	1.26%	0.00%	0.00%	2.3%
4063	94	2%	0%	10%	45%	0%	45%	0%	0%	100.00%	0.00%	0.17%	0.79%	0.00%	0.79%	0.00%	0.00%	1.7%
4064	14	0%	0%	10%	45%	0%	45%	0%	0%	100.00%	0.00%	0.03%	0.12%	0.00%	0.12%	0.00%	0.00%	0.3%
4065	45	1%	0%	5%	45%	0%	50%	0%	0%	100.00%	0.00%	0.04%	0.38%	0.00%	0.42%	0.00%	0.00%	0.8%
4068	139	3%	0%	5%	55%	0%	40%	0%	0%	100.00%	0.00%	0.13%	1.42%	0.00%	1.03%	0.00%	0.00%	2.6%
4069	144	3%	0%	5%	65%	0%	30%	0%	0%	100.00%	0.00%	0.13%	1.74%	0.00%	0.80%	0.00%	0.00%	2.7%
4072	12	0%	0%	5%	55%	0%	40%	0%	0%	100.00%	0.00%	0.01%	0.12%	0.00%	0.09%	0.00%	0.00%	0.2%
4075	74	1%	0%	5%	60%	0%	35%	0%	0%	100.00%	0.00%	0.07%	0.83%	0.00%	0.48%	0.00%	0.00%	1.4%
4078	75	1%	10%	10%	65%	0%	15%	0%	0%	100.00%	0.14%	0.14%	0.91%	0.00%	0.21%	0.00%	0.00%	1.4%
4079	24	0%	20%	10%	65%	0%	5%	0%	0%	100.00%	0.09%	0.04%	0.29%	0.00%	0.02%	0.00%	0.00%	0.4%
4080	35	1%	25%	10%	60%	0%	5%	0%	0%	100.00%	0.16%	0.07%	0.39%	0.00%	0.03%	0.00%	0.00%	0.7%
4081	46	1%	10%	20%	65%	0%	5%	0%	0%	100.00%	0.09%	0.17%	0.56%	0.00%	0.04%	0.00%	0.00%	0.9%
4082	87	2%	0%	25%	65%	0%	10%	0%	0%	100.00%	0.00%	0.40%	1.05%	0.00%	0.16%	0.00%	0.00%	1.6%
4085	9	0%	20%	25%	50%	0%	5%	0%	0%	100.00%	0.03%	0.04%	0.08%	0.00%	0.01%	0.00%	0.00%	0.2%
4086	22	0%	0%	30%	60%	0%	10%	0%	0%	100.00%	0.00%	0.12%	0.25%	0.00%	0.04%	0.00%	0.00%	0.4%
4087	25	0%	5%	40%	50%	0%	5%	0%	0%	100.00%	0.02%	0.19%	0.23%	0.00%	0.02%	0.00%	0.00%	0.5%
4088	121	2%	0%	60%	30%	0%	10%	0%	0%	100.00%	0.00%	1.35%	0.68%	0.00%	0.23%	0.00%	0.00%	2.3%
4091	73	1%	50%	40%	0%	0%	10%	0%	0%	100.00%	0.68%	0.54%	0.00%	0.00%	0.14%	0.00%	0.00%	1.4%
4093	13	0%	60%	10%	30%	0%	0%	0%	0%	100.00%	0.15%	0.02%	0.07%	0.00%	0.00%	0.00%	0.00%	0.2%
4189	33	1%	60%	10%	25%	0%	5%	0%	0%	100.00%	0.37%	0.06%	0.15%	0.00%	0.03%	0.00%	0.00%	0.6%
4190	57	1%	10%	20%	65%	0%	5%	0%	0%	100.00%	0.11%	0.21%	0.69%	0.00%	0.05%	0.00%	0.00%	1.1%
Flamborough	214	4%	20%	0%	0%	70%	0%	10%	0%	100.00%	0.80%	0.00%	0.00%	2.79%	0.00%	0.40%	0.00%	4.0%
Dundas	43	1%	10%	0%	0%	55%	0%	35%	0%	100.00%	0.08%	0.00%	0.00%	0.44%	0.00%	0.28%	0.00%	0.8%
Ancaster	97	2%	0%	0%	0%	90%	0%	10%	0%	100.00%	0.00%	0.00%	0.00%	1.62%	0.00%	0.18%	0.00%	1.8%
Stoney Creek	68	1%	0%	0%	15%	25%	60%	0%	0%	100.00%	0.00%	0.00%	0.19%	0.32%	0.76%	0.00%	0.00%	1.3%
Hamilton	652	12%	0%	0%	5%	70%	20%	5%	0%	100.00%	0.00%	0.00%	0.61%	8.49%	2.43%	0.61%	0.00%	12.1%
St. Catharines	32	1%	0%	0%	30%	0%	70%	0%	0%	100.00%	0.00%	0.00%	0.18%	0.00%	0.42%	0.00%	0.00%	0.6%
Niagara Falls	27	1%	0%	0%	30%	0%	70%	0%	0%	100.00%	0.00%	0.00%	0.15%	0.00%	0.35%	0.00%	0.00%	0.5%
Port Colborne	34	1%	0%	0%	25%	5%	70%	0%	0%	100.00%	0.00%	0.00%	0.16%	0.03%	0.44%	0.00%	0.00%	0.6%
City of Guelph	79	1%	15%	0%	0%	80%	0%	5%	0%	100.00%	0.22%	0.00%	0.00%	1.18%	0.00%	0.07%	0.00%	1.5%
Oxford	29	1%	5%	0%	0%	90%	0%	5%	0%	100.00%	0.03%	0.00%	0.00%	0.49%	0.00%	0.03%	0.00%	0.5%
Brantford	12	0%	0%	0%	0%	100%	0%	0%	0%	100.00%	0.00%	0.00%	0.00%	0.22%	0.00%	0.00%	0.00%	0.0%
External	83	2%	0%	0%	25%	40%	25%	10%	0%	100.00%	0.00%	0.00%	0.39%	0.62%	0.39%	0.15%	0.00%	1.5%
TOTAL TRIPS	5374	100%									**5%**	**10%**	**32%**	**16%**	**31%**	**5%**	**0%**	99.8%
										Assumed Split	**5%**	**10%**	**35%**	**15%**	**30%**	**5%**	**0%**	100%

AM OUT RAW

Wed May 03 2023 22:21:28 GMT-0400 (Eastern Daylight Time) - Run Time: 2665ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of destination - pd_dest
Column: 2006 GTA zone of origin - gta06_orig

Filters:
Start time of trip - start_time In 600-859
and
Primary travel mode of trip - mod P T M U
and
Trip purpose of origin - purp_orig
and
2006 GTA zone of origin - gta06_ 4051 4052 4053 4054 4055

Trip 2016
Table:

	4050	4051	4052	4053	4054	4055	TRIPS
PD 1 of Toronto	0	0	0	0	0	5	5
PD 2 of Toronto	0	0	0	0	30	0	30
PD 4 of Toronto	0	26	0	0	0	0	26
PD 8 of Toronto	0	0	0	0	0	10	10
PD 9 of Toronto	0	44	27	0	0	0	71
Caledon	0	0	0	0	0	40	40
Brampton	24	16	14	0	0	0	54
Mississauga	0	171	66	30	0	27	294
Halton Hills	0	0	0	0	0	35	35
Milton	0	29	14	0	0	0	43
Oakville	47	102	88	60	92	252	641
Burlington	258	288	183	92	275	1026	2122
4050	0	20	0	0	0	0	20
4051	23	0	54	0	0	85	162
4052	66	0	34	0	0	0	100
4053	44	31	14	9	83	210	391
4054	11	0	0	0	0	0	11
4056	0	0	22	0	20	0	42
4057	13	28	0	0	30	0	71
4059	0	11	0	0	17	137	165
4061	0	13	0	0	14	0	27
4062	0	26	0	0	0	0	26
4063	18	13	8	0	0	33	72
4065	0	0	0	0	0	45	45
4068	12	0	31	13	20	24	100
4069	0	0	0	0	0	38	38
4075	0	0	0	45	0	29	74
4076	47	0	0	0	0	0	47
4078	0	6	0	0	0	75	81
4079	0	0	0	0	0	56	56
4080	0	72	8	0	0	0	80
4081	0	0	0	12	0	63	75
4082	0	13	0	0	23	17	53
4084	0	0	0	0	25	0	25
4086	0	0	0	13	0	0	13
4088	0	0	0	0	25	33	58
4089	0	0	0	0	18	49	67
4091	24	42	0	0	0	61	127
4093	0	0	0	0	0	27	27
4097	0	12	0	0	0	0	12
4190	0	0	12	0	0	44	56
Flamborough	11	0	22	28	0	59	120
Ancaster	0	33	0	66	0	0	99
Stoney Creek	0	0	0	0	0	140	140
Hamilton	60	240	22	43	224	233	822
Lincoln	0	33	0	0	0	0	33
St. Catharines	32	12	0	0	0	0	44
Port Colborne	0	0	0	0	34	0	34
Cambridge	0	34	0	0	0	0	34
City of Guelph	44	0	0	0	0	0	44
Perth	0	0	13	0	0	0	13
Oxford	0	0	0	0	29	0	29
External	0	0	0	0	83	35	118
							4900

Wed May 03 2023 22:30:48 GMT-0400 (Eastern Daylight Time) - Run Time: 2566ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06_dest
Column: 2006 GTA zone of origin - gta06_orig

Filters:
Start time of trip - start_time In 600-859
and
Primary tra P T M U
and
Trip purpos
and
2006 GTA z 4051 4052 4053 4054 4055
and
Planning di

Trip 2016
Table:

	4050	4051	4052	4053	4054	4055
4050	0	20	0	0	0	0
4051	23	0	54	0	0	85
4052	66	0	34	0	0	0
4053	44	31	14	9	83	210
4054	11	0	0	0	0	0
4056	0	0	22	0	20	0
4057	13	28	0	0	30	0
4059	0	11	0	0	17	137
4061	0	13	0	0	14	0
4062	0	26	0	0	0	0
4063	18	13	8	0	0	33
4065	0	0	0	0	0	45
4068	12	0	31	13	20	24
4069	0	0	0	0	0	38
4075	0	0	0	45	0	29
4076	47	0	0	0	0	0
4078	0	6	0	0	0	75
4079	0	0	0	0	0	56
4080	0	72	8	0	0	0
4081	0	0	0	12	0	63
4082	0	13	0	0	23	17
4084	0	0	0	0	25	0
4086	0	0	0	13	0	0
4088	0	0	0	0	25	33
4089	0	0	0	0	18	49
4091	24	42	0	0	0	61
4093	0	0	0	0	0	27
4097	0	12	0	0	0	0
4190	0	0	12	0	0	44

PM IN RAW

Wed May 03 2023 22:27:15 GMT-0400 (Eastern Daylight Time) - Run Time: 2644ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
Start time of trip - start_time In 1500-1759
and
Primary travel mode of trip - mode_prim P T M U
and
Trip purpose of destination - purp_dest In
and
2006 GTA zone of destination - gta06_des 4051 4052 4053 4054 4055

Trip 2016
Table:

	4050	4051	4052	4053	4054	4055	TRIPS
PD 1 of Toronto	0	0	27	0	0	5	32
PD 8 of Toronto	0	13	13	0	0	0	26
PD 9 of Toronto	0	44	0	0	30	0	74
PD 11 of Toronto	0	0	0	0	14	0	14
PD 13 of Toronto	0	13	0	0	0	0	13
Vaughan	0	13	0	0	0	0	13
Brampton	0	16	0	0	0	0	16
Mississauga	0	27	96	30	95	16	264
Milton	0	29	0	0	0	63	92
Oakville	47	71	71	48	41	169	447
Burlington	129	636	300	189	526	1238	3018
4051	0	0	10	0	0	42	52
4052	0	39	79	15	32	31	196
4053	42	67	20	44	88	458	719
4054	11	31	0	0	0	29	71
4055	0	0	13	0	93	16	122
4056	0	10	0	0	37	0	47
4057	0	105	48	15	47	119	334
4059	0	11	13	0	0	45	69
4060	0	43	32	0	18	16	109
4061	0	29	0	0	0	0	29
4062	44	36	0	0	14	29	123
4063	18	51	8	0	0	17	94
4064	0	0	14	0	0	0	14
4065	0	0	0	0	0	45	45
4068	0	12	31	13	0	83	139
4069	0	23	0	0	83	38	144
4072	0	12	0	0	0	0	12
4075	0	0	0	45	0	29	74
4078	0	0	0	0	0	75	75
4079	0	0	0	0	0	24	24
4080	0	18	0	0	17	0	35
4081	0	0	0	12	0	34	46
4082	0	13	9	0	48	17	87
4085	0	0	9	0	0	0	9
4086	0	0	0	22	0	0	22
4087	0	0	0	0	25	0	25
4088	0	71	13	12	25	0	121
4091	0	28	0	0	0	45	73
4093	0	13	0	0	0	0	13
4189	0	23	0	10	0	0	33
4190	13	0	0	0	0	44	57
Flamborough	22	49	56	28	0	59	214
Dundas	0	30	13	0	0	0	43
Ancaster	0	25	0	57	15	0	97
Stoney Creek	0	23	0	0	0	45	68
Hamilton	78	164	57	79	84	190	652
St. Catharines	32	0	0	0	0	0	32
Niagara Falls	0	0	0	0	0	27	27
Port Colborne	0	0	0	0	34	0	34
City of Guelph	44	0	0	0	0	35	79
Oxford	0	0	0	0	29	0	29
Brantford	0	0	0	12	0	0	12
External	0	0	0	0	83	0	83
							5374

Wed May 03 2023 22:41:41 GMT-0400 (Eastern Daylight Time) - Run Time: 2646ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
Start time of trip - start_time In 1500-1759
and
Primary tra P T M U
and
Trip purpos
and
2006 GTA z 4051 4052 4053 4054 4055
and
Planning di

Trip 2016
Table:

	4050	4051	4052	4053	4054	4055
4051	0	0	10	0	0	42
4052	0	39	79	15	32	31
4053	42	67	20	44	88	458
4054	11	31	0	0	0	29
4055	0	0	13	0	93	16
4056	0	10	0	0	37	0
4057	0	105	48	15	47	119
4059	0	11	13	0	0	45
4060	0	43	32	0	18	16
4061	0	29	0	0	0	0
4062	44	36	0	0	14	29
4063	18	51	8	0	0	17
4064	0	0	14	0	0	0
4065	0	0	0	0	0	45
4068	0	12	31	13	0	83
4069	0	23	0	0	83	38
4072	0	12	0	0	0	0
4075	0	0	0	45	0	29
4078	0	0	0	0	0	75
4079	0	0	0	0	0	24
4080	0	18	0	0	17	0
4081	0	0	0	12	0	34
4082	0	13	9	0	48	17
4085	0	0	9	0	0	0
4086	0	0	0	22	0	0
4087	0	0	0	0	25	0
4088	0	71	13	12	25	0
4091	0	28	0	0	0	45
4093	0	13	0	0	0	0
4189	0	23	0	10	0	0
4190	13	0	0	0	0	44

Appendix H:
Signal Timing Plans (STPs)

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	Date M	Date 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

Intersection Name:	TS ID:	Line No:	Model:	Controller Make:	IP address:
Aldershot Go Stn @ Bus Entrance	32	4	ACS/3	Econolite	172.22.10.2

Type of Operation:				8 Phase Semi-Actuated	
No	Date			Description	Prepared By
	Y	M	D		
2	2015	10	2	Decrease SS Max time, Increase MS Walk Time	EN
3	2020	12	14	Update Main Street FDW	JR

*- Start from Main Manu

PHASE DESCRIPTION			
Ph1		Ph5	
Ph2	EB -403 On Ramp	Ph6	WB -403 On Ramp
Ph3		Ph7	
Ph4	NB - Bus Entrance	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		
Conditional Service Min. Green								
Walk		15		7		15		
Ped. Clearance		9		10		9		
Pedestrian Carry Over								
Vehicle Extension		3		3		3		
MAX 1		30		15		30		
MAX 2		30		15		30		
Yellow Change		4		4		4		
Red Clearance		3		3		3		

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			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	10	00:00	254	1

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

Day Plan 1 (Weekday/Saturday/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

Intersection Name:	TS ID:	Line No:	Model:	IP address:	Controller Make:
Plains Road @ Cooke Blvd	117	4	ACS/3	172.22.15.2	Econolite

Type of Operation: 8 Phase Semi-Actuated

*-Start from Main Menu

No	Date			Description	Prepared by
	Y	M	D		
5	2019	5	8	Plains Road Optimization	MA

PHASE DESCRIPTION

Ph1		Ph5	EBLT - Plains Road
Ph2	EB - Plains Road	Ph6	WB - Plains Road
Ph3		Ph7	
Ph4	NB - Driveway	Ph8	SB - Cooke Blvd

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		8		8	6	8		8
Walk		8		8		8		8
Ped. Clearance		11		14		11		14
Pedestrian Carry Over								
Vehicle Extension		3		3	3	3		3
MAX 1		40		30	10	40		30
MAX 2		40		30	10	40		30
Yellow Change		4		4	3	4		4
Red Clearance		3		3		3		3
Phase Minimum:	1	27	1	30	10	27	1	30

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

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

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

Coordinator Pattern (CP)	Cycle Length	Offset (sec)	Timing Plan	Split Pattern	Phases (sec)							
					1	2	3	4	5	6	7	8
1	100	20	1	1		68		32	15	53		32
2	90	84	1	2		52		38	12	40		38
3	110	23	1	3		78		32	16	62		32
4	85	52	1	4		55		30	12	43		30
10	0	0	1	10		0		0	0	0		0

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

Day Plan	Sched. #	Action Plan	Time Period	Pattern	Timing Plan	
1	1	4	06:00	4	1	
1	1	1	07:00	1	1	Schedule 1 = Day Plan 1
1	1	2	09:00	2	1	Schedule 2 = Day Plan 2
1	1	3	15:30	3	1	Schedule 3 = Day Plan 3
1	1	4	19:00	4	1	
1	1	10	22:00	254	1	Day Plan 1 (Weekday)
2	2	4	08:00	4	1	Day Plan 2 (Saturday)
2	2	3	10:30	3	1	Day Plan 3 (Sunday, Holidays)
2	2	4	17:00	4	1	
2	2	10	21:00	254	1	Action Plan 10 = free (254)
3	3	4	09:30	4	1	
3	3	2	12:00	2	1	
3	3	4	17:00	4	1	
3	3	10	21:00	254	1	

Special Programming:

Intersection Name:	TS ID:	Line No:	Model:	IP address:	Controller Make:
Plains Road @ Waterdown Rd	100	4	ACS/3	172.22.7.2	Econolite

Type of Operation: 8 Phase Semi-Actuated

*-Start from Main Menu

No	Date			Description	Prepared by
	Y	M	D		
8	2019	5	15	Plains Road Optimization	MA

PHASE DESCRIPTION

Ph1	WBLT - Plains Road	Ph5	EBLT - Plains Road
Ph2	EB - Plains Road	Ph6	WB - Plains Road
Ph3	SBLT - Waterdown Road	Ph7	NBLT - Waterdown Road
Ph4	NB - Waterdown Road	Ph8	SB - Waterdown Road

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

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

CONTROLLER TIMING DATA - VEHICLE TIMING * - 2 - 1

Timing Plan: 1	Phase: 1	2	3	4	5	6	7	8
Minimum Green	6	8	6	8	6	8	6	8
Walk		8		10		8		10
Ped. Clearance		13		17		13		17
Pedestrian Carry Over								
Vehicle Extension	3	3	3	3	3	3	3	3
MAX 1	12	35	12	25	12	35	12	25
MAX 2	12	35	12	25	12	35	12	25
Yellow Change	3	4	3	4	3	4	3	4
Red Clearance		2		3		2		3
Phase Minimum:	10	28	10	35	10	28	10	35

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

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

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

Coordinator Pattern (CP)	Cycle Length	Offset (sec)	Timing Plan	Split Pattern	Phases (sec) 1	2	3	4	5	6	7	8
1	110	0	1	1	12	51	13	34	32	31	10	37
2	90	84	1	2	12	34	10	34	14	32	10	34
3	110	37	1	3	18	46	20	26	18	46	10	36
4	85	52	1	4	12	30	10	33	14	28	10	33
10	0	0	1	10	0	0	0	0	0	0		

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

Day Plan	Sched. #	Action Plan	Time Period	Pattern	Timing Plan	
1	1	4	06:00	4	1	
1	1	1	07:00	1	1	Schedule 1 = Day Plan 1
1	1	2	09:00	2	1	Schedule 2 = Day Plan 2
1	1	3	15:30	3	1	Schedule 3 = Day Plan 3
1	1	4	19:00	4	1	
1	1	10	22:00	254	1	Day Plan 1 (Weekday)
2	2	4	08:00	4	1	Day Plan 2 (Saturday)
2	2	3	10:30	3	1	Day Plan 3 (Sunday, Holidays)
2	2	4	17:00	4	1	
2	2	10	21:00	254	1	Action Plan 10 = free (254)
3	3	4	09:30	4	1	
3	3	2	12:00	2	1	
3	3	4	17:00	4	1	
3	3	10	21:00	254	1	

Special Programming:

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:	TS ID:	Line No:	Model:	IP address:	Controller Make:
Waterdown Rd @ Masonry Crt	104	4	ACS/3	172.22.8.2	Econolite

Type of Operation: 8 Phase Semi-Actuated

*-Start from Main Menu

No	Date Y	Date M	Date D	Description	Prepared by
					BP
8	2017	12	19	Timings reverted back to original	

PHASE DESCRIPTION

Ph1	SBL - Waterdown Road	Ph5	
Ph2	NB - Waterdown Road	Ph6	SB - Waterdown Road
Ph3		Ph7	
Ph4	EB - Railway Road	Ph8	WB - Masonry Court

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	8	8		8		8		8
Walk		15		8		15		8
Ped. Clearance		14		14		14		14
Pedestrian Carry Over								
Vehicle Extension	3	3		5		3		5
MAX 1	15	40		30		40		30
MAX 2	15	40		30		40		30
Yellow Change	3	4		4		4		4
Red Clearance	0	2		3		2		3
Phase Minimum:	12	36	1	30	1	36	1	30

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

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

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

Coordinator Pattern (CP)	Cycle Length	Offset (sec)	Timing Plan	Split Pattern	Phases (sec) 1	2	3	4	5	6	7	8
1	100	22	1	1	18	42		40		60		40
2	0	0	0	0	0	0		0		0		0
3	110	72	1	3	18	60		32		78		32
10	0	0	1	10	0	0		0		0		0

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

Day Plan	Sched. #	Action Plan	Time Period	Pattern	Timing Plan
1	1	1	06:00	1	1
1	1	10	09:00	254	1
1	1	3	15:30	3	1
1	1	10	19:00	254	1
2	2	1	09:00	1	1
2	2	10	18:00	254	1
3	3	1	9:00	1	1
3	3	10	18:00	254	1

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

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

Action Plan 10 = free (254)

Special Programming:

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
				Actual	Actual
1&2	5&6	3&4	7&8	Cycle	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 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
				Actual	Actual
1&2	5&6	3&4	7&8	Cycle	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

Appendix I:
Intergreen Studies

Project: StationWest
Project No: 8057-01
Location: Waterdown Rd & Alayne Bryk Way
Date: Tuesday May 30, 2023

AM Intergreen Study - Northbound Left Turns

Time Ending	Advance	All Green	Amber	All Red	Total	Intergreen	
7:00	-	4	2	1	7	3	
7:02	7	0	0	0	7	0	
7:04	-	1	0	0	1	0	
7:05	-	4	0	1	5	1	
7:07	6	0	1	0	7	1	
7:09	-	2	1	0	3	1	
7:11	6	1	0	0	7	0	
7:12	-	0	1	1	2	2	
7:14	8	1	0	1	10	1	
7:15	2	1	2	1	6	3	
7:17	-	2	0	1	3	1	
7:19	6	0	0	0	6	0	
7:20	-	3	1	1	5	2	
7:22	7	0	1	1	9	2	
7:24	-	4	1	1	6	2	
7:25	7	1	1	1	10	2	1.5
7:27	3	0	1	0	4	1	
7:29	8	0	1	0	9	1	
7:30	7	0	2	1	10	3	
7:32	-	3	2	1	6	3	
7:34	7	1	0	0	8	0	
7:35	-	2	2	1	5	3	
7:37	6	0	1	1	8	2	
7:39	4	3	0	1	8	1	
7:40	8	0	0	0	8	0	
7:42	6	0	0	0	6	0	
7:44	-	2	1	1	4	2	
7:45	7	2	1	0	10	1	
7:47	-	0	0	0	0	0	
7:49	8	7	2	1	18	3	
7:50	4	0	0	1	5	1	
7:52	5	5	1	1	12	2	
7:54	7	1	1	0	9	1	
7:55	-	2	1	1	4	2	
7:57	8	0	1	2	11	3	
7:59	2	4	1	1	8	2	
8:00	6	0	0	0	6	0	
8:02	0	0	0	0	0	0	
8:04	3	5	0	2	10	2	
8:05	3	1	0	1	5	1	
8:07	-	0	0	1	1	1	
8:09	7	0	0	2	9	2	
8:10	2	0	0	2	4	2	
8:12	7	6	0	0	13	0	
8:14	1	0	1	2	4	3	
8:15	-	4	1	2	7	3	
8:17	-	1	1	0	2	1	
8:19	-	2	0	2	4	2	
8:20	8	4	1	1	14	2	
8:22	3	5	0	2	10	2	
8:24	7	2	0	0	9	0	
8:25	6	0	0	2	8	2	
8:27	5	1	1	1	8	2	
8:29	3	0	0	1	4	1	
8:30	4	0	1	2	7	3	
8:32	5	0	0	0	5	0	
8:34	-	2	1	2	5	3	
8:35	6	0	0	0	6	0	
8:37	-	0	0	1	1	1	
8:39	4	4	0	1	9	1	
8:40	3	1	0	0	4	0	
8:42	3	5	0	2	10	2	
8:44	4	0	0	0	4	0	
8:45	3	3	1	2	9	3	
8:47	4	0	0	0	4	0	
8:49	1	3	1	0	5	1	
8:50	5	0	0	2	7	2	
8:52	-	4	0	0	4	0	
8:54	-	7	1	0	8	1	
8:55	3	0	0	0	3	0	
8:57	-	10	2	2	14	4	
8:59	2	0	0	0	2	0	
Total	**247**	**126**	**41**	**58**	**472**	**99**	
Peak Hour 7:15 - 8:15	**141**	**55**	**25**	**29**	**250**	**54**	

Project: StationWest
Project No: 8057-01
Location: Waterdown Rd & Alayne Bryk Way
Date: Tuesday May 30, 2023

PM Intergreen Study - Northbound Left Turns

Time Ending	Advance	All Green	Amber	All Red	Total	Intergreen	
16:00	4	4	1	1	10	2	
16:02	5	2	0	2	9	2	
16:04	4	5	0	0	9	0	
16:06	4	0	0	1	5	1	
16:07	6	9	1	1	17	2	
16:09	-	0	0	0	0	0	
16:11	2	7	0	1	10	1	
16:13	5	2	0	0	7	0	
16:15	4	0	0	1	5	1	
16:16	9	4	0	1	14	1	
16:18	-	3	0	1	4	1	
16:20	8	5	0	0	13	0	
16:22	2	5	0	1	8	1	
16:24	7	1	0	0	8	0	
16:26	3	5	1	1	10	2	
16:27	8	2	0	0	10	0	
16:29	-	0	1	2	3	3	
16:31	6	0	0	1	7	1	
16:33	5	0	0	1	6	1	
16:35	4	4	0	1	9	1	
16:37	4	0	0	1	5	1	
16:38	7	0	1	2	10	3	
16:40	7	0	0	0	7	0	
16:42	4	5	1	1	11	2	1.2
16:44	4	0	0	1	5	1	
16:46	4	1	1	1	7	2	
16:48	5	0	0	1	6	1	
16:50	9	0	1	2	12	3	
16:51	8	0	0	0	8	0	
16:53	4	4	0	1	9	1	
16:55	9	0	0	0	9	0	
16:57	3	9	0	0	12	0	
16:59	6	0	0	0	6	0	
17:01	-	7	0	1	8	1	
17:03	6	1	0	0	7	0	
17:04	2	1	0	1	4	1	
17:06	9	2	0	1	12	1	
17:08	7	4	2	0	13	2	
17:10	5	2	0	1	8	1	
17:11	3	3	1	0	7	1	
17:13	4	0	0	1	5	1	
17:15	6	0	0	2	8	2	
17:17	6	0	0	2	8	2	
17:19	10	2	0	1	13	1	
17:21	-	3	2	1	6	3	
17:22	8	3	0	0	11	0	
17:24	7	3	1	1	12	2	
17:26	9	2	0	0	11	0	
17:28	2	0	1	2	5	3	
17:30	8	0	1	2	11	3	
17:32	5	9	0	0	14	0	
17:33	2	2	0	0	4	0	
17:35	3	1	0	1	5	1	
17:37	7	0	0	1	8	1	
17:39	2	1	2	1	6	3	
17:41	8	2	2	1	13	3	
17:43	8	2	1	1	12	2	
17:44	8	0	0	0	8	0	
17:46	3	4	0	0	7	0	
17:48	5	3	1	1	10	2	
17:50	8	0	0	1	9	1	
17:52	3	0	0	2	5	2	
17:54	8	0	0	1	9	1	
17:55	8	0	0	1	9	1	
17:57	8	0	0	1	9	1	
17:59	2	0	0	0	2	0	
Total	**340**	**134**	**22**	**54**	**550**	**76**	
Peak Hour 16:30 - 17:30	**173**	**56**	**12**	**29**	**270**	**41**	

Project: StationWest
Project No: 8057-01
Location: Waterdown Rd & N. Service Rd/403 WB On Ramp
Date: Tuesday May 30, 2023

AM Intergreen Study - Northbound Left Turns

Time Ending	Advance	All Green	Amber	All Red	Total	Intergreen	
7:00	-	2	1	0	3	1	
7:01	-	6	1	0	7	1	
7:03	-	2	0	0	2	0	
7:04	-	5	1	0	6	1	
7:06	4	2	0	0	6	0	
7:08	-	3	0	0	3	0	
7:09	3	2	1	0	6	1	
7:11	1	4	1	0	6	1	
7:13	1	1	0	0	2	0	
7:14	5	1	0	0	6	0	
7:16	3	4	1	1	9	2	
7:18	2	3	1	0	6	1	
7:19	3	2	1	0	6	1	
7:21	2	3	1	1	7	2	1
7:23	-	10	0	1	11	1	
7:26	3	2	1	0	6	1	
7:28	3	5	0	0	8	0	
7:29	1	5	0	0	6	0	
7:31	5	6	0	0	11	0	
7:33	3	3	1	1	8	2	
7:34	2	2	0	1	5	1	
7:36	2	4	0	1	7	1	
7:38	9	1	0	0	10	0	
7:39	3	6	1	0	10	1	
7:41	3	6	0	0	9	0	
7:43	1	7	0	0	8	0	
7:44	3	7	1	0	11	1	
7:46	-	4	0	0	4	0	
7:48	4	0	0	1	5	1	
7:49	4	0	1	1	6	2	
7:51	3	1	0	0	4	0	
7:53	1	5	2	1	9	3	
7:54	1	3	0	0	4	0	
7:56	6	5	1	1	13	2	
7:58	3	5	1	0	9	1	
7:59	1	0	0	1	2	1	
8:01	2	2	0	0	4	0	
8:03	3	9	0	0	12	0	
8:04	0	4	0	0	4	0	
8:06	1	3	1	1	6	2	
8:08	2	4	0	0	6	0	
8:09	0	2	0	0	2	0	
8:11	2	0	0	1	3	1	
8:13	8	5	0	1	14	1	
8:14	0	3	1	0	4	1	
8:16	2	6	0	0	8	0	
8:18	0	2	0	2	4	2	
8:19	3	4	1	1	9	2	
8:21	2	3	0	0	5	0	
8:23	4	3	1	0	8	1	
8:24	4	1	1	0	6	1	
8:26	1	3	0	1	5	1	
8:28	2	3	0	0	5	0	
8:29	3	2	0	1	6	1	
8:31	2	0	1	1	4	2	
8:33	2	3	0	0	5	0	
8:34	4	1	0	1	6	1	
8:36	3	6	0	1	10	1	
8:38	1	6	0	1	8	1	
8:39	3	2	0	0	5	0	
8:41	3	5	0	0	8	0	
8:43	2	4	1	0	7	1	
8:44	2	1	0	0	3	0	
8:46	2	2	0	0	4	0	
8:48	3	3	0	0	6	0	
8:49	2	1	1	1	5	2	
8:51	3	1	0	0	4	0	
8:53	1	3	0	0	4	0	
8:54	1	2	1	0	4	1	
8:56	1	2	0	0	3	0	
8:58	0	4	0	0	4	0	
Total	**159**	**232**	**27**	**24**	**442**	**51**	
Peak Hour 7:15 - 8:15	**89**	**131**	**15**	**14**	**249**	**29**	

Project: StationWest
Project No: 8057-01
Location: Waterdown Rd & N. Service Rd/403 WB On Ramp
Date: Tuesday May 30, 2023

PM Intergreen Study - Northbound Left Turns

Time Ending	Advance	All Green	Amber	All Red	Total	Intergreen		
16:00	-	0	0	0	0	0		
16:01	10	2	1	0	13	1		
16:03	10	3	1	1	15	2		
16:04	4	6	1	0	11	1		
16:06	-	0	1	0	1	1		
16:08	6	3	2	1	12	3		
16:10	6	6	1	0	13	1		
16:12	-	3	1	1	5	2		
16:14	6	3	1	1	11	2		
16:15	1	3	1	0	5	1		
16:17	7	9	1	0	17	1		
16:19	5	6	0	0	11	0		
16:21	5	2	1	0	8	1		
16:23	5	0	1	0	6	1		
16:25	8	8	1	1	18	2		
16:26	2	2	0	1	5	1		
16:28	9	1	0	1	11	1		
16:30	8	2	0	1	11	1		
16:32	7	12	1	1	21	2		
16:34	9	4	1	0	14	1		
16:36	8	4	1	1	14	2		
16:37	9	10	0	1	20	1		
16:39	7	14	2	1	24	3		
16:41	8	6	1	1	16	2		
16:43	10	5	2	1	18	3		
16:45	10	15	0	0	25	0		
16:47	8	7	1	1	17	2		
16:48	7	14	0	1	22	1		
16:50	8	0	1	2	11	3	1.67	
16:52	7	16	1	0	24	1		1.70
16:54	5	0	0	1	6	1		
16:56	8	8	0	0	16	0		
16:58	6	0	1	1	8	2		
16:59	4	11	1	1	17	2		
17:01	9	0	0	2	11	2		
17:03	7	9	0	0	16	0		
17:05	3	0	0	0	3	0		
17:07	9	7	0	0	16	0		
17:09	8	1	0	0	9	0		
17:10	8	3	1	0	12	1		
17:12	9	6	0	1	16	1		
17:14	9	8	2	1	20	3		
17:16	8	12	1	1	22	2		
17:18	11	4	1	1	17	2		
17:20	8	15	2	1	26	3		
17:21	8	0	1	2	11	3		
17:23	10	12	1	0	23	1		
17:25	6	1	2	2	11	4		
17:27	6	6	1	1	14	2		
17:29	5	0	2	2	9	4		
17:31	8	14	1	1	24	2		
17:32	6	0	0	2	8	2		
17:34	8	13	1	1	23	2		
17:36	9	0	0	1	10	1		
17:38	5	1	1	0	7	1		
17:40	8	0	0	1	9	1		
17:42	10	10	0	0	20	0		
17:43	6	2	0	1	9	1		
17:45	9	7	0	0	16	0		
17:47	5	0	0	0	5	0		
17:49	6	5	1	0	12	1		
17:51	8	12	0	1	21	1		
17:52	10	8	2	1	21	3		
17:54	10	13	1	1	25	2		
17:56	9	5	1	1	16	2		
17:58	10	16	2	1	29	3		
Total	**464**	**375**	**51**	**47**	**937**	**98**		
Peak Hour 16:30 - 17:30	**253**	**212**	**27**	**28**	**520**	**55**		

Project: StationWest
Project No: 8057-01
Location: Waterdown Rd & Alayne Bryk Way
Date: Tuesday May 30, 2023

AM RTOR Study - Northbound Right Turns

Time Ending	All Green	Amber	Red	Total	Intergreen
7:00	15	1	0	16	1
7:02	8	2	6	16	8
7:04	15	2	3	20	5
7:05	23	0	7	30	7
7:07	9	1	11	21	12
7:09	13	2	3	18	5
7:11	15	2	4	21	6
7:12	16	0	2	18	2
7:14	15	2	2	19	4
7:15	13	0	0	13	0
7:17	12	1	2	15	3
7:19	14	0	1	15	1
7:20	11	0	2	13	2
7:22	10	2	2	14	4
7:24	5	1	4	10	5
7:25	6	0	1	7	1
7:27	5	0	2	7	2
7:29	6	2	1	9	3
7:30	8	1	4	13	5
7:32	7	0	1	8	1
7:34	5	1	0	6	1
7:35	8	1	0	9	1
7:37	7	1	4	12	5
7:39	6	1	0	7	1
7:40	5	1	13	19	14
7:42	12	1	0	13	1
7:44	13	0	1	14	1
7:45	6	2	1	9	3
7:47	13	2	1	16	3
7:49	7	0	2	9	2
7:50	11	1	5	17	6
7:52	1	0	5	6	5
7:54	7	0	0	7	0
7:55	7	1	2	10	3
7:57	6	2	6	14	8
7:59	6	0	1	7	1
8:00	15	1	1	17	2
8:02	4	1	3	8	4
8:04	10	0	3	13	3
8:05	13	1	1	15	2
8:07	11	0	1	12	1
8:09	6	1	7	14	8
8:10	11	2	2	15	4
8:12	11	1	1	13	2
8:14	10	0	0	10	0
8:15	14	0	0	14	0
8:17	7	0	0	7	0
8:19	13	1	1	15	2
8:20	11	0	0	11	0
8:22	8	0	2	10	2
8:24	10	2	5	17	7
8:25	5	1	2	8	3
8:27	7	1	2	10	3
8:29	13	2	3	18	5
8:30	12	0	1	13	1
8:32	13	2	0	15	2
8:34	11	1	3	15	4
8:35	8	1	0	9	1
8:37	11	2	4	17	6
8:39	7	0	1	8	1
8:40	11	0	3	14	3
8:42	8	1	1	10	2
8:44	7	2	3	12	5
8:45	7	1	3	11	4
8:47	7	0	3	10	3
8:49	8	1	0	9	1
8:50	8	1	1	10	2
8:52	5	0	0	5	0
8:54	8	0	1	9	1
8:55	8	0	0	8	0
8:57	4	1	1	6	2
8:59	9	0	0	9	0
Total	**677**	**60**	**158**	**895**	**218**
Peak Hour 7:15 - 8:15	**308**	**28**	**80**	**416**	**108**

AM RTOR Study - Eastbound Right Turns

Time Ending	All Green	Amber	Red	Total	Intergreen
7:00	2	0	4	6	4
7:02	2	1	2	5	3
7:04	1	0	3	4	3
7:05	1	0	4	5	4
7:07	0	0	2	2	2
7:09	3	0	5	8	5
7:11	5	1	1	7	2
7:12	6	1	7	14	8
7:14	1	0	5	6	5
7:15	1	0	5	6	5
7:17	5	1	5	11	6
7:19	0	0	2	2	2
7:20	1	0	7	8	7
7:22	4	0	3	7	3
7:24	1	1	1	3	2
7:25	0	0	2	2	2
7:27	6	1	5	12	6
7:29	2	0	5	7	5
7:30	3	0	6	9	6
7:32	4	1	4	9	5
7:34	5	0	3	8	3
7:35	4	1	5	10	6
7:37	6	0	10	16	10
7:39	1	0	4	5	4
7:40	5	1	3	9	4
7:42	2	0	4	6	4
7:44	2	0	1	3	1
7:45	3	0	6	9	6
7:47	4	0	1	5	1
7:49	7	1	5	13	6
7:50	2	0	4	6	4
7:52	2	0	2	4	2
7:54	2	0	4	6	4
7:55	0	0	3	3	3
7:57	1	0	3	4	3
7:59	4	0	0	4	0
8:00	3	0	2	5	2
8:02	0	0	1	1	1
8:04	2	0	5	7	5
8:05	4	0	3	7	3
8:07	1	0	3	4	3
8:09	0	0	2	2	2
8:10	2	0	5	7	5
8:12	2	0	4	6	4
8:14	3	0	5	8	5
8:15	0	0	5	5	5
8:17	5	1	6	12	7
8:19	1	0	4	5	4
8:20	3	1	2	6	3
8:22	2	0	3	5	3
8:24	1	0	4	5	4
8:25	2	0	2	4	2
8:27	2	0	2	4	2
8:29	1	0	1	2	1
8:30	1	0	9	10	9
8:32	3	0	2	5	2
8:34	2	0	1	3	1
8:35	2	0	1	3	1
8:37	2	0	4	6	4
8:39	0	0	3	3	3
8:40	0	0	8	8	8
8:42	1	0	3	4	3
8:44	2	0	6	8	6
8:45	2	1	1	4	2
8:47	3	0	4	7	4
8:49	0	0	4	4	4
8:50	2	0	4	6	4
8:52	0	0	2	2	2
8:54	0	1	5	6	6
8:55	2	0	4	6	4
8:57	0	0	5	5	5
8:59	1	0	0	1	0
Total	**155**	**14**	**261**	**430**	**275**
Peak Hour 7:15 - 8:15	**94**	**7**	**133**	**234**	**140**

Project: StationWest
Project No: 8057-01
Location: Waterdown Rd & Alayne Bryk Way
Date: Tuesday May 30, 2023

PM RTOR Study - Northbound Right Turns

Time Ending	All Green	Amber	Red	Total	Intergreen
16:00	4	0	0	4	0
16:02	10	0	3	13	3
16:04	4	2	0	6	2
16:06	11	2	1	14	3
16:07	5	0	0	5	0
16:09	5	0	0	5	0
16:11	8	0	0	8	0
16:13	10	1	0	11	1
16:15	3	0	2	5	2
16:16	4	0	1	5	1
16:18	9	0	4	13	4
16:20	7	1	2	10	3
16:22	7	0	1	8	1
16:24	8	0	3	11	3
16:26	6	0	3	9	3
16:27	7	0	1	8	1
16:29	7	0	4	11	4
16:31	3	1	0	4	1
16:33	6	1	3	10	4
16:35	1	0	3	4	3
16:37	10	0	4	14	4
16:38	5	2	0	7	2
16:40	11	1	8	20	9
16:42	4	2	2	8	4
16:44	5	1	0	6	1
16:46	6	2	3	11	5
16:48	6	2	0	8	2
16:50	8	1	3	12	4
16:51	5	1	0	6	1
16:53	9	0	2	11	2
16:55	4	0	3	7	3
16:57	8	1	4	13	5
16:59	4	2	1	7	3
17:01	10	0	1	11	1
17:03	4	0	4	8	4
17:04	5	0	4	9	4
17:06	7	0	0	7	0
17:08	5	0	0	5	0
17:10	11	0	0	11	0
17:11	7	0	3	10	3
17:13	4	1	0	5	1
17:15	6	0	0	6	0
17:17	11	0	4	15	4
17:19	3	1	3	7	4
17:21	4	1	4	9	5
17:22	3	1	0	4	1
17:24	7	1	2	10	3
17:26	10	0	3	13	3
17:28	6	0	1	7	1
17:30	8	1	3	12	4
17:32	4	1	0	5	1
17:33	2	1	0	3	1
17:35	7	1	0	8	1
17:37	8	1	1	10	2
17:39	12	0	1	13	1
17:41	5	1	1	7	2
17:43	6	1	0	7	1
17:44	5	0	0	5	0
17:46	4	1	1	6	2
17:48	4	0	2	6	2
17:50	7	1	1	9	2
17:52	4	2	0	6	2
17:54	4	0	3	7	3
17:55	1	0	0	1	0
17:57	6	0	1	7	1
17:59	3	0	0	3	0
Total	**403**	**39**	**104**	**546**	143
Peak Hour 16:30 - 17:30	**205**	**22**	**69**	**296**	91

PM RTOR Study - Eastbound Right Turns

Time Ending	All Green	Amber	Red	Total	Intergreen
16:00	0	1	4	5	5
16:02	1	0	5	6	5
16:04	3	0	7	10	7
16:06	3	0	1	4	1
16:07	2	0	2	4	2
16:09	2	0	13	15	13
16:11	1	0	6	7	6
16:13	1	0	1	2	1
16:15	3	0	4	7	4
16:16	6	1	4	11	5
16:18	5	0	6	11	6
16:20	3	0	8	11	8
16:22	4	0	0	4	0
16:24	4	0	10	14	10
16:26	2	0	2	4	2
16:27	3	0	0	3	0
16:29	6	0	8	14	8
16:31	0	0	1	1	1
16:33	2	0	5	7	5
16:35	6	0	5	11	5
16:37	5	0	0	5	0
16:38	3	1	8	12	9
16:40	2	0	2	4	2
16:42	4	0	2	6	2
16:44	0	0	7	7	7
16:46	4	0	3	7	3
16:48	5	0	4	9	4
16:50	5	0	4	9	4
16:51	5	0	7	12	7
16:53	1	1	6	8	7
16:55	1	0	3	4	3
16:57	3	0	7	10	7
16:59	2	0	6	8	6
17:01	2	1	3	6	4
17:03	3	2	2	7	4
17:04	0	0	2	2	2
17:06	4	0	4	8	4
17:08	5	0	6	11	6
17:10	6	0	4	10	4
17:11	3	0	5	8	5
17:13	1	0	3	4	3
17:15	4	0	6	10	6
17:17	2	0	3	5	3
17:19	1	0	3	4	3
17:21	5	1	3	9	4
17:22	2	0	4	6	4
17:24	1	0	5	6	5
17:26	1	0	5	6	5
17:28	4	0	4	8	4
17:30	3	0	2	5	2
17:32	3	0	2	5	2
17:33	3	0	7	10	7
17:35	8	1	2	11	3
17:37	2	0	4	6	4
17:39	3	0	6	9	6
17:41	3	1	7	11	8
17:43	1	0	6	7	6
17:44	3	1	8	12	9
17:46	4	0	4	8	4
17:48	1	0	5	6	5
17:50	2	1	5	8	6
17:52	2	0	1	3	1
17:54	6	0	1	7	1
17:55	3	0	2	5	2
17:57	1	0	4	5	4
17:59	2	1	1	4	2
Total	**191**	**13**	**280**	**484**	293
Peak Hour 16:30 - 17:30	**98**	**6**	**140**	**244**	146

Appendix J:
Synchro Worksheets

Queues
1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road

Existing
AM Peak Hour

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	77	93	36	253	748	113	444
v/c Ratio	0.42	0.45	0.14	0.34	0.34	0.20	0.21
Control Delay	47.2	47.3	1.2	3.8	2.1	3.6	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	47.3	1.2	3.8	2.1	3.6	8.5
Queue Length 50th (m)	14.8	18.0	0.0	4.3	0.0	3.9	16.7
Queue Length 95th (m)	28.5	32.6	0.0	26.5	22.7	9.2	29.8
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	209	236	276	821	2184	758	2132
Starvation Cap Reductn	0	0	0	0	0	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	0.37	0.39	0.13	0.31	0.34	0.15	0.21

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road

Existing
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	75	90	35	245	255	470	110	345	85
Future Volume (vph)	0	0	0	75	90	35	245	255	470	110	345	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)				7.0	7.0	7.0	1.0	7.0		2.0	7.0	
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	0.90		1.00	0.97	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	1601	3153		1711	3434	
Flt Permitted				0.95	1.00	1.00	0.49	1.00		0.36	1.00	
Satd. Flow (perm)				1544	1743	1479	821	3153		651	3434	
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)	0	0	0	77	93	36	253	263	485	113	356	88
RTOR Reduction (vph)	0	0	0	0	0	32	0	176	0	0	17	0
Lane Group Flow (vph)	0	0	0	77	93	4	253	572	0	113	427	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				10.9	10.9	10.9	72.2	62.7		68.0	60.6	
Effective Green, g (s)				11.9	11.9	11.9	75.1	63.7		70.0	61.6	
Actuated g/C Ratio				0.12	0.12	0.12	0.75	0.64		0.70	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)				183	207	176	706	2008		544	2115	
v/s Ratio Prot				0.05	c0.05		c0.04	c0.18		0.02	0.12	
v/s Ratio Perm						0.00	0.23			0.13		
v/c Ratio				0.42	0.45	0.02	0.36	0.28		0.21	0.20	
Uniform Delay, d1				40.9	41.0	38.9	3.7	8.0		4.8	8.4	
Progression Factor				1.00	1.00	1.00	1.00	0.59		1.00	1.00	
Incremental Delay, d2				1.6	1.6	0.1	0.3	0.3		0.2	0.2	
Delay (s)				42.4	42.6	39.0	4.0	5.1		5.0	8.6	
Level of Service				D	D	D	A	A		A	A	
Approach Delay (s)		0.0			41.9			4.8			7.9	
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	0.32			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	50.0%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Queues
2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp

Existing
AM Peak Hour

Lane Group	EBT	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	5	276	135	875	438
v/c Ratio	0.01	0.59	0.39	0.36	0.18
Control Delay	0.0	44.4	9.9	10.0	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	44.4	9.9	10.0	6.3
Queue Length 50th (m)	0.0	27.3	0.0	46.8	10.1
Queue Length 95th (m)	0.0	38.9	16.0	75.1	41.0
Internal Link Dist (m)	106.5			174.0	121.9
Turn Bay Length (m)		145.0	115.0		
Base Capacity (vph)	381	658	426	2404	2427
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.01	0.42	0.32	0.36	0.18

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp

Existing
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	5	265	0	130	0	840	0	0	420	0
Future Volume (vph)	0	0	5	265	0	130	0	840	0	0	420	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)		6.0		6.0		6.0		6.0			6.0	
Lane Util. Factor		1.00		0.97		1.00		0.95			0.95	
Frt		0.86		1.00		0.85		1.00			1.00	
Flt Protected		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (prot)		984		3134		1521		3438			3471	
Flt Permitted		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (perm)		984		3134		1521		3438			3471	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	5	276	0	135	0	875	0	0	438	0
RTOR Reduction (vph)	0	5	0	0	0	115	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	276	0	20	0	875	0	0	438	0
Heavy Vehicles (%)	0%	0%	67%	8%	0%	5%	0%	5%	0%	0%	4%	0%
Turn Type		NA		Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)		1.6		14.1		14.1		63.3			63.3	
Effective Green, g (s)		2.6		15.1		15.1		64.3			64.3	
Actuated g/C Ratio		0.03		0.15		0.15		0.64			0.64	
Clearance Time (s)		7.0		7.0		7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)		25		473		229		2210			2231	
v/s Ratio Prot		c0.00		c0.09		0.01		c0.25			0.13	
v/s Ratio Perm												
v/c Ratio		0.01		0.58		0.09		0.40			0.20	
Uniform Delay, d1		47.4		39.5		36.5		8.5			7.3	
Progression Factor		1.00		1.00		1.00		1.31			0.95	
Incremental Delay, d2		0.1		1.8		0.2		0.4			0.2	
Delay (s)		47.5		41.4		36.7		11.6			7.1	
Level of Service		D		D		D		B			A	
Approach Delay (s)		47.5			39.8			11.6			7.1	
Approach LOS		D			D			B			A	

Intersection Summary				
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.42			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	52.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Queues
3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road

Existing
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	284	305	247	21	74	973	258	468
v/c Ratio	0.73	0.71	0.46	0.08	0.27	0.76	0.83	0.27
Control Delay	46.8	44.8	6.8	42.6	2.3	33.4	48.6	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.8	44.8	6.8	42.6	2.3	33.4	48.6	20.0
Queue Length 50th (m)	53.2	56.8	0.0	2.0	0.0	96.5	44.6	42.7
Queue Length 95th (m)	79.3	83.0	18.6	5.8	0.0	#123.5	#76.6	33.8
Internal Link Dist (m)		253.6				353.3		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	419	461	562	372	329	1287	314	1746
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	0.68	0.66	0.44	0.06	0.22	0.76	0.82	0.27

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road

Existing
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	290	235	20	0	70	0	500	425	245	445	0
Future Volume (vph)	270	290	235	20	0	70	0	500	425	245	445	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
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)	1694	1863	1521	2869		1439		3232		1662	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.11	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3232		195	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	284	305	247	21	0	74	0	526	447	258	468	0
RTOR Reduction (vph)	0	0	190	0	0	69	0	143	0	0	0	0
Lane Group Flow (vph)	284	305	57	21	0	5	0	830	0	258	468	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	21.9	21.9	21.9	6.4		6.4		32.9		48.7	48.7	
Effective Green, g (s)	22.9	22.9	22.9	7.4		7.4		33.9		49.7	49.7	
Actuated g/C Ratio	0.23	0.23	0.23	0.07		0.07		0.34		0.50	0.50	
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)	387	426	348	212		106		1095		299	1692	
v/s Ratio Prot	c0.17	0.16		c0.01		0.00		c0.26		c0.12	0.14	
v/s Ratio Perm			0.04							0.31		
v/c Ratio	0.73	0.72	0.16	0.10		0.05		0.76		0.86	0.28	
Uniform Delay, d1	35.7	35.6	30.9	43.2		43.0		29.4		24.8	14.7	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.22		1.18	1.25	
Incremental Delay, d2	7.0	5.7	0.2	0.2		0.2		4.7		21.3	0.4	
Delay (s)	42.8	41.2	31.1	43.4		43.2		40.7		50.6	18.7	
Level of Service	D	D	C	D		D		D		D	B	
Approach Delay (s)		38.7			43.3			40.7			30.0	
Approach LOS		D			D			D			C	

Intersection Summary				
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0	
Intersection Capacity Utilization	76.8%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	679	214	48
v/c Ratio	0.46	0.15	0.14
Control Delay	4.7	1.0	21.8
Queue Delay	0.0	0.0	0.0
Total Delay	4.7	1.0	21.8
Queue Length 50th (m)	0.0	0.0	3.0
Queue Length 95th (m)	56.1	4.4	11.8
Internal Link Dist (m)	190.8		55.4
Turn Bay Length (m)			
Base Capacity (vph)	1472	1416	1352
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.46	0.15	0.04

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	570	180	15	25	0	0
Future Volume (vph)	570	180	15	25	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)	5.0	5.0		6.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.98		
Satd. Flow (prot)	1694	1597		1865		
Flt Permitted	0.95	1.00		0.98		
Satd. Flow (perm)	1694	1597		1865		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	679	214	18	30	0	0
RTOR Reduction (vph)	0	57	0	0	0	0
Lane Group Flow (vph)	679	157	0	48	0	0
Heavy Vehicles (%)	3%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	40.0	40.0		2.8		
Effective Green, g (s)	41.0	41.0		3.8		
Actuated g/C Ratio	0.73	0.73		0.07		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	1244	1173		127		
v/s Ratio Prot	c0.40			c0.03		
v/s Ratio Perm		0.10				
v/c Ratio	0.55	0.13		0.38		
Uniform Delay, d1	3.3	2.2		24.9		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	0.5	0.1		1.9		
Delay (s)	3.8	2.2		26.8		
Level of Service	A	A		C		
Approach Delay (s)	3.4			26.8	0.0	
Approach LOS	A			C	A	

Intersection Summary				
HCM 2000 Control Delay	4.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	11.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues
6: Waterdown Road & Railway Road/Masonry Court

Existing
AM Peak Hour

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	11	101	11	910	128	617
v/c Ratio	0.16	0.10	0.22	0.03	0.37	0.24	0.22
Control Delay	2.6	43.9	1.1	5.8	6.7	1.7	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.6	43.9	1.1	5.8	6.7	1.7	1.3
Queue Length 50th (m)	0.0	2.1	0.0	0.6	35.9	1.1	3.6
Queue Length 95th (m)	0.0	7.8	0.0	2.7	51.5	1.8	4.3
Internal Link Dist (m)	95.0		120.3		324.2		353.3
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	309	418	782	351	2440	618	2828
Starvation Cap Reductn	0	0	0	0	0	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	0.07	0.03	0.13	0.03	0.37	0.21	0.22

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Waterdown Road & Railway Road/Masonry Court

Existing
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	0	5	10	0	95	10	815	40	120	565	15
Future Volume (vph)	15	0	5	10	0	95	10	815	40	120	565	15
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1060		1572	1615		1118	3414		1693	3370	
Flt Permitted		0.71		0.74	1.00		0.42	1.00		0.28	1.00	
Satd. Flow (perm)		784		1230	1615		492	3414		497	3370	
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)	16	0	5	11	0	101	11	867	43	128	601	16
RTOR Reduction (vph)	0	19	0	0	93	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	2	0	11	8	0	11	908	0	128	616	0
Confl. Peds. (#/hr)									5	5		
Heavy Vehicles (%)	88%	0%	0%	11%	0%	0%	56%	4%	0%	3%	5%	71%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		6.5		6.5	6.5		69.0	69.0		80.5	80.5	
Effective Green, g (s)		7.5		7.5	7.5		70.0	70.0		81.5	81.5	
Actuated g/C Ratio		0.08		0.08	0.08		0.70	0.70		0.82	0.82	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		58		92	121		344	2389		518	2746	
v/s Ratio Prot					0.00			c0.27		c0.02	0.18	
v/s Ratio Perm		0.00		c0.01			0.02			0.18		
v/c Ratio		0.03		0.12	0.06		0.03	0.38		0.25	0.22	
Uniform Delay, d1		42.9		43.2	43.0		4.6	6.1		2.3	2.1	
Progression Factor		1.00		1.00	1.00		1.00	1.00		0.46	0.51	
Incremental Delay, d2		0.2		0.6	0.2		0.2	0.5		0.2	0.2	
Delay (s)		43.1		43.8	43.2		4.8	6.6		1.3	1.2	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		43.1			43.3			6.6			1.2	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.34			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	51.1%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	130	25	25	60	0	20	0	25	0	5	25
Future Volume (Veh/h)	5	130	25	25	60	0	20	0	25	0	5	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.82	0.82	0.82	0.82	0.92	0.82	0.92	0.82	0.92	0.92	0.92
Hourly flow rate (vph)	5	159	30	30	73	0	24	0	30	0	5	27
Pedestrians					5							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked												
vC, conflicting volume	73			189			346	317	179	352	332	73
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	73			189			346	317	179	352	332	73
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			96	100	97	100	99	97
cM capacity (veh/h)	1527			1397			564	584	865	569	573	989

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	194	103	54	32
Volume Left	5	30	24	0
Volume Right	30	0	30	27
cSH	1527	1397	699	888
Volume to Capacity	0.00	0.02	0.08	0.04
Queue Length 95th (m)	0.1	0.5	2.0	0.9
Control Delay (s)	0.2	2.3	10.6	9.2
Lane LOS	A	A	B	A
Approach Delay (s)	0.2	2.3	10.6	9.2
Approach LOS			B	A

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	Err%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	155	85	0	0	0
Future Volume (Veh/h)	0	155	85	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	168	92	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)		280				
pX, platoon unblocked						
vC, conflicting volume	92				260	92
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	92				260	92
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)	1503				729	965

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	168	92	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1503	1700	1700
Volume to Capacity	0.00	0.05	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	11.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues
10: Lasalle Park Road/Waterdown Road & Plains Road

Existing
AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	521	920	69	463	80	271	165	223	229
v/c Ratio	0.83	0.55	0.22	0.44	0.20	0.74	0.50	0.49	0.43
Control Delay	28.1	23.1	16.0	26.4	22.2	51.8	28.3	38.8	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.1	23.1	16.0	26.4	22.2	51.8	28.3	38.8	6.7
Queue Length 50th (m)	68.1	77.5	6.5	33.8	11.4	55.5	25.1	43.6	0.0
Queue Length 95th (m)	#124.6	109.0	14.3	53.6	20.6	79.8	38.9	65.0	18.4
Internal Link Dist (m)		134.8		133.0		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	663	1679	331	1090	404	463	330	510	571
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.55	0.21	0.42	0.20	0.59	0.50	0.44	0.40

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Lasalle Park Road/Waterdown Road & Plains Road

Existing
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	490	740	125	65	265	170	75	205	50	155	210	215
Future Volume (vph)	490	740	125	65	265	170	75	205	50	155	210	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.94		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1674	3407		1674	3197		1723	1786		1613	1810	1446
Flt Permitted	0.36	1.00		0.31	1.00		0.60	1.00		0.32	1.00	1.00
Satd. Flow (perm)	629	3407		547	3197		1096	1786		536	1810	1446
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)	521	787	133	69	282	181	80	218	53	165	223	229
RTOR Reduction (vph)	0	11	0	0	87	0	0	9	0	0	0	171
Lane Group Flow (vph)	521	909	0	69	376	0	80	262	0	165	223	58
Confl. Peds. (#/hr)	10		10	10		10	5		10	10		5
Confl. Bikes (#/hr)			10			5						
Heavy Vehicles (%)	4%	3%	2%	4%	5%	5%	1%	2%	6%	8%	5%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	60.3	51.0		37.8	31.5		28.6	21.6		36.7	26.7	26.7
Effective Green, g (s)	61.3	52.0		39.8	32.5		30.6	22.6		37.7	27.7	27.7
Actuated g/C Ratio	0.56	0.47		0.36	0.30		0.28	0.21		0.34	0.25	0.25
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	605	1610		272	944		350	366		311	455	364
v/s Ratio Prot	c0.21	c0.27		0.02	0.12		0.02	c0.15		c0.06	0.12	
v/s Ratio Perm	0.27			0.07			0.05			0.12		0.04
v/c Ratio	0.86	0.56		0.25	0.40		0.23	0.72		0.53	0.49	0.16
Uniform Delay, d1	16.6	20.9		23.4	30.9		30.1	40.7		27.2	35.1	32.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.0	1.4		0.5	1.3		0.3	6.6		1.7	0.8	0.2
Delay (s)	28.6	22.3		23.9	32.2		30.4	47.3		28.9	36.0	32.3
Level of Service	C	C		C	C		C	D		C	D	C
Approach Delay (s)		24.6			31.1			43.4			32.7	
Approach LOS		C			C			D			C	

Intersection Summary					
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.69				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0		
Intersection Capacity Utilization	85.5%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Queues
11: Plains Road & Cooke Boulevard

Existing
AM Peak Hour

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	78	972	578	39
v/c Ratio	0.11	0.34	0.23	0.25
Control Delay	1.7	2.7	4.6	22.9
Queue Delay	0.0	0.2	0.0	0.0
Total Delay	1.7	2.9	4.6	22.9
Queue Length 50th (m)	2.0	24.2	19.4	2.2
Queue Length 95th (m)	4.6	34.5	29.1	12.6
Internal Link Dist (m)		133.0	135.9	318.4
Turn Bay Length (m)	60.0			
Base Capacity (vph)	787	2858	2540	390
Starvation Cap Reductn	0	968	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.10	0.51	0.23	0.10

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Plains Road & Cooke Boulevard

Existing
AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	875	475	45	10	25
Future Volume (vph)	70	875	475	45	10	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.99		0.90	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1687	3282	3243		1425	
Flt Permitted	0.42	1.00	1.00		0.99	
Satd. Flow (perm)	751	3282	3243		1425	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	78	972	528	50	11	28
RTOR Reduction (vph)	0	0	3	0	26	0
Lane Group Flow (vph)	78	972	575	0	13	0
Heavy Vehicles (%)	7%	10%	9%	4%	36%	12%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	80.9	80.9	72.7		5.1	
Effective Green, g (s)	81.9	81.9	73.7		6.1	
Actuated g/C Ratio	0.82	0.82	0.74		0.06	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	673	2687	2390		86	
v/s Ratio Prot	0.01	c0.30	0.18			
v/s Ratio Perm	0.09				c0.01	
v/c Ratio	0.12	0.36	0.24		0.15	
Uniform Delay, d1	1.7	2.3	4.2		44.5	
Progression Factor	1.00	1.00	1.00		0.92	
Incremental Delay, d2	0.1	0.4	0.2		0.8	
Delay (s)	1.8	2.7	4.4		41.9	
Level of Service	A	A	A		D	
Approach Delay (s)		2.6	4.4		41.9	
Approach LOS		A	A		D	

Intersection Summary				
HCM 2000 Control Delay	4.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	989	77	15
v/c Ratio	0.30	0.02	0.06
Control Delay	1.9	1.7	16.9
Queue Delay	0.0	0.0	0.0
Total Delay	1.9	1.7	16.9
Queue Length 50th (m)	0.0	0.0	0.6
Queue Length 95th (m)	36.1	3.3	6.2
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3102	3140	419
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.32	0.02	0.04

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	945	15	0	75	15	0
Future Volume (vph)	945	15	0	75	15	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3495			3539	943	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3495			3539	943	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	974	15	0	77	15	0
RTOR Reduction (vph)	1	0	0	0	0	0
Lane Group Flow (vph)	988	0	0	77	15	0
Heavy Vehicles (%)	2%	71%	0%	2%	85%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	28.9			28.9	1.1	
Effective Green, g (s)	29.9			29.9	2.1	
Actuated g/C Ratio	0.68			0.68	0.05	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2375			2404	45	
v/s Ratio Prot	c0.28			0.02	c0.02	
v/s Ratio Perm						
v/c Ratio	0.42			0.03	0.33	
Uniform Delay, d1	3.1			2.3	20.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.1			0.0	4.3	
Delay (s)	3.3			2.3	24.6	
Level of Service	A			A	C	
Approach Delay (s)	3.3			2.3	24.6	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.5	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.41			
Actuated Cycle Length (s)	44.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	43.3%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Queues
1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road

Existing
PM Peak Hour

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	253	505	121	568	642	84	505
v/c Ratio	0.43	0.77	0.19	0.89	0.42	0.22	0.54
Control Delay	29.2	40.0	4.8	39.7	18.5	15.3	35.1
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	29.2	40.0	4.8	39.8	18.5	15.3	35.1
Queue Length 50th (m)	43.2	100.2	0.0	99.1	41.3	8.2	50.2
Queue Length 95th (m)	62.6	132.8	11.7	#154.4	80.7	17.2	65.7
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	594	659	630	635	1772	381	1416
Starvation Cap Reductn	0	0	0	2	0	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	0.77	0.19	0.90	0.36	0.22	0.36

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road

Existing
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	240	480	115	540	385	225	80	365	115
Future Volume (vph)	0	0	0	240	480	115	540	385	225	80	365	115
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)				7.0	7.0	7.0	0.5	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.94		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	1693	3302		1728	3397	
Flt Permitted				0.95	1.00	1.00	0.35	1.00		0.41	1.00	
Satd. Flow (perm)				1694	1881	1575	629	3302		742	3397	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	253	505	121	568	405	237	84	384	121
RTOR Reduction (vph)	0	0	0	0	0	79	0	87	0	0	34	0
Lane Group Flow (vph)	0	0	0	253	505	42	568	555	0	84	471	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				37.6	37.6	37.6	56.4	46.6		34.8	28.0	
Effective Green, g (s)				38.6	38.6	38.6	58.9	47.6		36.8	29.0	
Actuated g/C Ratio				0.35	0.35	0.35	0.54	0.43		0.33	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)				594	660	552	606	1428		318	895	
v/s Ratio Prot				0.15	c0.27		c0.24	0.17		0.02	c0.14	
v/s Ratio Perm						0.03	0.26			0.07		
v/c Ratio				0.43	0.77	0.08	0.94	0.39		0.26	0.53	
Uniform Delay, d1				27.2	31.7	23.8	18.7	21.3		25.6	34.6	
Progression Factor				1.00	1.00	1.00	1.39	1.03		1.00	1.00	
Incremental Delay, d2				0.5	5.3	0.1	21.1	0.7		0.4	2.2	
Delay (s)				27.7	37.0	23.9	47.1	22.7		26.0	36.8	
Level of Service				C	D	C	D	C		C	D	
Approach Delay (s)		0.0			32.5			34.2			35.3	
Approach LOS		A			C			C			D	

Intersection Summary

HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues
2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp

Existing
PM Peak Hour

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	191	170	1053	644
v/c Ratio	0.52	0.51	0.39	0.24
Control Delay	50.2	12.3	7.4	5.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	50.2	12.3	7.4	5.5
Queue Length 50th (m)	21.1	0.0	29.6	22.7
Queue Length 95th (m)	31.9	19.5	86.2	38.3
Internal Link Dist (m)			174.0	121.9
Turn Bay Length (m)	145.0	115.0		
Base Capacity (vph)	569	421	2708	2708
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	7	156	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.34	0.41	0.41	0.24

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp

Existing
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	180	0	160	0	990	0	0	605	0
Future Volume (vph)	0	0	0	180	0	160	0	990	0	0	605	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)				6.0		6.0		6.0			6.0	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frpb, ped/bikes				1.00		1.00		1.00			1.00	
Flpb, ped/bikes				1.00		1.00		1.00			1.00	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3134		1551		3505			3505	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3134		1551		3505			3505	
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)	0	0	0	191	0	170	0	1053	0	0	644	0
RTOR Reduction (vph)	0	0	0	0	0	150	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	191	0	20	0	1053	0	0	644	0
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)									1			2
Heavy Vehicles (%)	0%	0%	0%	8%	100%	3%	0%	3%	0%	0%	3%	0%
Turn Type				Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)				12.0		12.0		84.0			84.0	
Effective Green, g (s)				13.0		13.0		85.0			85.0	
Actuated g/C Ratio				0.12		0.12		0.77			0.77	
Clearance Time (s)				7.0		7.0		7.0			7.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				370		183		2708			2708	
v/s Ratio Prot				c0.06		0.01		c0.30			0.18	
v/s Ratio Perm												
v/c Ratio				0.52		0.11		0.39			0.24	
Uniform Delay, d1				45.5		43.3		4.1			3.5	
Progression Factor				1.00		1.00		1.62			1.44	
Incremental Delay, d2				1.2		0.3		0.4			0.2	
Delay (s)				46.8		43.6		6.9			5.2	
Level of Service				D		D		A			A	
Approach Delay (s)		0.0			45.3			6.9			5.2	
Approach LOS		A			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.43				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		18.0	
Intersection Capacity Utilization	47.4%	ICU Level of Service		A	
Analysis Period (min)	15				

c Critical Lane Group

Queues
3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road

Existing
PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	136	162	242	56	288	869	273	520
v/c Ratio	0.57	0.62	0.57	0.18	0.71	0.60	0.67	0.26
Control Delay	53.0	54.3	10.9	46.3	15.5	27.8	36.2	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.0	54.3	10.9	46.3	15.5	27.8	36.2	19.2
Queue Length 50th (m)	29.0	34.8	0.0	6.2	0.0	78.9	53.3	46.2
Queue Length 95th (m)	47.5	55.0	21.8	11.9	25.7	120.2	#80.2	58.1
Internal Link Dist (m)		253.6				353.3		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	305	335	474	431	458	1458	420	2013
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	0.48	0.51	0.13	0.63	0.60	0.65	0.26

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	160	240	55	0	285	0	570	290	270	515	0
Future Volume (vph)	135	160	240	55	0	285	0	570	290	270	515	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00		1.00		1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00		0.85		0.95		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)	1678	1845	1521	3164		1536		3338		1678	3471	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.21	1.00	
Satd. Flow (perm)	1678	1845	1521	3164		1536		3338		366	3471	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	136	162	242	56	0	288	0	576	293	273	520	0
RTOR Reduction (vph)	0	0	208	0	0	260	0	51	0	0	0	0
Lane Group Flow (vph)	136	162	34	56	0	28	0	818	0	273	520	0
Confl. Peds. (#/hr)			5	5			4					4
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	3%	3%	7%	0%	4%	0%	1%	6%	4%	4%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	14.6	14.6	14.6	9.6		9.6		45.4		62.8	62.8	
Effective Green, g (s)	15.6	15.6	15.6	10.6		10.6		46.4		63.8	63.8	
Actuated g/C Ratio	0.14	0.14	0.14	0.10		0.10		0.42		0.58	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)	237	261	215	304		148		1408		395	2013	
v/s Ratio Prot	0.08	c0.09		0.02		c0.02		c0.24		c0.10	0.15	
v/s Ratio Perm			0.02							0.30		
v/c Ratio	0.57	0.62	0.16	0.18		0.19		0.58		0.69	0.26	
Uniform Delay, d1	44.1	44.4	41.4	45.7		45.7		24.4		14.3	11.4	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.11		2.49	1.53	
Incremental Delay, d2	3.3	4.5	0.3	0.3		0.6		1.7		5.0	0.3	
Delay (s)	47.4	48.9	41.8	46.0		46.4		28.6		40.6	17.7	
Level of Service	D	D	D	D		D		C		D	B	
Approach Delay (s)		45.4			46.3			28.6			25.6	
Approach LOS		D			D			C			C	

Intersection Summary					
HCM 2000 Control Delay	33.6	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.56				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		22.0	
Intersection Capacity Utilization	70.8%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Queues
4: GO Station Access/Highway 403 EB Off-Ramp & S Service Road

Existing
PM Peak Hour



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	500	26	218
v/c Ratio	0.63	0.03	0.44
Control Delay	13.5	3.5	17.1
Queue Delay	0.0	0.0	0.0
Total Delay	13.5	3.5	17.1
Queue Length 50th (m)	27.3	0.0	13.1
Queue Length 95th (m)	61.4	2.9	35.3
Internal Link Dist (m)	190.8		55.4
Turn Bay Length (m)			
Base Capacity (vph)	1153	1115	1469
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.43	0.02	0.15

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: GO Station Access/Highway 403 EB Off-Ramp & S Service Road

Existing
PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	480	25	175	35	0	0
Future Volume (vph)	480	25	175	35	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)	5.0	5.0		6.0		
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)	1662	1597		1824		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1662	1597		1824		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	500	26	182	36	0	0
RTOR Reduction (vph)	0	13	0	0	0	0
Lane Group Flow (vph)	500	13	0	218	0	0
Heavy Vehicles (%)	5%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	20.9	20.9		11.5		
Effective Green, g (s)	21.9	21.9		12.5		
Actuated g/C Ratio	0.48	0.48		0.28		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	801	770		502		
v/s Ratio Prot	c0.30			c0.12		
v/s Ratio Perm		0.01				
v/c Ratio	0.62	0.02		0.43		
Uniform Delay, d1	8.7	6.1		13.5		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	1.5	0.0		0.6		
Delay (s)	10.2	6.1		14.1		
Level of Service	B	A		B		
Approach Delay (s)	10.0			14.1	0.0	
Approach LOS	B			B	A	

Intersection Summary				
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	45.4	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	47.3%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Queues
6: Waterdown Road & Railway Road/Masonry Court

Existing
PM Peak Hour

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	31	268	10	629	88	747
v/c Ratio	0.20	0.25	0.53	0.03	0.25	0.13	0.26
Control Delay	4.6	51.5	3.8	3.6	3.1	3.0	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	51.5	3.8	3.6	3.1	3.0	5.3
Queue Length 50th (m)	0.0	6.7	0.0	0.3	10.7	10.3	50.5
Queue Length 95th (m)	0.0	16.2	0.0	m0.4	m11.7	1.4	13.0
Internal Link Dist (m)	95.0		120.3		324.2		353.3
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	161	321	682	369	2498	738	2833
Starvation Cap Reductn	0	0	0	0	0	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	0.12	0.10	0.39	0.03	0.25	0.12	0.26

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
6: Waterdown Road & Railway Road/Masonry Court

Existing
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	10	30	0	260	10	590	20	85	715	10
Future Volume (vph)	10	0	10	30	0	260	10	590	20	85	715	10
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1573		1740	1575		1307	3420		1708	3497	
Flt Permitted		0.30		0.74	1.00		0.37	1.00		0.39	1.00	
Satd. Flow (perm)		488		1363	1575		507	3420		708	3497	
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)	10	0	10	31	0	268	10	608	21	88	737	10
RTOR Reduction (vph)	0	18	0	0	244	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	2	0	31	24	0	10	628	0	88	746	0
Confl. Peds. (#/hr)	2		2	2		2	5		6	6		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	18%	0%	0%	0%	0%	1%	33%	4%	0%	2%	2%	75%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.9		8.9	8.9		78.7	78.7		88.1	88.1	
Effective Green, g (s)		9.9		9.9	9.9		79.7	79.7		89.1	89.1	
Actuated g/C Ratio		0.09		0.09	0.09		0.72	0.72		0.81	0.81	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		43		122	141		367	2477		640	2832	
v/s Ratio Prot					0.02			0.18		0.01	c0.21	
v/s Ratio Perm		0.00		c0.02			0.02			0.10		
v/c Ratio		0.04		0.25	0.17		0.03	0.25		0.14	0.26	
Uniform Delay, d1		45.7		46.6	46.3		4.3	5.1		2.2	2.5	
Progression Factor		1.00		1.00	1.00		0.67	0.54		1.59	1.94	
Incremental Delay, d2		0.4		1.1	0.6		0.1	0.1		0.1	0.2	
Delay (s)		46.1		47.7	46.8		2.9	2.9		3.5	5.1	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		46.1			46.9			2.9			4.9	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.27				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	60.6%	ICU Level of Service		B	
Analysis Period (min)	15				

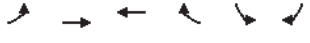
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	70	15	40	235	0	45	20	30	5	5	10
Future Volume (Veh/h)	20	70	15	40	235	0	45	20	30	5	5	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	22	79	17	45	264	0	51	22	34	6	6	11
Pedestrians					15						5	
Lane Width (m)					3.6						3.6	
Walking Speed (m/s)					1.2						1.2	
Percent Blockage					1						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked												
vC, conflicting volume	269			96			500	490	102	550	499	269
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	269			96			500	490	102	550	499	269
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			97			89	95	96	98	99	99
cM capacity (veh/h)	1301			1510			446	457	946	394	452	771

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	118	309	107	23
Volume Left	22	45	51	6
Volume Right	17	0	34	11
cSH	1301	1510	539	538
Volume to Capacity	0.02	0.03	0.20	0.04
Queue Length 95th (m)	0.4	0.7	5.9	1.1
Control Delay (s)	1.6	1.3	13.3	12.0
Lane LOS	A	A	B	B
Approach Delay (s)	1.6	1.3	13.3	12.0
Approach LOS			B	B

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	36.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	105	275	0	0	0
Future Volume (Veh/h)	0	105	275	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	107	281	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)		280				
pX, platoon unblocked						
vC, conflicting volume	281				388	281
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	281				388	281
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)	1293				619	763

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	107	281	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1293	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	17.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues
10: Lasalle Park Road/Waterdown Road & Plains Road

Existing
PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	191	536	67	1134	113	299	263	222	294
v/c Ratio	0.72	0.33	0.14	0.80	0.30	0.88	0.75	0.45	0.49
Control Delay	35.4	19.7	12.1	39.5	24.6	70.0	50.5	46.9	21.0
Queue Delay	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	19.7	12.1	42.8	24.6	70.0	50.5	46.9	21.0
Queue Length 50th (m)	23.8	39.8	9.2	141.1	16.2	64.8	58.0	50.2	29.5
Queue Length 95th (m)	48.7	55.3	11.8	#168.2	28.9	#116.4	#77.4	70.0	44.7
Internal Link Dist (m)		134.8		136.1		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	304	1620	564	1410	373	343	368	518	620
Starvation Cap Reductn	0	0	0	186	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.33	0.12	0.93	0.30	0.87	0.71	0.43	0.47

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Lasalle Park Road/Waterdown Road & Plains Road

Existing
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	455	65	65	900	200	110	235	55	255	215	285
Future Volume (vph)	185	455	65	65	900	200	110	235	55	255	215	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.97		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1616	3458		1637	3413		1694	1796		1710	1900	1490
Flt Permitted	0.09	1.00		0.45	1.00		0.62	1.00		0.22	1.00	1.00
Satd. Flow (perm)	161	3458		776	3413		1105	1796		393	1900	1490
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)	191	469	67	67	928	206	113	242	57	263	222	294
RTOR Reduction (vph)	0	9	0	0	16	0	0	7	0	0	0	218
Lane Group Flow (vph)	191	527	0	67	1118	0	113	292	0	263	222	76
Confl. Peds. (#/hr)	5		10	10		5			5	5		
Confl. Bikes (#/hr)			10			15						5
Heavy Vehicles (%)	8%	2%	0%	6%	2%	4%	3%	3%	0%	2%	0%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	59.2	49.8		50.4	44.0		26.6	19.3		37.8	27.5	27.5
Effective Green, g (s)	60.2	50.8		52.4	45.0		28.6	20.3		38.8	28.5	28.5
Actuated g/C Ratio	0.55	0.46		0.48	0.41		0.26	0.18		0.35	0.26	0.26
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	262	1596		427	1396		331	331		336	492	386
v/s Ratio Prot	c0.09	0.15		0.01	c0.33		0.03	c0.16		c0.12	0.12	
v/s Ratio Perm	0.31			0.06			0.06			0.16		0.05
v/c Ratio	0.73	0.33		0.16	0.80		0.34	0.88		0.78	0.45	0.20
Uniform Delay, d1	23.4	18.8		15.7	28.6		32.3	43.7		28.4	34.2	31.8
Progression Factor	1.00	1.00		1.01	1.20		1.00	1.00		1.52	1.29	4.76
Incremental Delay, d2	9.7	0.6		0.2	4.5		0.6	22.8		11.1	0.6	0.2
Delay (s)	33.2	19.4		16.1	38.7		32.9	66.5		54.2	44.7	151.6
Level of Service	C	B		B	D		C	E		D	D	F
Approach Delay (s)		23.0			37.4			57.3			88.3	
Approach LOS		C			D			E			F	

Intersection Summary					
HCM 2000 Control Delay	49.4	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.80				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		15.0	
Intersection Capacity Utilization	88.4%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Queues
11: Plains Road & Cooke Boulevard

Existing
PM Peak Hour



Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	15	773	1181	87
v/c Ratio	0.04	0.28	0.45	0.45
Control Delay	1.5	3.2	5.9	35.2
Queue Delay	0.0	0.0	0.0	0.1
Total Delay	1.5	3.2	6.0	35.2
Queue Length 50th (m)	0.4	29.6	33.8	10.7
Queue Length 95th (m)	m0.8	m15.8	78.8	25.6
Internal Link Dist (m)		136.1	132.2	314.3
Turn Bay Length (m)	60.0			
Base Capacity (vph)	488	2803	2651	411
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	198	42
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.03	0.28	0.48	0.24

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
11: Plains Road & Cooke Boulevard

Existing
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	750	1125	20	45	40
Future Volume (vph)	15	750	1125	20	45	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.94	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1686	3374	3322		1618	
Flt Permitted	0.21	1.00	1.00		0.97	
Satd. Flow (perm)	375	3374	3322		1618	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	15	773	1160	21	46	41
RTOR Reduction (vph)	0	0	0	0	35	0
Lane Group Flow (vph)	15	773	1181	0	52	0
Confl. Peds. (#/hr)	10			10		
Confl. Bikes (#/hr)				10		
Heavy Vehicles (%)	7%	7%	7%	5%	9%	5%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	87.8	87.8	82.4		8.2	
Effective Green, g (s)	88.8	88.8	83.4		9.2	
Actuated g/C Ratio	0.81	0.81	0.76		0.08	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	343	2723	2518		135	
v/s Ratio Prot	0.00	c0.23	c0.36			
v/s Ratio Perm	0.03				c0.03	
v/c Ratio	0.04	0.28	0.47		0.39	
Uniform Delay, d1	2.5	2.7	5.0		47.7	
Progression Factor	0.69	1.04	1.00		1.00	
Incremental Delay, d2	0.0	0.2	0.6		1.8	
Delay (s)	1.8	3.0	5.6		49.4	
Level of Service	A	A	A		D	
Approach Delay (s)		3.0	5.6		49.4	
Approach LOS		A	A		D	

Intersection Summary

HCM 2000 Control Delay	6.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	848	388	18
v/c Ratio	0.26	0.12	0.07
Control Delay	1.8	1.6	13.6
Queue Delay	0.0	0.0	0.0
Total Delay	1.8	1.6	13.6
Queue Length 50th (m)	0.0	0.0	0.5
Queue Length 95th (m)	27.0	11.7	5.6
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3128	3260	473
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.27	0.12	0.04

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	700	20	0	330	10	5
Future Volume (vph)	700	20	0	330	10	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	0.95	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	3462			3610	1018	
Flt Permitted	1.00			1.00	0.97	
Satd. Flow (perm)	3462			3610	1018	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	824	24	0	388	12	6
RTOR Reduction (vph)	2	0	0	0	6	0
Lane Group Flow (vph)	846	0	0	388	12	0
Heavy Vehicles (%)	2%	67%	0%	0%	100%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	27.3			27.3	1.1	
Effective Green, g (s)	28.3			28.3	2.1	
Actuated g/C Ratio	0.67			0.67	0.05	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2310			2409	50	
v/s Ratio Prot	c0.24			0.11	c0.01	
v/s Ratio Perm						
v/c Ratio	0.37			0.16	0.25	
Uniform Delay, d1	3.1			2.6	19.4	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.1			0.0	2.6	
Delay (s)	3.2			2.7	22.0	
Level of Service	A			A	C	
Approach Delay (s)	3.2			2.7	22.0	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.3	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.36			
Actuated Cycle Length (s)	42.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	36.7%	ICU Level of Service	A	
Analysis Period (min)	15			

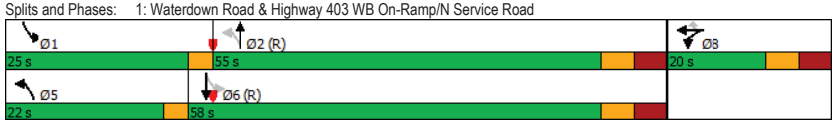
c Critical Lane Group

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	80	90	35	290	265	110	350
Future Volume (vph)	80	90	35	290	265	110	350
Lane Group Flow (vph)	82	93	36	299	783	113	449
Turn Type	Split	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	8	8		5	2	1	6
Permitted Phases			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)	40.0	40.0	40.0	10.0	31.0	10.0	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%
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)	-1.0	-1.0	-1.0	-2.0	-1.0	-1.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	1.0	7.0	2.0	7.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.44	0.44	0.14	0.40	0.36	0.20	0.21
Control Delay	47.9	47.1	1.2	5.5	3.2	3.8	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	47.1	1.2	5.5	3.2	3.8	9.0
Queue Length 50th (m)	15.9	18.0	0.0	5.5	1.7	3.9	17.5
Queue Length 95th (m)	29.7	32.5	0.0	43.9	32.0	9.3	31.6
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	211	238	277	818	2187	746	2100
Starvation Cap Reductn	0	0	0	0	0	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	0.39	0.39	0.13	0.37	0.36	0.15	0.21

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 48 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	80	90	35	290	265	495	110	350	85
Future Volume (vph)	0	0	0	80	90	35	290	265	495	110	350	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)				7.0	7.0	7.0	1.0	7.0		2.0	7.0	
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	0.90		1.00	0.97	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	1601	3152		1711	3435	
Flt Permitted				0.95	1.00	1.00	0.48	1.00		0.35	1.00	
Satd. Flow (perm)				1544	1743	1479	817	3152		630	3435	
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)	0	0	0	82	93	36	299	273	510	113	361	88
RTOR Reduction (vph)	0	0	0	0	0	32	0	186	0	0	17	0
Lane Group Flow (vph)	0	0	0	82	93	4	299	597	0	113	432	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				11.0	11.0	11.0	72.9	62.5		67.1	59.6	
Effective Green, g (s)				12.0	12.0	12.0	75.0	63.5		69.1	60.6	
Actuated g/C Ratio				0.12	0.12	0.12	0.75	0.64		0.69	0.61	
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)				185	209	177	709	2001		527	2081	
v/s Ratio Prot				0.05	c0.05		c0.05	c0.19		0.02	0.13	
v/s Ratio Perm						0.00	0.26			0.13		
v/c Ratio				0.44	0.44	0.02	0.42	0.30		0.21	0.21	
Uniform Delay, d1				40.9	40.9	38.8	3.9	8.2		5.1	8.9	
Progression Factor				1.00	1.00	1.00	1.45	0.94		1.00	1.00	
Incremental Delay, d2				1.7	1.5	0.1	0.4	0.4		0.2	0.2	
Delay (s)				42.6	42.4	38.9	6.0	8.1		5.3	9.1	
Level of Service				D	D	D	A	A		A	A	
Approach Delay (s)		0.0			41.9			7.5			8.3	
Approach LOS		A			D			A			A	

Intersection Summary

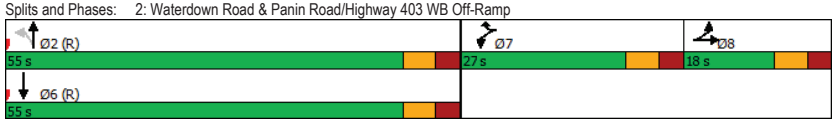
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.34				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	51.0%	ICU Level of Service		A	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBT	WBL	WBR	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	0	295	130	920	430
Future Volume (vph)	0	295	130	920	430
Lane Group Flow (vph)	5	307	135	958	448
Turn Type	NA	Prot	Prot	NA	NA
Protected Phases	8	7	7	2	6
Permitted Phases					
Detector Phase	8	7	7	2	6
Switch Phase					
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	15.0	15.0	31.0	31.0
Total Split (s)	18.0	27.0	27.0	55.0	55.0
Total Split (%)	18.0%	27.0%	27.0%	55.0%	55.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lead	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	None	None	None	C-Min	C-Min
v/c Ratio	0.01	0.61	0.38	0.40	0.19
Control Delay	0.0	44.2	9.4	9.7	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	44.2	9.4	9.7	6.3
Queue Length 50th (m)	0.0	30.4	0.0	50.1	10.7
Queue Length 95th (m)	0.0	42.3	15.7	m65.5	39.2
Internal Link Dist (m)	106.5			174.0	121.9
Turn Bay Length (m)		145.0	115.0		
Base Capacity (vph)	366	658	426	2372	2395
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.01	0.47	0.32	0.40	0.19

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 55 (55%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	5	295	0	130	0	920	0	0	430	0
Future Volume (vph)	0	0	5	295	0	130	0	920	0	0	430	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)		6.0		6.0		6.0		6.0			6.0	
Lane Util. Factor		1.00		0.97		1.00		0.95			0.95	
Frt		0.86		1.00		0.85		1.00			1.00	
Flt Protected		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (prot)		984		3134		1521		3438			3471	
Flt Permitted		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (perm)		984		3134		1521		3438			3471	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	5	307	0	135	0	958	0	0	448	0
RTOR Reduction (vph)	0	5	0	0	0	113	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	307	0	22	0	958	0	0	448	0
Heavy Vehicles (%)	0%	0%	67%	8%	0%	5%	0%	5%	0%	0%	4%	0%
Turn Type		NA		Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)		1.6		15.0		15.0		62.4			62.4	
Effective Green, g (s)		2.6		16.0		16.0		63.4			63.4	
Actuated g/C Ratio		0.03		0.16		0.16		0.63			0.63	
Clearance Time (s)		7.0		7.0		7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)		25		501		243		2179			2200	
v/s Ratio Prot		c0.00		c0.10		0.01		c0.28			0.13	
v/s Ratio Perm												
v/c Ratio		0.01		0.61		0.09		0.44			0.20	
Uniform Delay, d1		47.4		39.1		35.8		9.3			7.7	
Progression Factor		1.00		1.00		1.00		1.16			0.90	
Incremental Delay, d2		0.1		2.2		0.2		0.4			0.2	
Delay (s)		47.5		41.3		35.9		11.1			7.1	
Level of Service		D		D		D		B			A	
Approach Delay (s)		47.5			39.7			11.1			7.1	
Approach LOS		D			D			B			A	

Intersection Summary					
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.46				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0		
Intersection Capacity Utilization	55.1%	ICU Level of Service	B		
Analysis Period (min)	15				

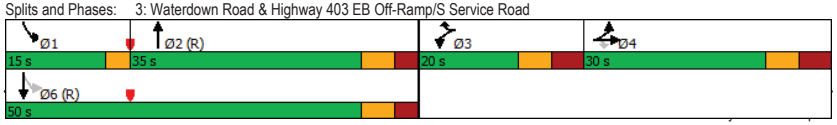
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	270	290	245	20	70	580	245	485
Future Volume (vph)	270	290	245	20	70	580	245	485
Lane Group Flow (vph)	284	305	258	21	74	1174	258	511
Turn Type	Split	NA	Perm	Prot	Prot	NA	pm+pt	NA
Protected Phases	4	4		3	3	2	1	6
Permitted Phases			4				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	16.0	16.0	29.0	9.0	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%
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)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	6.0	2.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.73	0.71	0.47	0.08	0.27	0.90	0.84	0.29
Control Delay	46.8	44.8	6.8	42.6	2.3	39.8	51.7	20.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.8	44.8	6.8	42.6	2.3	39.8	51.7	20.5
Queue Length 50th (m)	53.2	56.8	0.0	2.0	0.0	~125.1	45.2	47.5
Queue Length 95th (m)	79.3	83.0	18.9	5.8	0.0	#168.6	#88.7	41.6
Internal Link Dist (m)		253.6				252.8		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	419	461	571	372	329	1298	313	1746
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	0.68	0.66	0.45	0.06	0.22	0.90	0.82	0.29

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 54 (54%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	290	245	20	0	70	0	580	535	245	485	0
Future Volume (vph)	270	290	245	20	0	70	0	580	535	245	485	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
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)	1694	1863	1521	2869		1439		3221		1662	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.11	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3221		194	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	284	305	258	21	0	74	0	611	563	258	511	0
RTOR Reduction (vph)	0	0	199	0	0	69	0	154	0	0	0	0
Lane Group Flow (vph)	284	305	59	21	0	5	0	1020	0	258	511	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	21.9	21.9	21.9	6.4		6.4		33.1		48.7	48.7	
Effective Green, g (s)	22.9	22.9	22.9	7.4		7.4		34.1		49.7	49.7	
Actuated g/C Ratio	0.23	0.23	0.23	0.07		0.07		0.34		0.50	0.50	
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)	387	426	348	212		106		1098		296	1692	
v/s Ratio Prot	c0.17	0.16		c0.01		0.00		c0.32		c0.12	0.15	
v/s Ratio Perm			0.04							0.31		
v/c Ratio	0.73	0.72	0.17	0.10		0.05		0.93		0.87	0.30	
Uniform Delay, d1	35.7	35.6	30.9	43.2		43.0		31.8		26.1	14.9	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.10		1.30	1.26	
Incremental Delay, d2	7.0	5.7	0.2	0.2		0.2		14.3		22.8	0.4	
Delay (s)	42.8	41.2	31.2	43.4		43.2		49.1		56.6	19.2	
Level of Service	D	D	C	D		D		D		E	B	
Approach Delay (s)		38.7			43.3			49.1			31.7	
Approach LOS		D			D			D			C	

Intersection Summary

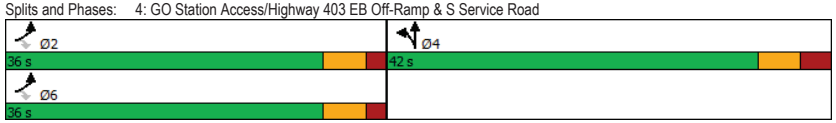
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	NBT	Ø2	Ø6
Lane Configurations					
Traffic Volume (vph)	680	180	25		
Future Volume (vph)	680	180	25		
Lane Group Flow (vph)	810	214	48		
Turn Type	Prot	Perm	NA		
Protected Phases	2 6		4	2	6
Permitted Phases		2 6			
Detector Phase	2 6	2 6	4		
Switch Phase					
Minimum Initial (s)			8.0	8.0	8.0
Minimum Split (s)			15.0	29.0	29.0
Total Split (s)			42.0	36.0	36.0
Total Split (%)			53.8%	46%	46%
Yellow Time (s)			4.0	4.0	4.0
All-Red Time (s)			3.0	2.0	2.0
Lost Time Adjust (s)			-1.0		
Total Lost Time (s)			6.0		
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode			None	Min	Min
v/c Ratio	0.55	0.15	0.16		
Control Delay	5.8	1.0	23.0		
Queue Delay	0.0	0.0	0.0		
Total Delay	5.8	1.0	23.0		
Queue Length 50th (m)	0.0	0.0	4.0		
Queue Length 95th (m)	77.6	4.4	11.8		
Internal Link Dist (m)	190.8		55.4		
Turn Bay Length (m)					
Base Capacity (vph)	1472	1416	1221		
Starvation Cap Reductn	0	0	0		
Spillback Cap Reductn	0	0	0		
Storage Cap Reductn	0	0	0		
Reduced v/c Ratio	0.55	0.15	0.04		

Intersection Summary
Cycle Length: 78
Actuated Cycle Length: 55.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 4: GO Station Access/Highway 403 EB Off-Ramp & S Service Road



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	680	180	15	25	0	0
Future Volume (vph)	680	180	15	25	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)	5.0	5.0		6.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.98		
Satd. Flow (prot)	1694	1597		1865		
Flt Permitted	0.95	1.00		0.98		
Satd. Flow (perm)	1694	1597		1865		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	810	214	18	30	0	0
RTOR Reduction (vph)	0	54	0	0	0	0
Lane Group Flow (vph)	810	161	0	48	0	0
Heavy Vehicles (%)	3%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	44.0	44.0		3.0		
Effective Green, g (s)	45.0	45.0		4.0		
Actuated g/C Ratio	0.75	0.75		0.07		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	1270	1197		124		
v/s Ratio Prot	c0.48			c0.03		
v/s Ratio Perm		0.10				
v/c Ratio	0.64	0.13		0.39		
Uniform Delay, d1	3.6	2.1		26.8		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	1.1	0.1		2.0		
Delay (s)	4.7	2.1		28.8		
Level of Service	A	A		C		
Approach Delay (s)	4.1			28.8	0.0	
Approach LOS	A			C	A	

Intersection Summary			
HCM 2000 Control Delay	5.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	165	950	10	0	750
Future Volume (Veh/h)	0	165	950	10	0	750
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	179	1033	11	0	815
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			101			277
pX, platoon unblocked	0.91	0.88			0.88	
vC, conflicting volume	1446	522			1044	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	997	189			781	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	75			100	
cM capacity (veh/h)	220	724			734	

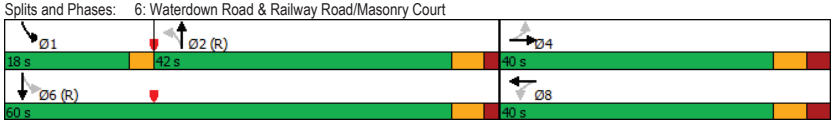
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	179	689	355	408	408
Volume Left	0	0	0	0	0
Volume Right	179	0	11	0	0
cSH	724	1700	1700	1700	1700
Volume to Capacity	0.25	0.41	0.21	0.24	0.24
Queue Length 95th (m)	7.8	0.0	0.0	0.0	0.0
Control Delay (s)	11.6	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.6	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay		1.0	
Intersection Capacity Utilization		43.5%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	15	0	10	0	10	825	170	565
Future Volume (vph)	15	0	10	0	10	825	170	565
Lane Group Flow (vph)	0	21	11	128	11	921	181	617
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	29.0	29.0	29.0	29.0	35.0	35.0	11.0	35.0
Total Split (s)	40.0	40.0	40.0	40.0	42.0	42.0	18.0	60.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	42.0%	42.0%	18.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)		6.0	6.0	6.0	5.0	5.0	2.0	5.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Recall Mode	None	None	None	None	C-Min	C-Min	None	C-Min
v/c Ratio		0.17	0.10	0.28	0.03	0.40	0.34	0.23
Control Delay		3.1	43.9	1.5	7.0	8.5	3.1	2.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		3.1	43.9	1.5	7.0	8.5	3.1	2.8
Queue Length 50th (m)		0.0	2.1	0.0	0.7	38.6	1.6	3.6
Queue Length 95th (m)		0.0	7.8	0.0	3.1	59.5	2.3	10.3
Internal Link Dist (m)		95.0		120.3		324.2		76.6
Turn Bay Length (m)			25.0		35.0		45.0	
Base Capacity (vph)		275	418	780	327	2277	590	2693
Starvation Cap Reductn		0	0	0	0	0	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		0.08	0.03	0.16	0.03	0.40	0.31	0.23

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 22 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 6: Waterdown Road & Railway Road/Masonry Court



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	0	5	10	0	120	10	825	40	170	565	15
Future Volume (vph)	15	0	5	10	0	120	10	825	40	170	565	15
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1060		1572	1615		1118	3414		1693	3370	
Flt Permitted		0.62		0.74	1.00		0.42	1.00		0.27	1.00	
Satd. Flow (perm)		685		1230	1615		492	3414		478	3370	
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)	16	0	5	11	0	128	11	878	43	181	601	16
RTOR Reduction (vph)	0	19	0	0	116	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	2	0	11	12	0	11	919	0	181	616	0
Confl. Peds. (#/hr)									5	5		
Heavy Vehicles (%)	88%	0%	0%	11%	0%	0%	56%	4%	0%	3%	5%	71%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.1		8.1	8.1		65.6	65.6		78.9	78.9	
Effective Green, g (s)		9.1		9.1	9.1		66.6	66.6		79.9	79.9	
Actuated g/C Ratio		0.09		0.09	0.09		0.67	0.67		0.80	0.80	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		62		111	146		327	2273		519	2692	
v/s Ratio Prot					0.01			c0.27		c0.04	0.18	
v/s Ratio Perm		0.00		c0.01			0.02			0.24		
v/c Ratio		0.03		0.10	0.08		0.03	0.40		0.35	0.23	
Uniform Delay, d1		41.4		41.7	41.6		5.7	7.6		2.9	2.5	
Progression Factor		1.00		1.00	1.00		1.00	1.00		0.86	1.05	
Incremental Delay, d2		0.2		0.4	0.2		0.2	0.5		0.4	0.2	
Delay (s)		41.6		42.1	41.9		5.9	8.2		2.9	2.8	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		41.6			41.9			8.1			2.8	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.36			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	53.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	70	70	5	30	0
Future Volume (Veh/h)	0	70	70	5	30	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	76	76	5	33	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	190	33	33			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	190	33	33			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	93	95			
cM capacity (veh/h)	761	1041	1579			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	76	81	33
Volume Left	0	76	0
Volume Right	76	0	0
cSH	1041	1579	1700
Volume to Capacity	0.07	0.05	0.02
Queue Length 95th (m)	1.9	1.2	0.0
Control Delay (s)	8.7	7.0	0.0
Lane LOS	A	A	
Approach Delay (s)	8.7	7.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay	6.5			
Intersection Capacity Utilization	21.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	130	25	25	60	0	20	20	25	0	50	50
Future Volume (Veh/h)	55	130	25	25	60	0	20	20	25	0	50	50
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.82	0.82	0.82	0.82	0.92	0.82	0.92	0.82	0.92	0.92	0.92
Hourly flow rate (vph)	60	159	30	30	73	0	24	22	30	0	54	54
Pedestrians					5							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked												
vC, conflicting volume	73			189			508	427	179	473	442	73
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	73			189			508	427	179	473	442	73
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			98			94	95	97	100	89	95
cM capacity (veh/h)	1527			1397			383	489	865	444	479	989

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	249	103	76	108
Volume Left	60	30	24	0
Volume Right	30	0	30	54
cSH	1527	1397	534	646
Volume to Capacity	0.04	0.02	0.14	0.17
Queue Length 95th (m)	1.0	0.5	3.9	4.8
Control Delay (s)	2.0	2.3	12.9	11.7
Lane LOS	A	A	B	B
Approach Delay (s)	2.0	2.3	12.9	11.7
Approach LOS			B	B

Intersection Summary				
Average Delay	5.6			
Intersection Capacity Utilization	32.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	155	85	0	0	0
Future Volume (Veh/h)	0	155	85	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	168	92	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)		282				
pX, platoon unblocked						
vC, conflicting volume	92				260	92
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	92				260	92
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)	1503				729	965

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	168	92	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1503	1700	1700
Volume to Capacity	0.00	0.05	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

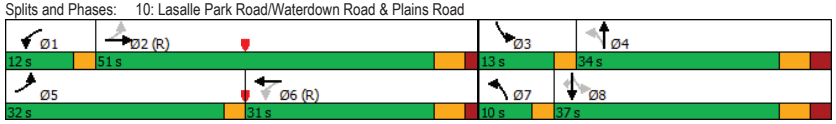
Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	11.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	490	745	65	275	75	205	155	210	215
Future Volume (vph)	490	745	65	275	75	205	155	210	215
Lane Group Flow (vph)	521	926	69	484	80	271	165	223	229
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	6.0	8.0	6.0	8.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	27.0	9.0	27.0	9.0	34.0	9.0	34.0	34.0
Total Split (s)	32.0	51.0	12.0	31.0	10.0	34.0	13.0	37.0	37.0
Total Split (%)	29.1%	46.4%	10.9%	28.2%	9.1%	30.9%	11.8%	33.6%	33.6%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	3.0	0.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	5.0	2.0	5.0	2.0	6.0	2.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
v/c Ratio	0.84	0.56	0.23	0.46	0.20	0.74	0.51	0.49	0.43
Control Delay	29.2	23.1	15.9	26.6	22.3	51.8	28.5	38.9	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.2	23.1	15.9	26.6	22.3	51.8	28.5	38.9	6.7
Queue Length 50th (m)	68.1	78.3	6.5	36.1	11.4	55.5	25.1	43.6	0.0
Queue Length 95th (m)	#127.4	109.2	14.2	55.9	20.7	79.8	39.2	65.0	18.4
Internal Link Dist (m)		134.8		133.0		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	653	1679	329	1083	403	463	328	510	571
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.55	0.21	0.45	0.20	0.59	0.50	0.44	0.40

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Lasalle Park Road/Waterdown Road & Plains Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	490	745	125	65	275	180	75	205	50	155	210	215
Future Volume (vph)	490	745	125	65	275	180	75	205	50	155	210	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.94		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1675	3408		1674	3195		1723	1786		1613	1810	1446
Flt Permitted	0.34	1.00		0.31	1.00		0.60	1.00		0.32	1.00	1.00
Satd. Flow (perm)	600	3408		544	3195		1096	1786		536	1810	1446
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)	521	793	133	69	293	191	80	218	53	165	223	229
RTOR Reduction (vph)	0	11	0	0	90	0	0	9	0	0	0	171
Lane Group Flow (vph)	521	915	0	69	394	0	80	262	0	165	223	58
Confl. Peds. (#/hr)	10		10	10		10	5		10	10		5
Confl. Bikes (#/hr)			10			5						
Heavy Vehicles (%)	4%	3%	2%	4%	5%	5%	1%	2%	6%	8%	5%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	60.4	51.1		37.7	31.4		28.5	21.6		36.6	26.7	26.7
Effective Green, g (s)	61.4	52.1		39.7	32.4		30.5	22.6		37.6	27.7	27.7
Actuated g/C Ratio	0.56	0.47		0.36	0.29		0.28	0.21		0.34	0.25	0.25
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	598	1614		271	941		348	366		310	455	364
v/s Ratio Prot	c0.21	c0.27		0.02	0.12		0.02	c0.15		c0.06	0.12	
v/s Ratio Perm	0.27			0.07			0.05			0.12		0.04
v/c Ratio	0.87	0.57		0.25	0.42		0.23	0.72		0.53	0.49	0.16
Uniform Delay, d1	16.7	20.8		23.4	31.2		30.1	40.7		27.3	35.1	32.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.1	1.4		0.5	1.4		0.3	6.6		1.8	0.8	0.2
Delay (s)	29.9	22.3		23.9	32.6		30.5	47.3		29.0	36.0	32.3
Level of Service	C	C		C	C		C	D		C	D	C
Approach Delay (s)		25.0			31.5			43.4			32.7	
Approach LOS		C			C			D			C	

Intersection Summary

HCM 2000 Control Delay	30.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	85.5%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	75	875	485	45
Future Volume (vph)	75	875	485	45
Lane Group Flow (vph)	83	972	606	89
Turn Type	pm+pt	NA	NA	Perm
Protected Phases	5	2	6	
Permitted Phases	2			8
Detector Phase	5	2	6	8
Switch Phase				
Minimum Initial (s)	6.0	8.0	8.0	8.0
Minimum Split (s)	9.0	26.0	26.0	29.0
Total Split (s)	15.0	68.0	53.0	32.0
Total Split (%)	15.0%	68.0%	53.0%	32.0%
Yellow Time (s)	3.0	4.0	4.0	4.0
All-Red Time (s)	0.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	None	C-Min	C-Min	None
v/c Ratio	0.12	0.37	0.26	0.47
Control Delay	2.6	4.1	6.4	32.6
Queue Delay	0.0	0.3	0.0	0.0
Total Delay	2.6	4.4	6.4	32.6
Queue Length 50th (m)	2.4	26.0	21.4	10.1
Queue Length 95th (m)	6.7	44.6	36.7	24.7
Internal Link Dist (m)		133.0	135.9	318.4
Turn Bay Length (m)	60.0			
Base Capacity (vph)	732	2659	2371	388
Starvation Cap Reductn	0	916	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.11	0.56	0.26	0.23

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Splits and Phases: 11: Plains Road & Cooke Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	75	875	485	60	45	35
Future Volume (vph)	75	875	485	60	45	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.98		0.94	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	3282	3234		1386	
Flt Permitted	0.41	1.00	1.00		0.97	
Satd. Flow (perm)	725	3282	3234		1386	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	83	972	539	67	50	39
RTOR Reduction (vph)	0	0	5	0	34	0
Lane Group Flow (vph)	83	972	601	0	55	0
Heavy Vehicles (%)	7%	10%	9%	4%	36%	12%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	77.4	77.4	69.0		8.6	
Effective Green, g (s)	78.4	78.4	70.0		9.6	
Actuated g/C Ratio	0.78	0.78	0.70		0.10	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	629	2573	2263		133	
v/s Ratio Prot	0.01	c0.30	0.19			
v/s Ratio Perm	0.09				c0.04	
v/c Ratio	0.13	0.38	0.27		0.41	
Uniform Delay, d1	2.5	3.3	5.5		42.5	
Progression Factor	1.00	1.00	1.00		0.97	
Incremental Delay, d2	0.1	0.4	0.3		2.1	
Delay (s)	2.6	3.7	5.8		43.1	
Level of Service	A	A	A		D	
Approach Delay (s)		3.6	5.8		43.1	
Approach LOS		A	A		D	

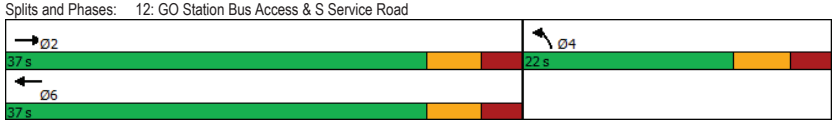
Intersection Summary				
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Configurations			
Traffic Volume (vph)	1055	75	15
Future Volume (vph)	1055	75	15
Lane Group Flow (vph)	1103	77	15
Turn Type	NA	NA	Prot
Protected Phases	2	6	4
Permitted Phases			
Detector Phase	2	6	4
Switch Phase			
Minimum Initial (s)	8.0	8.0	8.0
Minimum Split (s)	31.0	31.0	15.0
Total Split (s)	37.0	37.0	22.0
Total Split (%)	62.7%	62.7%	37.3%
Yellow Time (s)	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	Min	Min	None
v/c Ratio	0.34	0.02	0.06
Control Delay	1.9	1.6	18.1
Queue Delay	0.0	0.0	0.0
Total Delay	1.9	1.6	18.1
Queue Length 50th (m)	0.0	0.0	0.7
Queue Length 95th (m)	41.9	3.3	6.5
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3033	3067	404
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.36	0.03	0.04

Intersection Summary
Cycle Length: 59
Actuated Cycle Length: 40
Natural Cycle: 50
Control Type: Semi Act-Uncoord

Splits and Phases: 12: GO Station Bus Access & S Service Road



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1055	15	0	75	15	0
Future Volume (vph)	1055	15	0	75	15	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3500			3539	943	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3500			3539	943	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1088	15	0	77	15	0
RTOR Reduction (vph)	1	0	0	0	0	0
Lane Group Flow (vph)	1102	0	0	77	15	0
Heavy Vehicles (%)	2%	71%	0%	2%	85%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	30.5			30.5	1.1	
Effective Green, g (s)	31.5			31.5	2.1	
Actuated g/C Ratio	0.69			0.69	0.05	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2417			2444	43	
v/s Ratio Prot	c0.31			0.02	c0.02	
v/s Ratio Perm						
v/c Ratio	0.46			0.03	0.35	
Uniform Delay, d1	3.2			2.2	21.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.1			0.0	4.9	
Delay (s)	3.3			2.2	25.9	
Level of Service	A			A	C	
Approach Delay (s)	3.3			2.2	25.9	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.5	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.45			
Actuated Cycle Length (s)	45.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	46.3%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Queues
1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road

Existing + Site Traffic
PM Peak Hour

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	279	505	121	600	664	84	516
v/c Ratio	0.47	0.76	0.19	0.94	0.43	0.23	0.59
Control Delay	29.9	39.6	4.7	46.4	19.0	15.7	37.0
Queue Delay	0.0	0.0	0.0	1.1	0.0	0.0	0.0
Total Delay	29.9	39.6	4.7	47.5	19.0	15.7	37.0
Queue Length 50th (m)	48.5	100.2	0.0	116.9	56.0	8.2	53.8
Queue Length 95th (m)	68.3	131.0	11.6	#181.6	80.8	17.5	66.6
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	596	662	632	638	1776	365	1417
Starvation Cap Reductn	0	0	0	6	0	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	0.47	0.76	0.19	0.95	0.37	0.23	0.36

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road

Existing + Site Traffic
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	265	480	115	570	390	240	80	375	115
Future Volume (vph)	0	0	0	265	480	115	570	390	240	80	375	115
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)				7.0	7.0	7.0	0.5	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.94		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	1693	3293		1728	3400	
Flt Permitted				0.95	1.00	1.00	0.33	1.00		0.40	1.00	
Satd. Flow (perm)				1694	1881	1575	592	3293		726	3400	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	279	505	121	600	411	253	84	395	121
RTOR Reduction (vph)	0	0	0	0	0	78	0	98	0	0	33	0
Lane Group Flow (vph)	0	0	0	279	505	43	600	566	0	84	483	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				37.7	37.7	37.7	56.3	46.4		33.2	26.3	
Effective Green, g (s)				38.7	38.7	38.7	58.8	47.4		35.2	27.3	
Actuated g/C Ratio				0.35	0.35	0.35	0.53	0.43		0.32	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)				595	661	554	611	1418		304	843	
v/s Ratio Prot				0.16	c0.27		c0.26	0.17		0.02	c0.14	
v/s Ratio Perm						0.03	0.26			0.07		
v/c Ratio				0.47	0.76	0.08	0.98	0.40		0.28	0.57	
Uniform Delay, d1				27.7	31.6	23.7	19.9	21.5		26.7	36.2	
Progression Factor				1.00	1.00	1.00	1.31	1.07		1.00	1.00	
Incremental Delay, d2				0.6	5.2	0.1	30.3	0.8		0.5	2.8	
Delay (s)				28.3	36.8	23.8	56.4	23.9		27.2	39.1	
Level of Service				C	D	C	E	C		C	D	
Approach Delay (s)		0.0			32.5			39.3			37.4	
Approach LOS		A			C			D			D	

Intersection Summary

HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	277	170	1106	681
v/c Ratio	0.61	0.46	0.42	0.26
Control Delay	49.7	10.3	9.7	6.3
Queue Delay	0.0	0.0	0.3	0.0
Total Delay	49.7	10.4	10.1	6.3
Queue Length 50th (m)	30.6	0.0	62.0	48.7
Queue Length 95th (m)	42.9	18.7	87.3	39.5
Internal Link Dist (m)			174.0	121.9
Turn Bay Length (m)	145.0	115.0		
Base Capacity (vph)	570	421	2614	2614
Starvation Cap Reductn	0	0	832	0
Spillback Cap Reductn	0	7	160	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.41	0.62	0.26

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	260	0	160	0	1040	0	0	640	0
Future Volume (vph)	0	0	0	260	0	160	0	1040	0	0	640	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)				6.0		6.0		6.0			6.0	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frpb, ped/bikes				1.00		1.00		1.00			1.00	
Flpb, ped/bikes				1.00		1.00		1.00			1.00	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3134		1551		3505			3505	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3134		1551		3505			3505	
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)	0	0	0	277	0	170	0	1106	0	0	681	0
RTOR Reduction (vph)	0	0	0	0	0	145	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	277	0	25	0	1106	0	0	681	0
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)									1			2
Heavy Vehicles (%)	0%	0%	0%	8%	100%	3%	0%	3%	0%	0%	3%	0%
Turn Type				Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)				15.0		15.0		81.0			81.0	
Effective Green, g (s)				16.0		16.0		82.0			82.0	
Actuated g/C Ratio				0.15		0.15		0.75			0.75	
Clearance Time (s)				7.0		7.0		7.0			7.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				455		225		2612			2612	
v/s Ratio Prot				c0.09		0.02		c0.32			0.19	
v/s Ratio Perm												
v/c Ratio				0.61		0.11		0.42			0.26	
Uniform Delay, d1				44.1		40.8		5.2			4.4	
Progression Factor				1.00		1.00		1.68			1.28	
Incremental Delay, d2				2.3		0.2		0.4			0.2	
Delay (s)				46.4		41.0		9.1			5.9	
Level of Service				D		D		A			A	
Approach Delay (s)		0.0			44.3			9.1			5.9	
Approach LOS		A			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.48				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		18.0	
Intersection Capacity Utilization	48.8%	ICU Level of Service		A	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	136	162	278	56	288	985	273	636
v/c Ratio	0.56	0.61	0.61	0.18	0.71	0.70	0.71	0.32
Control Delay	52.5	53.7	10.9	46.3	15.5	31.6	41.4	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	53.7	10.9	46.3	15.5	31.6	41.4	21.1
Queue Length 50th (m)	29.0	34.8	0.0	6.2	0.0	106.3	56.3	61.6
Queue Length 95th (m)	47.5	55.0	23.6	11.9	25.7	133.2	#95.2	71.4
Internal Link Dist (m)		253.6				249.5		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	305	335	504	431	458	1400	387	2007
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	0.48	0.55	0.13	0.63	0.70	0.71	0.32

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)	135	160	275	55	0	285	0	620	355	270	630	0
Future Volume (vph)	135	160	275	55	0	285	0	620	355	270	630	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00		1.00		1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00		0.85		0.95		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)	1678	1845	1521	3164		1536		3319		1678	3471	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.15	1.00	
Satd. Flow (perm)	1678	1845	1521	3164		1536		3319		262	3471	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	136	162	278	56	0	288	0	626	359	273	636	0
RTOR Reduction (vph)	0	0	238	0	0	260	0	68	0	0	0	0
Lane Group Flow (vph)	136	162	40	56	0	28	0	917	0	273	636	0
Confl. Peds. (#/hr)			5	5			4					4
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	3%	3%	7%	0%	4%	0%	1%	6%	4%	4%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	14.8	14.8	14.8	9.6		9.6		43.2		62.6	62.6	
Effective Green, g (s)	15.8	15.8	15.8	10.6		10.6		44.2		63.6	63.6	
Actuated g/C Ratio	0.14	0.14	0.14	0.10		0.10		0.40		0.58	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)	241	265	218	304		148		1333		375	2006	
v/s Ratio Prot	0.08	c0.09		0.02		c0.02		c0.28		c0.12	0.18	
v/s Ratio Perm			0.03							0.31		
v/c Ratio	0.56	0.61	0.18	0.18		0.19		0.69		0.73	0.32	
Uniform Delay, d1	43.9	44.2	41.4	45.7		45.7		27.2		17.6	12.0	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.12		2.07	1.60	
Incremental Delay, d2	3.0	4.1	0.4	0.3		0.6		2.9		6.7	0.4	
Delay (s)	46.9	48.4	41.8	46.0		46.4		33.4		43.0	19.6	
Level of Service	D	D	D	D		D		C		D	B	
Approach Delay (s)		44.9			46.3			33.4			26.6	
Approach LOS		D			D			C			C	

Intersection Summary					
HCM 2000 Control Delay	35.1	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.62				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		22.0	
Intersection Capacity Utilization	74.2%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	568	26	218
v/c Ratio	0.66	0.03	0.47
Control Delay	13.8	3.3	19.4
Queue Delay	0.0	0.0	0.0
Total Delay	13.8	3.3	19.4
Queue Length 50th (m)	33.8	0.0	15.5
Queue Length 95th (m)	73.5	2.9	36.7
Internal Link Dist (m)	190.8		55.4
Turn Bay Length (m)			
Base Capacity (vph)	1059	1027	1350
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.54	0.03	0.16

Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	545	25	175	35	0	0
Future Volume (vph)	545	25	175	35	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)	5.0	5.0		6.0		
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)	1662	1597		1824		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1662	1597		1824		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	568	26	182	36	0	0
RTOR Reduction (vph)	0	13	0	0	0	0
Lane Group Flow (vph)	568	13	0	218	0	0
Heavy Vehicles (%)	5%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	24.5	24.5		11.7		
Effective Green, g (s)	25.5	25.5		12.7		
Actuated g/C Ratio	0.52	0.52		0.26		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	861	827		470		
v/s Ratio Prot	c0.34			c0.12		
v/s Ratio Perm		0.01				
v/c Ratio	0.66	0.02		0.46		
Uniform Delay, d1	8.7	5.8		15.4		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	1.8	0.0		0.7		
Delay (s)	10.5	5.8		16.1		
Level of Service	B	A		B		
Approach Delay (s)	10.3			16.1	0.0	
Approach LOS	B			B	A	

Intersection Summary				
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	49.2	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	50.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	100	875	25	0	960
Future Volume (Veh/h)	0	100	875	25	0	960
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	109	951	27	0	1043
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			104			273
pX, platoon unblocked	0.96	0.93			0.93	
vC, conflicting volume	1486	489			978	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1103	310			834	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	83			100	
cM capacity (veh/h)	196	640			742	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	109	634	344	522	522
Volume Left	0	0	0	0	0
Volume Right	109	0	27	0	0
cSH	640	1700	1700	1700	1700
Volume to Capacity	0.17	0.37	0.20	0.31	0.31
Queue Length 95th (m)	4.9	0.0	0.0	0.0	0.0
Control Delay (s)	11.8	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.8	0.0		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization		37.8%	ICU Level of Service	A
Analysis Period (min)		15		



Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	31	284	10	655	242	747
v/c Ratio	0.20	0.25	0.57	0.03	0.28	0.36	0.26
Control Delay	4.6	51.5	5.0	4.4	3.9	4.3	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	51.5	5.0	4.4	3.9	4.3	4.7
Queue Length 50th (m)	0.0	6.7	0.0	0.3	11.4	21.6	52.1
Queue Length 95th (m)	0.0	16.2	0.8	m0.4	m17.6	5.1	16.4
Internal Link Dist (m)	95.0		120.3		324.2		79.9
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	161	321	673	350	2366	717	2833
Starvation Cap Reductn	0	0	0	0	0	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	0.12	0.10	0.42	0.03	0.28	0.34	0.26

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)	10	0	10	30	0	275	10	615	20	235	715	10
Future Volume (vph)	10	0	10	30	0	275	10	615	20	235	715	10
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.85		1.00	1.00		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1573		1740	1575		1307	3421		1708	3497	
Flt Permitted		0.30		0.74	1.00		0.37	1.00		0.38	1.00	
Satd. Flow (perm)		489		1363	1575		507	3421		678	3497	
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)	10	0	10	31	0	284	10	634	21	242	737	10
RTOR Reduction (vph)	0	18	0	0	258	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	2	0	31	26	0	10	654	0	242	746	0
Confl. Peds. (#/hr)	2		2	2		2	5		6	6		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	18%	0%	0%	0%	0%	1%	33%	4%	0%	2%	2%	75%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.9		8.9	8.9		75.1	75.1		88.1	88.1	
Effective Green, g (s)		9.9		9.9	9.9		76.1	76.1		89.1	89.1	
Actuated g/C Ratio		0.09		0.09	0.09		0.69	0.69		0.81	0.81	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		44		122	141		350	2366		652	2832	
v/s Ratio Prot					0.02			c0.19		c0.04	0.21	
v/s Ratio Perm		0.00		c0.02			0.02			0.26		
v/c Ratio		0.04		0.25	0.18		0.03	0.28		0.37	0.26	
Uniform Delay, d1		45.7		46.6	46.3		5.3	6.5		2.5	2.5	
Progression Factor		1.00		1.00	1.00		0.63	0.54		1.56	1.72	
Incremental Delay, d2		0.4		1.1	0.6		0.1	0.2		0.3	0.2	
Delay (s)		46.1		47.7	46.9		3.4	3.7		4.2	4.6	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		46.1			47.0			3.7			4.5	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.28			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	67.0%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	40	205	40	20	0
Future Volume (Veh/h)	0	40	205	40	20	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	43	223	43	22	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	511	22	22			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	511	22	22			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	86			
cM capacity (veh/h)	449	1055	1593			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	266	22
Volume Left	0	223	0
Volume Right	43	0	0
cSH	1055	1593	1700
Volume to Capacity	0.04	0.14	0.01
Queue Length 95th (m)	1.0	3.9	0.0
Control Delay (s)	8.6	6.6	0.0
Lane LOS	A	A	
Approach Delay (s)	8.6	6.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	30.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	70	15	40	235	0	45	75	30	5	30	25
Future Volume (Veh/h)	170	70	15	40	235	0	45	75	30	5	30	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.89	0.89	0.89	0.89	0.92	0.89	0.92	0.89	0.92	0.92	0.92
Hourly flow rate (vph)	185	79	17	45	264	0	51	82	34	5	33	27
Pedestrians					15							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	264			96			855	812	102	902	820	264
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	264			86			850	807	93	897	815	264
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	86			97			76	69	96	97	87	97
cM capacity (veh/h)	1300			1512			208	261	951	164	258	775

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	281	309	167	65
Volume Left	185	45	51	5
Volume Right	17	0	34	27
cSH	1300	1512	281	336
Volume to Capacity	0.14	0.03	0.60	0.19
Queue Length 95th (m)	4.0	0.7	28.3	5.6
Control Delay (s)	5.8	1.3	35.1	18.3
Lane LOS	A	A	E	C
Approach Delay (s)	5.8	1.3	35.1	18.3
Approach LOS			E	C

Intersection Summary				
Average Delay	11.1			
Intersection Capacity Utilization	53.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	105	275	0	0	0
Future Volume (Veh/h)	0	105	275	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	114	299	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)		280				
pX, platoon unblocked						
vC, conflicting volume	299				413	299
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	299				413	299
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)	1262				595	741

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	114	299	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1262	1700	1700
Volume to Capacity	0.00	0.18	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	17.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	191	546	67	1165	113	299	263	222	294
v/c Ratio	0.74	0.34	0.15	0.83	0.31	0.88	0.75	0.45	0.49
Control Delay	39.3	19.8	8.7	36.2	24.7	70.1	51.5	49.1	22.1
Queue Delay	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0
Total Delay	39.3	19.8	8.7	38.6	24.7	70.1	51.5	49.1	22.1
Queue Length 50th (m)	25.8	40.7	8.7	141.3	16.2	64.8	57.7	50.0	30.6
Queue Length 95th (m)	50.8	56.3	m4.0	#170.1	28.9	#116.4	#78.0	70.9	48.9
Internal Link Dist (m)		134.8		136.1		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	297	1622	559	1406	370	343	368	518	620
Starvation Cap Reductn	0	0	0	135	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.34	0.12	0.92	0.31	0.87	0.71	0.43	0.47

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)	185	465	65	65	905	225	110	235	55	255	215	285
Future Volume (vph)	185	465	65	65	905	225	110	235	55	255	215	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.97		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1616	3460		1638	3401		1694	1796		1710	1900	1490
Flt Permitted	0.09	1.00		0.44	1.00		0.62	1.00		0.22	1.00	1.00
Satd. Flow (perm)	145	3460		765	3401		1105	1796		393	1900	1490
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)	191	479	67	67	933	232	113	242	57	263	222	294
RTOR Reduction (vph)	0	9	0	0	19	0	0	7	0	0	0	217
Lane Group Flow (vph)	191	537	0	67	1146	0	113	292	0	263	222	77
Confl. Peds. (#/hr)	5		10	10		5			5	5		
Confl. Bikes (#/hr)			10			15						5
Heavy Vehicles (%)	8%	2%	0%	6%	2%	4%	3%	3%	0%	2%	0%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	59.1	49.7		50.3	43.9		26.5	19.3		37.9	27.7	27.7
Effective Green, g (s)	60.1	50.7		52.3	44.9		28.5	20.3		38.9	28.7	28.7
Actuated g/C Ratio	0.55	0.46		0.48	0.41		0.26	0.18		0.35	0.26	0.26
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	255	1594		422	1388		330	331		337	495	388
v/s Ratio Prot	c0.09	0.16		0.01	c0.34		0.03	c0.16		c0.12	0.12	
v/s Ratio Perm	0.32			0.06			0.06			0.16		0.05
v/c Ratio	0.75	0.34		0.16	0.83		0.34	0.88		0.78	0.45	0.20
Uniform Delay, d1	26.1	18.9		15.8	29.1		32.3	43.7		28.3	34.0	31.7
Progression Factor	1.00	1.00		0.72	1.05		1.00	1.00		1.57	1.36	5.06
Incremental Delay, d2	11.4	0.6		0.2	5.0		0.6	22.8		10.9	0.6	0.2
Delay (s)	37.5	19.5		11.4	35.6		33.0	66.5		55.3	46.9	160.5
Level of Service	D	B		B	D		C	E		E	D	F
Approach Delay (s)		24.2			34.2			57.3			92.6	
Approach LOS		C			C			E			F	

Intersection Summary					
HCM 2000 Control Delay	49.3	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		15.0	
Intersection Capacity Utilization	89.4%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	26	773	1253	113
v/c Ratio	0.07	0.30	0.52	0.54
Control Delay	1.8	3.0	8.6	42.3
Queue Delay	0.0	0.0	0.1	0.0
Total Delay	1.8	3.0	8.6	42.3
Queue Length 50th (m)	0.5	11.5	63.6	18.4
Queue Length 95th (m)	m1.2	m17.5	95.8	34.9
Internal Link Dist (m)		136.1	132.2	314.3
Turn Bay Length (m)	60.0			
Base Capacity (vph)	438	2620	2400	406
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	179	2
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.06	0.30	0.56	0.28

Intersection Summary

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

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	750	1150	65	65	45
Future Volume (vph)	25	750	1150	65	65	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1686	3374	3300		1624	
Flt Permitted	0.18	1.00	1.00		0.97	
Satd. Flow (perm)	326	3374	3300		1624	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	26	773	1186	67	67	46
RTOR Reduction (vph)	0	0	2	0	26	0
Lane Group Flow (vph)	26	773	1251	0	87	0
Confl. Peds. (#/hr)	10			10		
Confl. Bikes (#/hr)				10		
Heavy Vehicles (%)	7%	7%	7%	5%	9%	5%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	84.4	84.4	77.7		11.6	
Effective Green, g (s)	85.4	85.4	78.7		12.6	
Actuated g/C Ratio	0.78	0.78	0.72		0.11	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	311	2619	2361		186	
v/s Ratio Prot	0.00	c0.23	c0.38			
v/s Ratio Perm	0.06				c0.05	
v/c Ratio	0.08	0.30	0.53		0.47	
Uniform Delay, d1	3.8	3.6	7.2		45.6	
Progression Factor	0.59	0.71	1.00		0.99	
Incremental Delay, d2	0.1	0.3	0.9		1.9	
Delay (s)	2.3	2.8	8.0		46.9	
Level of Service	A	A	A		D	
Approach Delay (s)		2.8	8.0		46.9	
Approach LOS		A	A		D	

Intersection Summary

HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	924	388	18
v/c Ratio	0.29	0.12	0.07
Control Delay	1.9	1.5	14.2
Queue Delay	0.0	0.0	0.0
Total Delay	1.9	1.5	14.2
Queue Length 50th (m)	0.0	0.0	0.5
Queue Length 95th (m)	30.0	11.7	5.7
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3116	3242	466
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.30	0.12	0.04

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	765	20	0	330	10	5
Future Volume (vph)	765	20	0	330	10	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	0.95	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	3468			3610	1018	
Flt Permitted	1.00			1.00	0.97	
Satd. Flow (perm)	3468			3610	1018	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	900	24	0	388	12	6
RTOR Reduction (vph)	2	0	0	0	6	0
Lane Group Flow (vph)	922	0	0	388	12	0
Heavy Vehicles (%)	2%	67%	0%	0%	100%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	28.0			28.0	1.1	
Effective Green, g (s)	29.0			29.0	2.1	
Actuated g/C Ratio	0.67			0.67	0.05	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2333			2429	49	
v/s Ratio Prot	c0.27			0.11	c0.01	
v/s Ratio Perm						
v/c Ratio	0.40			0.16	0.25	
Uniform Delay, d1	3.1			2.6	19.7	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.1			0.0	2.7	
Delay (s)	3.3			2.6	22.4	
Level of Service	A			A	C	
Approach Delay (s)	3.3			2.6	22.4	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.3	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.39			
Actuated Cycle Length (s)	43.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	38.4%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	279	505	121	600	664	84	516
v/c Ratio	0.47	0.77	0.19	0.94	0.43	0.24	0.58
Control Delay	30.3	40.1	4.8	45.9	18.3	15.7	36.7
Queue Delay	0.0	0.0	0.0	0.9	0.0	0.0	0.0
Total Delay	30.3	40.1	4.8	46.8	18.3	15.7	36.7
Queue Length 50th (m)	48.5	100.2	0.0	116.5	55.6	8.2	53.8
Queue Length 95th (m)	69.6	133.6	11.8	#175.6	80.4	17.0	67.0
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	592	658	629	639	1776	361	1293
Starvation Cap Reductn	0	0	0	5	0	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	0.47	0.77	0.19	0.95	0.37	0.23	0.40

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	265	480	115	570	390	240	80	375	115
Future Volume (vph)	0	0	0	265	480	115	570	390	240	80	375	115
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)				7.0	7.0	7.0	0.5	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.94		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	1693	3294		1728	3400	
Flt Permitted				0.95	1.00	1.00	0.34	1.00		0.40	1.00	
Satd. Flow (perm)				1694	1881	1575	600	3294		726	3400	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	279	505	121	600	411	253	84	395	121
RTOR Reduction (vph)	0	0	0	0	0	79	0	97	0	0	31	0
Lane Group Flow (vph)	0	0	0	279	505	42	600	567	0	84	485	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				37.5	37.5	37.5	56.5	47.1		33.3	26.9	
Effective Green, g (s)				38.5	38.5	38.5	59.0	48.1		35.3	27.9	
Actuated g/C Ratio				0.35	0.35	0.35	0.54	0.44		0.32	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)				592	658	551	610	1440		300	862	
v/s Ratio Prot				0.16	c0.27		c0.26	0.17		0.02	c0.14	
v/s Ratio Perm						0.03	0.27			0.07		
v/c Ratio				0.47	0.77	0.08	0.98	0.39		0.28	0.56	
Uniform Delay, d1				27.8	31.8	23.9	19.4	21.0		26.7	35.7	
Progression Factor				1.00	1.00	1.00	1.32	1.07		1.00	1.00	
Incremental Delay, d2				0.6	5.4	0.1	30.7	0.7		0.5	2.6	
Delay (s)				28.4	37.1	23.9	56.4	23.2		27.2	38.4	
Level of Service				C	D	C	E	C		C	D	
Approach Delay (s)		0.0			32.7			39.0			36.8	
Approach LOS		A			C			D			D	

Intersection Summary

HCM 2000 Control Delay	36.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Queues — Future Background (No South Parking Lot)

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	103	93	57	314	907	170	804
v/c Ratio	0.51	0.41	0.21	0.57	0.43	0.33	0.40
Control Delay	48.7	44.4	5.2	13.9	5.4	5.0	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	48.7	44.4	5.2	13.9	5.5	5.0	11.7
Queue Length 50th (m)	19.9	17.7	0.0	13.3	6.6	6.7	38.6
Queue Length 95th (m)	35.2	31.8	5.6	62.4	46.4	14.7	65.7
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	221	249	286	638	2101	671	2042
Starvation Cap Reductn	0	0	0	0	214	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	0.47	0.37	0.20	0.49	0.48	0.25	0.39

Intersection Summary

HCM Signalized Intersection Capacity Analysis — Future Background (No South Parking Lot)

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	90	55	305	380	500	165	595	185
Future Volume (vph)	0	0	0	100	90	55	305	380	500	165	595	185
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)				7.0	7.0	7.0	1.0	7.0		2.0	7.0	
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	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	1601	3193		1711	3413	
Flt Permitted				0.95	1.00	1.00	0.31	1.00		0.28	1.00	
Satd. Flow (perm)				1544	1743	1479	523	3193		506	3413	
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)	0	0	0	103	93	57	314	392	515	170	613	191
RTOR Reduction (vph)	0	0	0	0	0	50	0	182	0	0	25	0
Lane Group Flow (vph)	0	0	0	103	93	7	314	725	0	170	779	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				12.1	12.1	12.1	70.1	59.1		67.7	57.9	
Effective Green, g (s)				13.1	13.1	13.1	73.9	60.1		69.7	58.9	
Actuated g/C Ratio				0.13	0.13	0.13	0.74	0.60		0.70	0.59	
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)				202	228	193	526	1918		482	2010	
v/s Ratio Prot				c0.07	0.05		c0.08	0.23		0.04	c0.23	
v/s Ratio Perm						0.01	0.36			0.21		
v/c Ratio				0.51	0.41	0.04	0.60	0.38		0.35	0.39	
Uniform Delay, d1				40.5	39.9	38.0	4.7	10.3		5.4	10.9	
Progression Factor				1.00	1.00	1.00	3.15	0.88		1.00	1.00	
Incremental Delay, d2				2.0	1.2	0.1	1.7	0.5		0.4	0.6	
Delay (s)				42.5	41.1	38.0	16.5	9.6		5.8	11.5	
Level of Service				D	D	D	B	A		A	B	
Approach Delay (s)		0.0			41.0			11.4			10.5	
Approach LOS		A			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	60.9%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Queues — Future Background (No South Parking Lot)

2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp — AM Peak Hour

Lane Group	EBT	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	5	328	182	1052	724
v/c Ratio	0.02	0.63	0.45	0.45	0.31
Control Delay	0.2	44.1	9.1	10.0	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.2	44.1	9.1	10.0	5.7
Queue Length 50th (m)	0.0	32.4	0.0	50.5	13.7
Queue Length 95th (m)	0.0	44.6	17.8	m52.8	72.5
Internal Link Dist (m)	106.5			174.0	121.9
Turn Bay Length (m)		145.0	115.0		
Base Capacity (vph)	250	658	463	2350	2372
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.02	0.50	0.39	0.45	0.31

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis — Future Background (No South Parking Lot)

2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	5	315	0	175	0	1010	0	0	695	0
Future Volume (vph)	0	0	5	315	0	175	0	1010	0	0	695	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)		6.0		6.0		6.0		6.0			6.0	
Lane Util. Factor		1.00		0.97		1.00		0.95			0.95	
Frt		0.86		1.00		0.85		1.00			1.00	
Flt Protected		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (prot)		984		3134		1521		3438			3471	
Flt Permitted		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (perm)		984		3134		1521		3438			3471	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	5	328	0	182	0	1052	0	0	724	0
RTOR Reduction (vph)	0	5	0	0	0	152	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	328	0	30	0	1052	0	0	724	0
Heavy Vehicles (%)	0%	0%	67%	8%	0%	5%	0%	5%	0%	0%	4%	0%
Turn Type		NA		Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)		1.6		15.6		15.6		61.8			61.8	
Effective Green, g (s)		2.6		16.6		16.6		62.8			62.8	
Actuated g/C Ratio		0.03		0.17		0.17		0.63			0.63	
Clearance Time (s)		7.0		7.0		7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)		25		520		252		2159			2179	
v/s Ratio Prot		c0.00		c0.10		0.02		c0.31			0.21	
v/s Ratio Perm												
v/c Ratio		0.01		0.63		0.12		0.49			0.33	
Uniform Delay, d1		47.4		38.8		35.5		10.0			8.7	
Progression Factor		1.00		1.00		1.00		1.12			0.70	
Incremental Delay, d2		0.1		2.5		0.2		0.2			0.4	
Delay (s)		47.5		41.3		35.7		11.4			6.5	
Level of Service		D		D		D		B			A	
Approach Delay (s)		47.5			39.3			11.4			6.5	
Approach LOS		D			D			B			A	

Intersection Summary				
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	60.4%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Queues — Future Background (No South Parking Lot)

3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	321	305	268	21	74	1289	400	668
v/c Ratio	0.78	0.67	0.47	0.08	0.27	1.17	1.02	0.39
Control Delay	48.4	41.5	6.6	42.6	2.3	112.6	79.3	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	41.5	6.6	42.6	2.3	112.6	79.3	17.8
Queue Length 50th (m)	59.3	54.5	0.0	2.0	0.0	~151.6	~89.8	61.9
Queue Length 95th (m)	90.6	83.0	19.2	5.8	0.0	#190.9	#153.6	43.3
Internal Link Dist (m)		253.6				353.3		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	431	474	587	372	329	1102	394	1693
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	0.74	0.64	0.46	0.06	0.22	1.17	1.02	0.39

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 — Future Background (No South Parking Lot)

3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	290	255	20	0	70	0	635	590	380	635	0
Future Volume (vph)	305	290	255	20	0	70	0	635	590	380	635	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
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)	1694	1863	1521	2869		1439		3220		1662	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.14	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3220		238	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	305	268	21	0	74	0	668	621	400	668	0
RTOR Reduction (vph)	0	0	202	0	0	69	0	172	0	0	0	0
Lane Group Flow (vph)	321	305	66	21	0	5	0	1117	0	400	668	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	23.5	23.5	23.5	6.4		6.4		26.4		47.1	47.1	
Effective Green, g (s)	24.5	24.5	24.5	7.4		7.4		27.4		48.1	48.1	
Actuated g/C Ratio	0.24	0.24	0.24	0.07		0.07		0.27		0.48	0.48	
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)	415	456	372	212		106		882		380	1638	
v/s Ratio Prot	c0.19	0.16		c0.01		0.00		c0.35		c0.20	0.20	
v/s Ratio Perm			0.04							0.31		
v/c Ratio	0.77	0.67	0.18	0.10		0.05		1.27		1.05	0.41	
Uniform Delay, d1	35.2	34.1	29.8	43.2		43.0		36.3		29.0	16.8	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.96		1.12	0.98	
Incremental Delay, d2	8.7	3.7	0.2	0.2		0.2		128.1		59.5	0.7	
Delay (s)	43.9	37.8	30.0	43.4		43.2		162.9		91.9	17.1	
Level of Service	D	D	C	D		D		F		F	B	
Approach Delay (s)		37.6			43.3			162.9			45.1	
Approach LOS		D			D			F			D	

Intersection Summary				
HCM 2000 Control Delay	88.4	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0	
Intersection Capacity Utilization	95.3%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Queues — Future Background (No South Parking Lot)

4: GO Station Access/Highway 403 EB Off-Ramp & S Service Road — AM Peak Hour



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	1036	214	48
v/c Ratio	0.70	0.15	0.16
Control Delay	10.3	1.3	23.0
Queue Delay	0.0	0.0	0.0
Total Delay	10.3	1.3	23.0
Queue Length 50th (m)	0.0	0.0	4.0
Queue Length 95th (m)	#163.5	6.0	11.8
Internal Link Dist (m)	190.8		55.4
Turn Bay Length (m)			
Base Capacity (vph)	1472	1411	1221
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.70	0.15	0.04

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis — Future Background (No South Parking Lot)

4: GO Station Access/Highway 403 EB Off-Ramp & S Service Road — AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	870	180	15	25	0	0
Future Volume (vph)	870	180	15	25	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)	5.0	5.0		6.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.98		
Satd. Flow (prot)	1694	1597		1865		
Flt Permitted	0.95	1.00		0.98		
Satd. Flow (perm)	1694	1597		1865		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	1036	214	18	30	0	0
RTOR Reduction (vph)	0	44	0	0	0	0
Lane Group Flow (vph)	1036	171	0	48	0	0
Heavy Vehicles (%)	3%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	44.0	44.0		3.0		
Effective Green, g (s)	45.0	45.0		4.0		
Actuated g/C Ratio	0.75	0.75		0.07		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	1270	1197		124		
v/s Ratio Prot	c0.61			c0.03		
v/s Ratio Perm		0.11				
v/c Ratio	0.82	0.14		0.39		
Uniform Delay, d1	4.8	2.1		26.8		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	4.2	0.1		2.0		
Delay (s)	9.0	2.2		28.8		
Level of Service	A	A		C		
Approach Delay (s)	7.8			28.8	0.0	
Approach LOS	A			C	A	

Intersection Summary

HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues — Future Background (No South Parking Lot)

6: Waterdown Road & Railway Road/Masonry Court — AM Peak Hour

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	16	282	11	1048	207	761
v/c Ratio	0.22	0.14	0.61	0.04	0.48	0.42	0.28
Control Delay	5.0	43.7	8.0	9.0	10.9	5.1	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	43.7	8.0	9.0	10.9	5.1	4.7
Queue Length 50th (m)	0.0	3.1	0.0	0.8	52.1	1.5	3.8
Queue Length 95th (m)	0.0	9.5	12.0	3.7	83.4	24.4	42.4
Internal Link Dist (m)	95.0		120.3		324.2		353.3
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	180	418	773	272	2184	536	2687
Starvation Cap Reductn	0	0	0	0	0	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	0.12	0.04	0.36	0.04	0.48	0.39	0.28

Intersection Summary

HCM Signalized Intersection Capacity Analysis — Future Background (No South Parking Lot)

6: Waterdown Road & Railway Road/Masonry Court — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	0	5	15	0	265	10	945	40	195	700	15
Future Volume (vph)	15	0	5	15	0	265	10	945	40	195	700	15
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1060		1572	1615		1118	3417		1694	3383	
Flt Permitted		0.37		0.74	1.00		0.36	1.00		0.22	1.00	
Satd. Flow (perm)		404		1230	1615		427	3417		391	3383	
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)	16	0	5	16	0	282	11	1005	43	207	745	16
RTOR Reduction (vph)	0	19	0	0	255	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	2	0	16	27	0	11	1046	0	207	760	0
Confl. Peds. (#/hr)									5	5		
Heavy Vehicles (%)	88%	0%	0%	11%	0%	0%	56%	4%	0%	3%	5%	71%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.6		8.6	8.6		62.8	62.8		78.4	78.4	
Effective Green, g (s)		9.6		9.6	9.6		63.8	63.8		79.4	79.4	
Actuated g/C Ratio		0.10		0.10	0.10		0.64	0.64		0.79	0.79	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		38		118	155		272	2180		487	2686	
v/s Ratio Prot					c0.02			c0.31		c0.06	0.22	
v/s Ratio Perm		0.00		0.01			0.03			0.28		
v/c Ratio		0.05		0.14	0.17		0.04	0.48		0.43	0.28	
Uniform Delay, d1		41.1		41.4	41.6		6.7	9.4		3.9	2.7	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.47	1.59	
Incremental Delay, d2		0.6		0.5	0.5		0.3	0.8		0.6	0.2	
Delay (s)		41.7		41.9	42.1		7.0	10.2		6.3	4.6	
Level of Service		D		D	D		A	B		A	A	
Approach Delay (s)		41.7			42.1			10.2			5.0	
Approach LOS		D			D			B			A	

Intersection Summary				
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.44			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	67.1%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	140	45	30	85	0	110	0	30	0	5	25
Future Volume (Veh/h)	5	140	45	30	85	0	110	0	30	0	5	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.82	0.82	0.82	0.82	0.92	0.82	0.92	0.82	0.92	0.92	0.92
Hourly flow rate (vph)	5	171	55	37	104	0	134	0	37	0	5	27
Pedestrians					5							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked												
vC, conflicting volume	104			226			416	386	204	428	414	104
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	104			226			416	386	204	428	414	104
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			73	100	96	100	99	97
cM capacity (veh/h)	1488			1354			504	531	839	499	512	951

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	231	141	171	32
Volume Left	5	37	134	0
Volume Right	55	0	37	27
cSH	1488	1354	551	839
Volume to Capacity	0.00	0.03	0.31	0.04
Queue Length 95th (m)	0.1	0.7	10.5	1.0
Control Delay (s)	0.2	2.2	14.4	9.5
Lane LOS	A	A	B	A
Approach Delay (s)	0.2	2.2	14.4	9.5
Approach LOS			B	A

Intersection Summary				
Average Delay	5.4			
Intersection Capacity Utilization	Err%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	170	115	0	0	0
Future Volume (Veh/h)	0	170	115	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	185	125	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)		280				
pX, platoon unblocked						
vC, conflicting volume	125				310	125
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	125				310	125
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)	1462				682	926

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	185	125	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1462	1700	1700
Volume to Capacity	0.00	0.07	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	12.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues — Future Background (No South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	532	957	80	611	80	277	282	223	266
v/c Ratio	0.91	0.59	0.29	0.68	0.20	0.75	0.83	0.45	0.45
Control Delay	45.3	24.0	17.3	32.0	22.7	52.1	48.3	37.0	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.3	24.0	17.3	32.0	22.7	52.1	48.3	37.0	6.5
Queue Length 50th (m)	89.0	83.8	7.7	50.6	11.3	56.6	46.0	43.1	0.0
Queue Length 95th (m)	#165.4	111.4	15.5	69.1	21.2	81.8	#90.6	65.0	19.6
Internal Link Dist (m)		134.8		133.0		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	594	1613	293	943	400	461	341	516	602
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.59	0.27	0.65	0.20	0.60	0.83	0.43	0.44

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis — Future Background (No South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	500	775	125	75	320	255	75	205	55	265	210	250
Future Volume (vph)	500	775	125	75	320	255	75	205	55	265	210	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.93		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1677	3411		1675	3164		1723	1779		1613	1810	1446
Flt Permitted	0.19	1.00		0.30	1.00		0.62	1.00		0.31	1.00	1.00
Satd. Flow (perm)	337	3411		527	3164		1123	1779		522	1810	1446
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)	532	824	133	80	340	271	80	218	59	282	223	266
RTOR Reduction (vph)	0	11	0	0	131	0	0	10	0	0	0	194
Lane Group Flow (vph)	532	946	0	80	480	0	80	267	0	282	223	72
Confl. Peds. (#/hr)	10		10	10		10	5		10	10		5
Confl. Bikes (#/hr)			10			5						
Heavy Vehicles (%)	4%	3%	2%	4%	5%	5%	1%	2%	6%	8%	5%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	59.0	49.5		31.5	25.0		27.9	21.8		38.0	28.9	28.9
Effective Green, g (s)	60.0	50.5		33.5	26.0		29.9	22.8		39.0	29.9	29.9
Actuated g/C Ratio	0.55	0.46		0.30	0.24		0.27	0.21		0.35	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	573	1565		238	747		343	368		325	491	393
v/s Ratio Prot	c0.27	c0.28		0.02	0.15		0.02	c0.15		c0.11	0.12	
v/s Ratio Perm	0.24			0.08			0.05			0.20		0.05
v/c Ratio	0.93	0.60		0.34	0.64		0.23	0.73		0.87	0.45	0.18
Uniform Delay, d1	26.2	22.3		27.9	37.8		30.6	40.7		29.3	33.3	30.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	21.4	1.7		0.8	4.2		0.4	7.0		20.9	0.7	0.2
Delay (s)	47.6	24.0		28.8	42.1		30.9	47.7		50.1	33.9	30.9
Level of Service	D	C		C	D		C	D		D	C	C
Approach Delay (s)		32.4			40.5			43.9			38.8	
Approach LOS		C			D			D			D	

Intersection Summary					
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.79				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0		
Intersection Capacity Utilization	92.4%	ICU Level of Service	F		
Analysis Period (min)	15				
c Critical Lane Group					



Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	100	1089	672	150
v/c Ratio	0.17	0.46	0.32	0.63
Control Delay	4.2	6.8	9.5	40.3
Queue Delay	0.0	0.5	0.0	0.0
Total Delay	4.2	7.3	9.5	40.3
Queue Length 50th (m)	4.0	40.2	29.6	23.3
Queue Length 95th (m)	10.6	67.7	50.8	41.7
Internal Link Dist (m)		133.0	135.9	318.4
Turn Bay Length (m)	60.0			
Base Capacity (vph)	635	2391	2093	383
Starvation Cap Reductn	0	755	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.16	0.67	0.32	0.39

Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	90	980	535	70	80	55
Future Volume (vph)	90	980	535	70	80	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.98		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	3282	3232		1381	
Flt Permitted	0.37	1.00	1.00		0.97	
Satd. Flow (perm)	652	3282	3232		1381	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	100	1089	594	78	89	61
RTOR Reduction (vph)	0	0	7	0	28	0
Lane Group Flow (vph)	100	1089	665	0	122	0
Heavy Vehicles (%)	7%	10%	9%	4%	36%	12%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	71.9	71.9	63.0		14.1	
Effective Green, g (s)	72.9	72.9	64.0		15.1	
Actuated g/C Ratio	0.73	0.73	0.64		0.15	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	546	2392	2068		208	
v/s Ratio Prot	0.01	c0.33	0.21			
v/s Ratio Perm	0.12				c0.09	
v/c Ratio	0.18	0.46	0.32		0.59	
Uniform Delay, d1	4.0	5.5	8.2		39.5	
Progression Factor	1.00	1.00	1.00		0.94	
Incremental Delay, d2	0.2	0.6	0.4		4.2	
Delay (s)	4.2	6.1	8.6		41.3	
Level of Service	A	A	A		D	
Approach Delay (s)		6.0	8.6		41.3	
Approach LOS		A	A		D	

Intersection Summary				
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	1299	77	15
v/c Ratio	0.40	0.02	0.07
Control Delay	2.1	1.5	19.5
Queue Delay	0.0	0.0	0.0
Total Delay	2.1	1.5	19.5
Queue Length 50th (m)	0.0	0.0	0.7
Queue Length 95th (m)	53.2	3.2	6.8
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3031	3060	379
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.43	0.03	0.04

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1245	15	0	75	15	0
Future Volume (vph)	1245	15	0	75	15	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3506			3539	943	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3506			3539	943	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1284	15	0	77	15	0
RTOR Reduction (vph)	1	0	0	0	0	0
Lane Group Flow (vph)	1298	0	0	77	15	0
Heavy Vehicles (%)	2%	71%	0%	2%	85%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	33.0			33.0	1.1	
Effective Green, g (s)	34.0			34.0	2.1	
Actuated g/C Ratio	0.71			0.71	0.04	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2478			2501	41	
v/s Ratio Prot	c0.37			0.02	c0.02	
v/s Ratio Perm						
v/c Ratio	0.52			0.03	0.37	
Uniform Delay, d1	3.3			2.1	22.4	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.2			0.0	5.5	
Delay (s)	3.5			2.1	27.8	
Level of Service	A			A	C	
Approach Delay (s)	3.5			2.1	27.8	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.51			
Actuated Cycle Length (s)	48.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	51.6%	ICU Level of Service	A	
Analysis Period (min)	15			

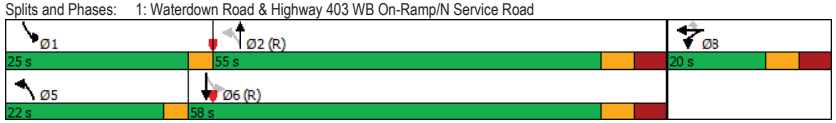
c Critical Lane Group

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	100	90	55	305	380	165	595
Future Volume (vph)	100	90	55	305	380	165	595
Lane Group Flow (vph)	103	93	57	314	907	170	804
Turn Type	Split	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	8	8		5	2	1	6
Permitted Phases			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)	40.0	40.0	40.0	10.0	31.0	10.0	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%
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)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	2.0	7.0	2.0	7.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.51	0.41	0.21	0.59	0.43	0.33	0.40
Control Delay	48.7	44.4	5.2	13.8	8.2	5.0	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	48.7	44.4	5.2	13.8	8.2	5.0	11.9
Queue Length 50th (m)	19.9	17.7	0.0	20.4	23.5	6.7	39.0
Queue Length 95th (m)	35.2	31.8	5.6	64.1	59.6	14.7	66.3
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	221	249	286	619	2101	673	2037
Starvation Cap Reductn	0	0	0	0	214	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	0.47	0.37	0.20	0.51	0.48	0.25	0.39

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 48 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	90	55	305	380	500	165	595	185
Future Volume (vph)	0	0	0	100	90	55	305	380	500	165	595	185
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)				7.0	7.0	7.0	2.0	7.0		2.0	7.0	
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	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	1601	3193		1711	3413	
Flt Permitted				0.95	1.00	1.00	0.31	1.00		0.28	1.00	
Satd. Flow (perm)				1544	1743	1479	516	3193		509	3413	
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)	0	0	0	103	93	57	314	392	515	170	613	191
RTOR Reduction (vph)	0	0	0	0	0	50	0	182	0	0	25	0
Lane Group Flow (vph)	0	0	0	103	93	7	314	725	0	170	779	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				12.1	12.1	12.1	70.4	59.1		67.4	57.6	
Effective Green, g (s)				13.1	13.1	13.1	72.4	60.1		69.4	58.6	
Actuated g/C Ratio				0.13	0.13	0.13	0.72	0.60		0.69	0.59	
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)				202	228	193	507	1918		483	2000	
v/s Ratio Prot				c0.07	0.05		c0.08	0.23		0.04	c0.23	
v/s Ratio Perm						0.01	0.37			0.21		
v/c Ratio				0.51	0.41	0.04	0.62	0.38		0.35	0.39	
Uniform Delay, d1				40.5	39.9	38.0	5.3	10.3		5.4	11.1	
Progression Factor				1.00	1.00	1.00	2.71	1.38		1.00	1.00	
Incremental Delay, d2				2.0	1.2	0.1	2.1	0.5		0.4	0.6	
Delay (s)				42.5	41.1	38.0	16.4	14.7		5.9	11.7	
Level of Service				D	D	D	B	B		A	B	
Approach Delay (s)		0.0			41.0			15.2			10.7	
Approach LOS		A			D			B			B	

Intersection Summary

HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

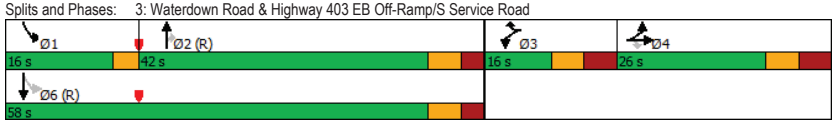
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	305	290	255	20	70	635	590	380	635
Future Volume (vph)	305	290	255	20	70	635	590	380	635
Lane Group Flow (vph)	321	305	268	21	74	668	621	400	668
Turn Type	Split	NA	Perm	Prot	Prot	NA	Perm	pm+pt	NA
Protected Phases	4	4		3	3	2		1	6
Permitted Phases			4				2	6	
Detector Phase	4	4	4	3	3	2	2	1	6
Switch Phase									
Minimum Initial (s)	8.0	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	16.0	16.0	29.0	29.0	9.0	29.0
Total Split (s)	26.0	26.0	26.0	16.0	16.0	42.0	42.0	16.0	58.0
Total Split (%)	26.0%	26.0%	26.0%	16.0%	16.0%	42.0%	42.0%	16.0%	58.0%
Yellow Time (s)	4.0	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	3.0	0.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-2.0	-1.0	-3.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	5.0	6.0	0.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Min	C-Min	None	C-Min
v/c Ratio	0.83	0.72	0.48	0.08	0.27	0.53	0.81	0.85	0.38
Control Delay	58.3	48.1	7.8	42.6	2.3	25.9	26.4	39.8	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.3	48.1	7.8	42.6	2.3	25.9	26.4	39.8	16.0
Queue Length 50th (m)	62.7	57.7	0.0	2.0	0.0	68.2	92.4	68.5	59.8
Queue Length 95th (m)	#122.6	#107.6	21.9	5.8	0.0	78.6	#133.3	#93.4	39.1
Internal Link Dist (m)		253.6				252.8			174.0
Turn Bay Length (m)	135.0			100.0				40.0	
Base Capacity (vph)	385	423	553	258	278	1358	803	471	1839
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.72	0.48	0.08	0.27	0.49	0.77	0.85	0.36

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 54 (54%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	290	255	20	0	70	0	635	590	380	635	0
Future Volume (vph)	305	290	255	20	0	70	0	635	590	380	635	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		5.0	6.0	0.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1694	1863	1521	2869		1439		3471	1553	1662	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.28	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3471	1553	484	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	305	268	21	0	74	0	668	621	400	668	0
RTOR Reduction (vph)	0	0	207	0	0	69	0	0	226	0	0	0
Lane Group Flow (vph)	321	305	61	21	0	5	0	668	395	400	668	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA	Perm	pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	21.7	21.7	21.7	6.4		6.4		32.7	32.7	48.9	48.9	
Effective Green, g (s)	22.7	22.7	22.7	7.4		7.4		34.7	33.7	51.9	49.9	
Actuated g/C Ratio	0.23	0.23	0.23	0.07		0.07		0.35	0.34	0.52	0.50	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0	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	3.0	
Lane Grp Cap (vph)	384	422	345	212		106		1204	523	442	1699	
v/s Ratio Prot	c0.19	0.16		c0.01		0.00		0.19		c0.15	0.20	
v/s Ratio Perm			0.04						c0.25	0.32		
v/c Ratio	0.84	0.72	0.18	0.10		0.05		0.55	0.76	0.90	0.39	
Uniform Delay, d1	36.9	35.7	31.1	43.2		43.0		26.4	29.5	16.6	15.6	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.94	1.33	1.70	1.01	
Incremental Delay, d2	14.5	6.0	0.2	0.2		0.2		1.7	9.0	20.8	0.7	
Delay (s)	51.4	41.8	31.4	43.4		43.2		26.5	48.1	49.1	16.4	
Level of Service	D	D	C	D		D		C	D	D	B	
Approach Delay (s)		42.1			43.3			36.9			28.6	
Approach LOS		D			D			D			C	

Intersection Summary

HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	305	505	179	605	1021	121	757
v/c Ratio	0.53	0.79	0.27	1.14	0.68	0.42	0.76
Control Delay	32.7	42.4	4.9	105.9	27.8	17.1	38.8
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	32.7	42.4	4.9	105.9	28.0	17.1	38.8
Queue Length 50th (m)	53.4	99.2	0.0	~142.0	109.6	12.3	77.2
Queue Length 95th (m)	84.2	#156.1	15.3	#211.0	119.3	20.2	90.2
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	579	643	656	530	1724	293	1417
Starvation Cap Reductn	0	0	0	0	134	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	0.53	0.79	0.27	1.14	0.64	0.41	0.53

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	290	480	170	575	725	245	115	540	180
Future Volume (vph)	0	0	0	290	480	170	575	725	245	115	540	180
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)				7.0	7.0	7.0	0.5	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	1694	3387		1728	3391	
Flt Permitted				0.95	1.00	1.00	0.19	1.00		0.25	1.00	
Satd. Flow (perm)				1694	1881	1575	336	3387		457	3391	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	305	505	179	605	763	258	121	568	189
RTOR Reduction (vph)	0	0	0	0	0	118	0	35	0	0	36	0
Lane Group Flow (vph)	0	0	0	305	505	61	605	986	0	121	721	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				36.6	36.6	36.6	57.4	46.4		38.0	30.0	
Effective Green, g (s)				37.6	37.6	37.6	59.9	47.4		40.0	31.0	
Actuated g/C Ratio				0.34	0.34	0.34	0.54	0.43		0.36	0.28	
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)				579	642	538	515	1459		270	955	
v/s Ratio Prot				0.18	c0.27		c0.29	0.29		0.04	c0.21	
v/s Ratio Perm						0.04	0.35			0.13		
v/c Ratio				0.53	0.79	0.11	1.17	0.68		0.45	0.76	
Uniform Delay, d1				29.1	32.6	24.8	27.5	25.1		24.0	36.0	
Progression Factor				1.00	1.00	1.00	0.85	1.06		1.00	1.00	
Incremental Delay, d2				0.9	6.3	0.1	95.1	2.1		1.2	5.5	
Delay (s)				29.9	38.9	24.9	118.4	28.7		25.2	41.6	
Level of Service				C	D	C	F	C		C	D	
Approach Delay (s)		0.0			33.6			62.1			39.3	
Approach LOS		A			C			E			D	

Intersection Summary

HCM 2000 Control Delay	48.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Queues — Future Background (No South Parking Lot)

2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp — PM Peak Hour



Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	298	309	1335	883
v/c Ratio	0.60	0.72	0.52	0.34
Control Delay	47.3	22.8	12.7	8.0
Queue Delay	0.0	0.2	0.5	0.3
Total Delay	47.3	23.0	13.2	8.4
Queue Length 50th (m)	32.9	18.5	82.4	46.7
Queue Length 95th (m)	42.8	46.0	m89.9	52.3
Internal Link Dist (m)			174.0	121.9
Turn Bay Length (m)	145.0	115.0		
Base Capacity (vph)	600	474	2563	2563
Starvation Cap Reductn	0	0	703	1011
Spillback Cap Reductn	0	13	230	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.50	0.67	0.72	0.57

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis — Future Background (No South Parking Lot)

2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	280	0	290	0	1255	0	0	830	0
Future Volume (vph)	0	0	0	280	0	290	0	1255	0	0	830	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)				6.0		6.0		6.0			6.0	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frpb, ped/bikes				1.00		1.00		1.00			1.00	
Flpb, ped/bikes				1.00		1.00		1.00			1.00	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3134		1551		3505			3505	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3134		1551		3505			3505	
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)	0	0	0	298	0	309	0	1335	0	0	883	0
RTOR Reduction (vph)	0	0	0	0	0	184	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	298	0	125	0	1335	0	0	883	0
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)									1			2
Heavy Vehicles (%)	0%	0%	0%	8%	100%	3%	0%	3%	0%	0%	3%	0%
Turn Type				Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)				16.6		16.6		79.4			79.4	
Effective Green, g (s)				17.6		17.6		80.4			80.4	
Actuated g/C Ratio				0.16		0.16		0.73			0.73	
Clearance Time (s)				7.0		7.0		7.0			7.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				501		248		2561			2561	
v/s Ratio Prot				c0.10		0.08		c0.38			0.25	
v/s Ratio Perm												
v/c Ratio				0.59		0.50		0.52			0.34	
Uniform Delay, d1				42.9		42.2		6.4			5.3	
Progression Factor				1.00		1.00		1.71			1.31	
Incremental Delay, d2				1.9		1.6		0.5			0.3	
Delay (s)				44.8		43.8		11.5			7.3	
Level of Service				D		D		B			A	
Approach Delay (s)		0.0			44.3			11.5			7.3	
Approach LOS		A			D			B			A	

Intersection Summary

HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues — Future Background (No South Parking Lot)

3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	232	162	303	56	288	1136	364	758
v/c Ratio	0.76	0.48	0.62	0.18	0.71	0.95	0.98	0.41
Control Delay	58.8	45.0	14.7	46.3	15.5	49.5	80.9	24.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.8	45.0	14.7	46.3	15.5	49.5	80.9	24.4
Queue Length 50th (m)	48.6	32.1	9.3	6.2	0.0	134.3	~84.1	67.2
Queue Length 95th (m)	#87.4	55.0	38.4	11.9	25.7	#166.3	#148.6	89.0
Internal Link Dist (m)		253.6				353.3		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	326	358	499	431	458	1212	371	1871
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	0.71	0.45	0.61	0.13	0.63	0.94	0.98	0.41

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 — Future Background (No South Parking Lot)

3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	230	160	300	55	0	285	0	740	385	360	750	0
Future Volume (vph)	230	160	300	55	0	285	0	740	385	360	750	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00		1.00		1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00		0.85		0.95		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)	1678	1845	1521	3164		1536		3334		1678	3471	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.10	1.00	
Satd. Flow (perm)	1678	1845	1521	3164		1536		3334		178	3471	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	232	162	303	56	0	288	0	747	389	364	758	0
RTOR Reduction (vph)	0	0	207	0	0	260	0	61	0	0	0	0
Lane Group Flow (vph)	232	162	96	56	0	28	0	1075	0	364	758	0
Confl. Peds. (#/hr)			5	5			4					4
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	3%	3%	7%	0%	4%	0%	1%	6%	4%	4%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	19.1	19.1	19.1	9.6		9.6		36.6		58.3	58.3	
Effective Green, g (s)	20.1	20.1	20.1	10.6		10.6		37.6		59.3	59.3	
Actuated g/C Ratio	0.18	0.18	0.18	0.10		0.10		0.34		0.54	0.54	
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)	306	337	277	304		148		1139		364	1871	
v/s Ratio Prot	c0.14	0.09		0.02		c0.02		c0.32		c0.18	0.22	
v/s Ratio Perm			0.06							0.36		
v/c Ratio	0.76	0.48	0.35	0.18		0.19		0.94		1.00	0.41	
Uniform Delay, d1	42.6	40.3	39.2	45.7		45.7		35.2		33.8	14.9	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.05		1.39	1.51	
Incremental Delay, d2	10.3	1.1	0.8	0.3		0.6		15.2		45.8	0.6	
Delay (s)	52.9	41.4	40.0	46.0		46.4		52.2		92.7	23.1	
Level of Service	D	D	D	D		D		D		F	C	
Approach Delay (s)		44.6			46.3			52.2			45.7	
Approach LOS		D			D			D			D	

Intersection Summary

HCM 2000 Control Delay	47.8	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)	22.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	693	26	218
v/c Ratio	0.72	0.03	0.53
Control Delay	15.6	3.1	23.7
Queue Delay	0.0	0.0	0.0
Total Delay	15.6	3.1	23.7
Queue Length 50th (m)	46.6	0.0	19.8
Queue Length 95th (m)	#120.6	2.9	36.7
Internal Link Dist (m)	190.8		55.4
Turn Bay Length (m)			
Base Capacity (vph)	965	939	1149
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.72	0.03	0.19

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)	665	25	175	35	0	0
Future Volume (vph)	665	25	175	35	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)	5.0	5.0		6.0		
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)	1662	1597		1824		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1662	1597		1824		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	693	26	182	36	0	0
RTOR Reduction (vph)	0	11	0	0	0	0
Lane Group Flow (vph)	693	15	0	218	0	0
Heavy Vehicles (%)	5%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	32.3	32.3		12.0		
Effective Green, g (s)	33.3	33.3		13.0		
Actuated g/C Ratio	0.58	0.58		0.23		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	965	928		413		
v/s Ratio Prot	c0.42			c0.12		
v/s Ratio Perm		0.01				
v/c Ratio	0.72	0.02		0.53		
Uniform Delay, d1	8.6	5.1		19.5		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	2.6	0.0		1.2		
Delay (s)	11.2	5.1		20.7		
Level of Service	B	A		C		
Approach Delay (s)	11.0			20.7	0.0	
Approach LOS	B			C	A	

Intersection Summary

HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	57.5%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	31	387	10	784	237	902
v/c Ratio	0.21	0.19	0.78	0.03	0.35	0.41	0.33
Control Delay	4.8	43.7	18.9	6.2	5.8	6.7	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	43.7	18.9	6.2	5.8	6.7	6.9
Queue Length 50th (m)	0.0	6.7	8.4	0.4	16.9	1.7	4.4
Queue Length 95th (m)	0.0	14.4	38.0	m0.8	m39.7	47.7	80.3
Internal Link Dist (m)	95.0		120.3		324.2		353.3
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	133	321	638	286	2256	624	2735
Starvation Cap Reductn	0	0	0	0	0	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	0.15	0.10	0.61	0.03	0.35	0.38	0.33

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)	10	0	10	30	0	375	10	740	20	230	865	10
Future Volume (vph)	10	0	10	30	0	375	10	740	20	230	865	10
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.85		1.00	1.00		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1573		1740	1575		1308	3423		1709	3504	
Flt Permitted		0.23		0.74	1.00		0.32	1.00		0.32	1.00	
Satd. Flow (perm)		369		1363	1575		435	3423		569	3504	
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)	10	0	10	31	0	387	10	763	21	237	892	10
RTOR Reduction (vph)	0	18	0	0	307	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	2	0	31	80	0	10	783	0	237	902	0
Confl. Peds. (#/hr)	2		2	2		2	5		6	6		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	18%	0%	0%	0%	0%	1%	33%	4%	0%	2%	2%	75%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.1		12.1	12.1		71.5	71.5		84.9	84.9	
Effective Green, g (s)		13.1		13.1	13.1		72.5	72.5		85.9	85.9	
Actuated g/C Ratio		0.12		0.12	0.12		0.66	0.66		0.78	0.78	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		43		162	187		286	2256		562	2736	
v/s Ratio Prot					c0.05			c0.23		c0.04	0.26	
v/s Ratio Perm		0.01		0.02			0.02			0.29		
v/c Ratio		0.06		0.19	0.43		0.03	0.35		0.42	0.33	
Uniform Delay, d1		43.0		43.7	45.0		6.5	8.3		3.5	3.6	
Progression Factor		1.00		1.00	1.00		0.60	0.59		1.59	1.62	
Incremental Delay, d2		0.5		0.6	1.6		0.1	0.2		0.5	0.3	
Delay (s)		43.5		44.3	46.6		4.0	5.1		6.1	6.1	
Level of Service		D		D	D		A	A		A	A	
Approach Delay (s)		43.5			46.4			5.0			6.1	
Approach LOS		D			D			A			A	

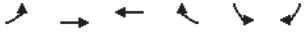
Intersection Summary					
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.36				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	72.8%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	95	50	45	250	0	105	20	35	5	5	10
Future Volume (Veh/h)	20	95	50	45	250	0	105	20	35	5	5	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.89	0.89	0.89	0.89	0.92	0.89	0.92	0.89	0.92	0.92	0.92
Hourly flow rate (vph)	22	107	56	51	281	0	118	22	39	5	5	11
Pedestrians					15							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked												
vC, conflicting volume	281			163			576	562	150	627	590	281
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	281			163			576	562	150	627	590	281
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			96			70	95	96	99	99	99
cM capacity (veh/h)	1282			1428			396	413	891	345	398	758

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	185	332	179	21
Volume Left	22	51	118	5
Volume Right	56	0	39	11
cSH	1282	1428	453	505
Volume to Capacity	0.02	0.04	0.39	0.04
Queue Length 95th (m)	0.4	0.9	14.9	1.0
Control Delay (s)	1.1	1.4	18.0	12.4
Lane LOS	A	A	C	B
Approach Delay (s)	1.1	1.4	18.0	12.4
Approach LOS			C	B

Intersection Summary				
Average Delay	5.8			
Intersection Capacity Utilization	45.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	135	295	0	0	0
Future Volume (Veh/h)	0	135	295	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	147	321	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)		280				
pX, platoon unblocked						
vC, conflicting volume	321				468	321
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	321				468	321
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)	1239				553	720

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	147	321	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1239	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	18.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues — Future Background (No South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	211	603	72	1330	113	309	371	222	314
v/c Ratio	0.78	0.38	0.17	0.99	0.31	0.93	1.03	0.43	0.49
Control Delay	43.3	20.8	6.6	48.9	24.7	77.3	93.1	44.3	21.5
Queue Delay	0.0	0.0	0.0	21.9	0.0	0.0	0.0	0.0	0.0
Total Delay	43.3	20.8	6.6	70.7	24.7	77.3	93.1	44.3	21.5
Queue Length 50th (m)	29.8	46.2	5.2	~171.2	16.2	67.1	~81.3	48.5	29.8
Queue Length 95th (m)	#62.0	63.4	m4.1	#211.6	28.9	#121.2	#133.8	69.1	63.6
Internal Link Dist (m)		134.8		136.1		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	298	1585	527	1344	364	334	361	518	635
Starvation Cap Reductn	0	0	0	89	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.38	0.14	1.06	0.31	0.93	1.03	0.43	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.

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

HCM Signalized Intersection Capacity Analysis — Future Background (No South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	520	65	70	965	325	110	235	65	360	215	305
Future Volume (vph)	205	520	65	70	965	325	110	235	65	360	215	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1616	3467		1639	3365		1694	1789		1710	1900	1491
Flt Permitted	0.09	1.00		0.41	1.00		0.62	1.00		0.19	1.00	1.00
Satd. Flow (perm)	151	3467		707	3365		1105	1789		344	1900	1491
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)	211	536	67	72	995	335	113	242	67	371	222	314
RTOR Reduction (vph)	0	8	0	0	29	0	0	9	0	0	0	228
Lane Group Flow (vph)	211	595	0	72	1301	0	113	300	0	371	222	86
Confl. Peds. (#/hr)	5		10	10		5			5	5		
Confl. Bikes (#/hr)			10			15						5
Heavy Vehicles (%)	8%	2%	0%	6%	2%	4%	3%	3%	0%	2%	0%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	58.0	48.5		48.5	42.0		26.0	19.0		39.0	29.0	29.0
Effective Green, g (s)	59.0	49.5		50.5	43.0		28.0	20.0		40.0	30.0	30.0
Actuated g/C Ratio	0.54	0.45		0.46	0.39		0.25	0.18		0.36	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	267	1560		388	1315		324	325		348	518	406
v/s Ratio Prot	c0.10	0.17		0.01	c0.39		0.03	c0.17		c0.17	0.12	
v/s Ratio Perm	0.32			0.07			0.06			0.21		0.06
v/c Ratio	0.79	0.38		0.19	0.99		0.35	0.92		1.07	0.43	0.21
Uniform Delay, d1	28.9	20.1		16.8	33.3		32.7	44.2		29.6	32.9	30.9
Progression Factor	1.00	1.00		0.51	0.87		1.00	1.00		1.48	1.25	5.05
Incremental Delay, d2	14.6	0.7		0.2	19.8		0.7	30.7		66.0	0.6	0.3
Delay (s)	43.6	20.8		8.9	48.6		33.4	75.0		109.7	41.7	156.1
Level of Service	D	C		A	D		C	E		F	D	F
Approach Delay (s)		26.7			46.6			63.8			109.1	
Approach LOS		C			D			E			F	

Intersection Summary

HCM 2000 Control Delay	60.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	62	856	1372	185
v/c Ratio	0.21	0.35	0.63	0.67
Control Delay	4.5	4.3	13.7	46.6
Queue Delay	0.0	0.2	0.7	0.0
Total Delay	4.5	4.4	14.4	46.6
Queue Length 50th (m)	1.5	14.9	88.8	33.2
Queue Length 95th (m)	m7.0	m48.8	138.3	56.0
Internal Link Dist (m)		136.1	132.2	314.3
Turn Bay Length (m)	60.0			
Base Capacity (vph)	375	2480	2188	404
Starvation Cap Reductn	0	756	0	0
Spillback Cap Reductn	0	0	443	3
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.50	0.79	0.46

Intersection Summary

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	830	1245	85	110	70
Future Volume (vph)	60	830	1245	85	110	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	3374	3294		1626	
Flt Permitted	0.14	1.00	1.00		0.97	
Satd. Flow (perm)	251	3374	3294		1626	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	62	856	1284	88	113	72
RTOR Reduction (vph)	0	0	3	0	23	0
Lane Group Flow (vph)	62	856	1369	0	162	0
Confl. Peds. (#/hr)	10			10		
Confl. Bikes (#/hr)				10		
Heavy Vehicles (%)	7%	7%	7%	5%	9%	5%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	79.9	79.9	71.5		16.1	
Effective Green, g (s)	80.9	80.9	72.5		17.1	
Actuated g/C Ratio	0.74	0.74	0.66		0.16	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	268	2481	2171		252	
v/s Ratio Prot	0.01	c0.25	c0.42			
v/s Ratio Perm	0.16				c0.10	
v/c Ratio	0.23	0.35	0.63		0.64	
Uniform Delay, d1	6.5	5.2	10.9		43.6	
Progression Factor	0.84	0.69	1.00		0.94	
Incremental Delay, d2	0.3	0.3	1.4		5.5	
Delay (s)	5.7	3.9	12.3		46.6	
Level of Service	A	A	B		D	
Approach Delay (s)		4.0	12.3		46.6	
Approach LOS		A	B		D	

Intersection Summary

HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	1065	388	18
v/c Ratio	0.33	0.12	0.07
Control Delay	1.9	1.4	15.4
Queue Delay	0.0	0.0	0.0
Total Delay	1.9	1.4	15.4
Queue Length 50th (m)	0.0	0.0	0.5
Queue Length 95th (m)	36.1	11.7	6.1
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3027	3140	443
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.35	0.12	0.04

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	885	20	0	330	10	5
Future Volume (vph)	885	20	0	330	10	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	0.95	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	3477			3610	1018	
Flt Permitted	1.00			1.00	0.97	
Satd. Flow (perm)	3477			3610	1018	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1041	24	0	388	12	6
RTOR Reduction (vph)	2	0	0	0	6	0
Lane Group Flow (vph)	1063	0	0	388	12	0
Heavy Vehicles (%)	2%	67%	0%	0%	100%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	30.2			30.2	1.1	
Effective Green, g (s)	31.2			31.2	2.1	
Actuated g/C Ratio	0.69			0.69	0.05	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2394			2486	47	
v/s Ratio Prot	c0.31			0.11	c0.01	
v/s Ratio Perm						
v/c Ratio	0.44			0.16	0.26	
Uniform Delay, d1	3.2			2.5	20.9	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.1			0.0	3.0	
Delay (s)	3.3			2.5	23.8	
Level of Service	A			A	C	
Approach Delay (s)	3.3			2.5	23.8	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.3	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	45.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	41.8%	ICU Level of Service	A	
Analysis Period (min)	15			

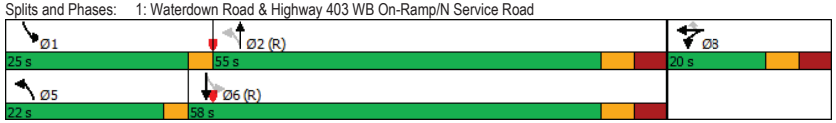
c Critical Lane Group

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	105	90	55	350	390	165	600
Future Volume (vph)	105	90	55	350	390	165	600
Lane Group Flow (vph)	108	93	57	361	943	170	810
Turn Type	Split	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	8	8		5	2	1	6
Permitted Phases			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)	40.0	40.0	40.0	10.0	31.0	10.0	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%
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)	-1.0	-1.0	-1.0	-2.0	-1.0	-1.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	1.0	7.0	2.0	7.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.52	0.40	0.21	0.65	0.45	0.35	0.41
Control Delay	48.8	43.7	5.1	18.8	7.0	5.4	12.7
Queue Delay	0.0	0.0	0.0	0.2	0.1	0.0	0.0
Total Delay	48.8	43.7	5.1	18.9	7.1	5.4	12.7
Queue Length 50th (m)	20.9	17.6	0.0	19.3	12.7	6.8	40.6
Queue Length 95th (m)	36.5	31.5	5.5	80.6	56.2	15.0	70.3
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	224	253	289	631	2093	659	2011
Starvation Cap Reductn	0	0	0	29	203	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	0.48	0.37	0.20	0.60	0.50	0.26	0.40

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 48 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	105	90	55	350	390	525	165	600	185
Future Volume (vph)	0	0	0	105	90	55	350	390	525	165	600	185
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)				7.0	7.0	7.0	1.0	7.0		2.0	7.0	
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	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	1601	3190		1711	3414	
Flt Permitted				0.95	1.00	1.00	0.30	1.00		0.27	1.00	
Satd. Flow (perm)				1544	1743	1479	512	3190		489	3414	
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)	0	0	0	108	93	57	361	402	541	170	619	191
RTOR Reduction (vph)	0	0	0	0	0	49	0	189	0	0	26	0
Lane Group Flow (vph)	0	0	0	108	93	8	361	754	0	170	784	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				12.4	12.4	12.4	70.9	58.7		66.3	56.4	
Effective Green, g (s)				13.4	13.4	13.4	73.6	59.7		68.3	57.4	
Actuated g/C Ratio				0.13	0.13	0.13	0.74	0.60		0.68	0.57	
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)				206	233	198	531	1904		467	1959	
v/s Ratio Prot				c0.07	0.05		c0.10	c0.24		0.04	0.23	
v/s Ratio Perm						0.01	0.40			0.21		
v/c Ratio				0.52	0.40	0.04	0.68	0.40		0.36	0.40	
Uniform Delay, d1				40.3	39.6	37.7	5.2	10.6		5.8	11.8	
Progression Factor				1.00	1.00	1.00	3.97	1.11		1.00	1.00	
Incremental Delay, d2				2.4	1.1	0.1	3.1	0.6		0.5	0.6	
Delay (s)				42.7	40.7	37.8	23.7	12.3		6.3	12.4	
Level of Service				D	D	D	C	B		A	B	
Approach Delay (s)		0.0			40.9			15.5			11.3	
Approach LOS		A			D			B			B	

Intersection Summary

HCM 2000 Control Delay	16.5	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.47				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	63.6%	ICU Level of Service		B	
Analysis Period (min)	15				

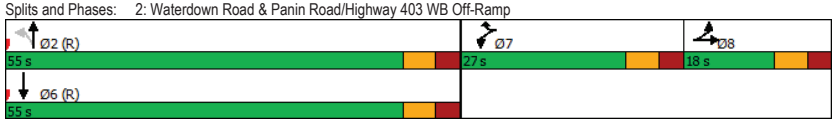
c Critical Lane Group

Lane Group	EBT	WBL	WBR	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	0	345	175	1090	705
Future Volume (vph)	0	345	175	1090	705
Lane Group Flow (vph)	5	359	182	1135	734
Turn Type	NA	Prot	Prot	NA	NA
Protected Phases	8	7	7	2	6
Permitted Phases					
Detector Phase	8	7	7	2	6
Switch Phase					
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	15.0	15.0	31.0	31.0
Total Split (s)	18.0	27.0	27.0	55.0	55.0
Total Split (%)	18.0%	27.0%	27.0%	55.0%	55.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lead	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	None	None	None	C-Min	C-Min
v/c Ratio	0.02	0.65	0.44	0.49	0.31
Control Delay	0.2	43.8	8.6	10.3	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.2	43.8	8.6	10.3	5.8
Queue Length 50th (m)	0.0	35.4	0.0	51.6	14.3
Queue Length 95th (m)	0.0	47.9	17.5	m46.6	73.3
Internal Link Dist (m)	106.5			174.0	121.9
Turn Bay Length (m)		145.0	115.0		
Base Capacity (vph)	242	664	466	2317	2339
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.02	0.54	0.39	0.49	0.31

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 55 (55%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	5	345	0	175	0	1090	0	0	705	0
Future Volume (vph)	0	0	5	345	0	175	0	1090	0	0	705	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)		6.0		6.0		6.0		6.0			6.0	
Lane Util. Factor		1.00		0.97		1.00		0.95			0.95	
Frt		0.86		1.00		0.85		1.00			1.00	
Flt Protected		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (prot)		984		3134		1521		3438			3471	
Flt Permitted		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (perm)		984		3134		1521		3438			3471	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	5	359	0	182	0	1135	0	0	734	0
RTOR Reduction (vph)	0	5	0	0	0	150	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	359	0	32	0	1135	0	0	734	0
Heavy Vehicles (%)	0%	0%	67%	8%	0%	5%	0%	5%	0%	0%	4%	0%
Turn Type		NA		Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)		1.6		16.6		16.6		60.8			60.8	
Effective Green, g (s)		2.6		17.6		17.6		61.8			61.8	
Actuated g/C Ratio		0.03		0.18		0.18		0.62			0.62	
Clearance Time (s)		7.0		7.0		7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)		25		551		267		2124			2145	
v/s Ratio Prot		c0.00		c0.11		0.02		c0.33			0.21	
v/s Ratio Perm												
v/c Ratio		0.01		0.65		0.12		0.53			0.34	
Uniform Delay, d1		47.4		38.3		34.7		10.9			9.3	
Progression Factor		1.00		1.00		1.00		1.06			0.67	
Incremental Delay, d2		0.1		2.8		0.2		0.1			0.4	
Delay (s)		47.5		41.1		34.9		11.6			6.6	
Level of Service		D		D		C		B			A	
Approach Delay (s)		47.5			39.0			11.6			6.6	
Approach LOS		D			D			B			A	

Intersection Summary

HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

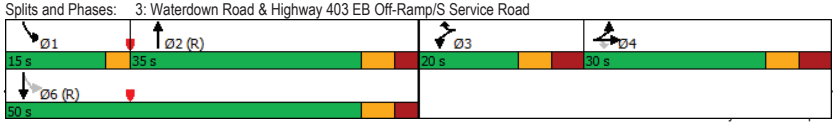
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	305	290	265	20	70	715	380	675
Future Volume (vph)	305	290	265	20	70	715	380	675
Lane Group Flow (vph)	321	305	279	21	74	1490	400	711
Turn Type	Split	NA	Perm	Prot	Prot	NA	pm+pt	NA
Protected Phases	4	4		3	3	2	1	6
Permitted Phases			4				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	16.0	16.0	29.0	9.0	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%
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)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	6.0	2.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.78	0.67	0.48	0.08	0.27	1.34	1.02	0.42
Control Delay	48.4	41.5	6.6	42.6	2.3	185.8	78.3	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	41.5	6.6	42.6	2.3	185.8	78.3	18.3
Queue Length 50th (m)	59.3	54.5	0.0	2.0	0.0	~195.6	~89.6	67.1
Queue Length 95th (m)	90.6	83.0	19.6	5.8	0.0	#236.5	#154.4	56.5
Internal Link Dist (m)		253.6				252.8		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	431	474	595	372	329	1108	394	1693
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	0.74	0.64	0.47	0.06	0.22	1.34	1.02	0.42

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 54 (54%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	290	265	20	0	70	0	715	700	380	675	0
Future Volume (vph)	305	290	265	20	0	70	0	715	700	380	675	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
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)	1694	1863	1521	2869		1439		3214		1662	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.14	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3214		238	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	305	279	21	0	74	0	753	737	400	711	0
RTOR Reduction (vph)	0	0	211	0	0	69	0	181	0	0	0	0
Lane Group Flow (vph)	321	305	68	21	0	5	0	1309	0	400	711	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	23.5	23.5	23.5	6.4		6.4		26.4		47.1	47.1	
Effective Green, g (s)	24.5	24.5	24.5	7.4		7.4		27.4		48.1	48.1	
Actuated g/C Ratio	0.24	0.24	0.24	0.07		0.07		0.27		0.48	0.48	
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)	415	456	372	212		106		880		380	1638	
v/s Ratio Prot	c0.19	0.16		c0.01		0.00		c0.41		c0.20	0.21	
v/s Ratio Perm			0.04							0.31		
v/c Ratio	0.77	0.67	0.18	0.10		0.05		1.49		1.05	0.43	
Uniform Delay, d1	35.2	34.1	29.8	43.2		43.0		36.3		29.0	17.0	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.89		1.06	0.99	
Incremental Delay, d2	8.7	3.7	0.2	0.2		0.2		225.1		59.3	0.8	
Delay (s)	43.9	37.8	30.1	43.4		43.2		257.5		90.0	17.6	
Level of Service	D	D	C	D		D		F		F	B	
Approach Delay (s)		37.6			43.3			257.5			43.7	
Approach LOS		D			D			F			D	

Intersection Summary

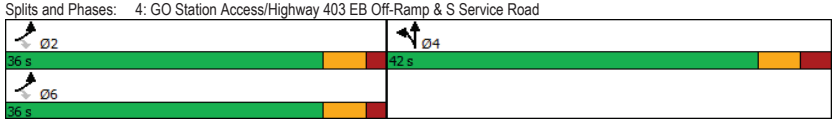
HCM 2000 Control Delay	130.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	NBT	Ø2	Ø6
Lane Configurations					
Traffic Volume (vph)	980	180	25		
Future Volume (vph)	980	180	25		
Lane Group Flow (vph)	1167	214	48		
Turn Type	Prot	Perm	NA		
Protected Phases	2 6		4	2	6
Permitted Phases		2 6			
Detector Phase	2 6	2 6	4		
Switch Phase					
Minimum Initial (s)			8.0	8.0	8.0
Minimum Split (s)			15.0	29.0	29.0
Total Split (s)			42.0	36.0	36.0
Total Split (%)			53.8%	46%	46%
Yellow Time (s)			4.0	4.0	4.0
All-Red Time (s)			3.0	2.0	2.0
Lost Time Adjust (s)			-1.0		
Total Lost Time (s)			6.0		
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode			None	Min	Min
v/c Ratio	0.79	0.15	0.16		
Control Delay	13.9	1.4	23.0		
Queue Delay	0.0	0.0	0.0		
Total Delay	13.9	1.4	23.0		
Queue Length 50th (m)	0.0	0.0	4.0		
Queue Length 95th (m)	#195.5	6.8	11.8		
Internal Link Dist (m)	190.8		55.4		
Turn Bay Length (m)					
Base Capacity (vph)	1472	1408	1221		
Starvation Cap Reductn	0	0	0		
Spillback Cap Reductn	0	0	0		
Storage Cap Reductn	0	0	0		
Reduced v/c Ratio	0.79	0.15	0.04		

Intersection Summary
Cycle Length: 78
Actuated Cycle Length: 55.6
Natural Cycle: 80
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: GO Station Access/Highway 403 EB Off-Ramp & S Service Road



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	980	180	15	25	0	0
Future Volume (vph)	980	180	15	25	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)	5.0	5.0		6.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.98		
Satd. Flow (prot)	1694	1597		1865		
Flt Permitted	0.95	1.00		0.98		
Satd. Flow (perm)	1694	1597		1865		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	1167	214	18	30	0	0
RTOR Reduction (vph)	0	39	0	0	0	0
Lane Group Flow (vph)	1167	175	0	48	0	0
Heavy Vehicles (%)	3%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	44.0	44.0		3.0		
Effective Green, g (s)	45.0	45.0		4.0		
Actuated g/C Ratio	0.75	0.75		0.07		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	1270	1197		124		
v/s Ratio Prot	c0.69			c0.03		
v/s Ratio Perm		0.11				
v/c Ratio	0.92	0.15		0.39		
Uniform Delay, d1	6.0	2.1		26.8		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	10.6	0.1		2.0		
Delay (s)	16.7	2.2		28.8		
Level of Service	B	A		C		
Approach Delay (s)	14.4			28.8	0.0	
Approach LOS	B			C	A	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	165	1250	10	0	960
Future Volume (Veh/h)	0	165	1250	10	0	960
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	179	1359	11	0	1043
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			101			277
pX, platoon unblocked	0.89	0.82			0.82	
vC, conflicting volume	1886	685			1370	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1122	191			1022	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	73			100	
cM capacity (veh/h)	177	674			556	

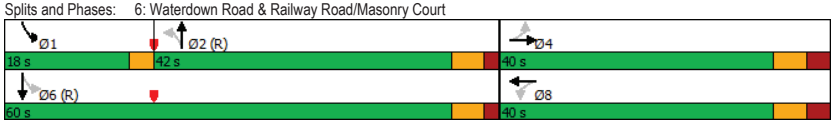
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	179	906	464	522	522
Volume Left	0	0	0	0	0
Volume Right	179	0	11	0	0
cSH	674	1700	1700	1700	1700
Volume to Capacity	0.27	0.53	0.27	0.31	0.31
Queue Length 95th (m)	8.5	0.0	0.0	0.0	0.0
Control Delay (s)	12.3	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	12.3	0.0		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay		0.8		
Intersection Capacity Utilization		51.8%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	15	0	15	0	10	955	245	700
Future Volume (vph)	15	0	15	0	10	955	245	700
Lane Group Flow (vph)	0	21	16	309	11	1059	261	761
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	29.0	29.0	29.0	29.0	35.0	35.0	11.0	35.0
Total Split (s)	40.0	40.0	40.0	40.0	42.0	42.0	18.0	60.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	42.0%	42.0%	18.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)		6.0	6.0	6.0	5.0	5.0	2.0	5.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Recall Mode	None	None	None	None	C-Min	C-Min	None	C-Min
v/c Ratio		0.22	0.13	0.66	0.04	0.51	0.50	0.29
Control Delay		5.1	42.2	10.6	11.4	13.5	7.2	5.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		5.1	42.2	10.6	11.4	13.5	7.2	5.8
Queue Length 50th (m)		0.0	3.1	0.0	0.8	58.8	2.0	3.9
Queue Length 95th (m)		0.0	9.2	17.8	4.3	98.8	36.6	48.4
Internal Link Dist (m)		95.0		120.3		324.2		76.6
Turn Bay Length (m)			25.0		35.0		45.0	
Base Capacity (vph)		173	418	772	257	2061	538	2669
Starvation Cap Reductn		0	0	0	0	0	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		0.12	0.04	0.40	0.04	0.51	0.49	0.29

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 22 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 6: Waterdown Road & Railway Road/Masonry Court



HCM Signalized Intersection Capacity Analysis — Future Total (No South Parking Lot)
6: Waterdown Road & Railway Road/Masonry Court — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	0	5	15	0	290	10	955	40	245	700	15
Future Volume (vph)	15	0	5	15	0	290	10	955	40	245	700	15
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1060		1572	1615		1118	3417		1694	3383	
Flt Permitted		0.35		0.74	1.00		0.36	1.00		0.21	1.00	
Satd. Flow (perm)		384		1230	1615		427	3417		367	3383	
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)	16	0	5	16	0	309	11	1016	43	261	745	16
RTOR Reduction (vph)	0	19	0	0	278	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	2	0	16	31	0	11	1057	0	261	760	0
Confl. Peds. (#/hr)									5	5		
Heavy Vehicles (%)	88%	0%	0%	11%	0%	0%	56%	4%	0%	3%	5%	71%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.1		9.1	9.1		59.3	59.3		77.9	77.9	
Effective Green, g (s)		10.1		10.1	10.1		60.3	60.3		78.9	78.9	
Actuated g/C Ratio		0.10		0.10	0.10		0.60	0.60		0.79	0.79	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		38		124	163		257	2060		509	2669	
v/s Ratio Prot					c0.02			c0.31		c0.08	0.22	
v/s Ratio Perm		0.01		0.01			0.03			0.32		
v/c Ratio		0.06		0.13	0.19		0.04	0.51		0.51	0.28	
Uniform Delay, d1		40.6		40.9	41.2		8.1	11.4		5.0	2.9	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.56	1.83	
Incremental Delay, d2		0.6		0.5	0.6		0.3	0.9		0.8	0.2	
Delay (s)		41.3		41.4	41.8		8.4	12.3		8.7	5.5	
Level of Service		D		D	D		A	B		A	A	
Approach Delay (s)		41.3			41.8			12.3			6.3	
Approach LOS		D			D			B			A	

Intersection Summary				
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.47			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	71.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis — Future Total (No South Parking Lot)
7: East Site Driveway — AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	70	70	5	30	0
Future Volume (Veh/h)	0	70	70	5	30	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	76	76	5	33	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	190	33	33			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	190	33	33			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	93	95			
cM capacity (veh/h)	761	1041	1579			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	76	81	33
Volume Left	0	76	0
Volume Right	76	0	0
cSH	1041	1579	1700
Volume to Capacity	0.07	0.05	0.02
Queue Length 95th (m)	1.9	1.2	0.0
Control Delay (s)	8.7	7.0	0.0
Lane LOS	A	A	
Approach Delay (s)	8.7	7.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	140	45	30	85	0	110	20	30	0	50	50
Future Volume (Veh/h)	55	140	45	30	85	0	110	20	30	0	50	50
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.82	0.82	0.82	0.82	0.92	0.82	0.92	0.82	0.92	0.92	0.92
Hourly flow rate (vph)	60	171	55	37	104	0	134	22	37	0	54	54
Pedestrians					5							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	104			226			578	496	204	550	524	104
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	104			216			571	489	194	542	517	104
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			97			60	95	96	100	87	94
cM capacity (veh/h)	1488			1355			339	444	843	389	429	951

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	286	141	193	108
Volume Left	60	37	134	0
Volume Right	55	0	37	54
cSH	1488	1355	395	591
Volume to Capacity	0.04	0.03	0.49	0.18
Queue Length 95th (m)	1.0	0.7	20.8	5.3
Control Delay (s)	1.9	2.2	22.5	12.5
Lane LOS	A	A	C	B
Approach Delay (s)	1.9	2.2	22.5	12.5
Approach LOS			C	B

Intersection Summary				
Average Delay	9.0			
Intersection Capacity Utilization	39.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	170	115	0	0	0
Future Volume (Veh/h)	0	170	115	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	185	125	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)		282				
pX, platoon unblocked						
vC, conflicting volume	125				310	125
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	125				310	125
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)	1462				682	926

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	185	125	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1462	1700	1700
Volume to Capacity	0.00	0.07	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

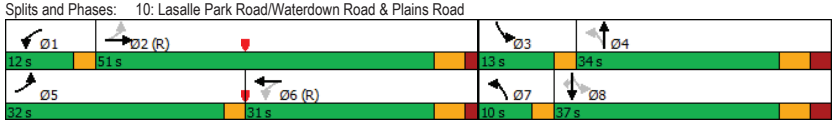
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	12.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	500	780	75	330	75	205	265	210	250
Future Volume (vph)	500	780	75	330	75	205	265	210	250
Lane Group Flow (vph)	532	963	80	633	80	277	282	223	266
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	6.0	8.0	6.0	8.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	27.0	9.0	27.0	9.0	34.0	9.0	34.0	34.0
Total Split (s)	32.0	51.0	12.0	31.0	10.0	34.0	13.0	37.0	37.0
Total Split (%)	29.1%	46.4%	10.9%	28.2%	9.1%	30.9%	11.8%	33.6%	33.6%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	3.0	0.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	5.0	2.0	5.0	2.0	6.0	2.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
v/c Ratio	0.91	0.59	0.30	0.72	0.20	0.75	0.84	0.46	0.46
Control Delay	46.6	23.8	17.4	33.4	22.9	52.1	50.5	37.4	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	23.8	17.4	33.4	22.9	52.1	50.5	37.4	6.6
Queue Length 50th (m)	92.0	83.6	7.6	53.0	11.4	56.6	46.6	43.5	0.0
Queue Length 95th (m)	#171.1	112.4	15.5	72.3	21.2	81.8	#90.6	65.0	19.6
Internal Link Dist (m)		134.8		133.0		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	586	1626	289	925	400	461	335	516	602
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.59	0.28	0.68	0.20	0.60	0.84	0.43	0.44

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Lasalle Park Road/Waterdown Road & Plains Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	500	780	125	75	330	265	75	205	55	265	210	250
Future Volume (vph)	500	780	125	75	330	265	75	205	55	265	210	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.93		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1677	3411		1675	3162		1723	1779		1613	1810	1446
Flt Permitted	0.17	1.00		0.30	1.00		0.62	1.00		0.31	1.00	1.00
Satd. Flow (perm)	297	3411		524	3162		1123	1779		522	1810	1446
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)	532	830	133	80	351	282	80	218	59	282	223	266
RTOR Reduction (vph)	0	11	0	0	133	0	0	10	0	0	0	195
Lane Group Flow (vph)	532	952	0	80	500	0	80	267	0	282	223	71
Confl. Peds. (#/hr)	10		10	10		10	5		10	10		5
Confl. Bikes (#/hr)			10			5						
Heavy Vehicles (%)	4%	3%	2%	4%	5%	5%	1%	2%	6%	8%	5%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	59.4	49.9		30.9	24.4		27.9	21.8		37.6	28.5	28.5
Effective Green, g (s)	60.4	50.9		32.9	25.4		29.9	22.8		38.6	29.5	29.5
Actuated g/C Ratio	0.55	0.46		0.30	0.23		0.27	0.21		0.35	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	577	1578		235	730		343	368		320	485	387
v/s Ratio Prot	c0.28	0.28		0.02	c0.16		0.02	c0.15		c0.11	0.12	
v/s Ratio Perm	0.23			0.08			0.05			0.20		0.05
v/c Ratio	0.92	0.60		0.34	0.68		0.23	0.73		0.88	0.46	0.18
Uniform Delay, d1	27.3	22.0		28.4	38.6		30.6	40.7		29.9	33.6	31.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	20.4	1.7		0.9	5.2		0.4	7.0		23.4	0.7	0.2
Delay (s)	47.7	23.7		29.2	43.8		30.9	47.7		53.4	34.3	31.2
Level of Service	D	C		C	D		C	D		D	C	C
Approach Delay (s)		32.3			42.2			43.9			40.2	
Approach LOS		C			D			D			D	

Intersection Summary

HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	93.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	95	980	545	115
Future Volume (vph)	95	980	545	115
Lane Group Flow (vph)	106	1089	700	200
Turn Type	pm+pt	NA	NA	Perm
Protected Phases	5	2	6	
Permitted Phases	2			8
Detector Phase	5	2	6	8
Switch Phase				
Minimum Initial (s)	6.0	8.0	8.0	8.0
Minimum Split (s)	9.0	26.0	26.0	29.0
Total Split (s)	15.0	68.0	53.0	32.0
Total Split (%)	15.0%	68.0%	53.0%	32.0%
Yellow Time (s)	3.0	4.0	4.0	4.0
All-Red Time (s)	0.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	None	C-Min	C-Min	None
v/c Ratio	0.20	0.48	0.37	0.71
Control Delay	5.8	8.9	12.4	44.5
Queue Delay	0.0	0.5	0.0	0.0
Total Delay	5.8	9.4	12.4	44.5
Queue Length 50th (m)	5.3	47.9	35.6	34.2
Queue Length 95th (m)	13.4	79.6	60.8	53.8
Internal Link Dist (m)		133.0	135.9	318.4
Turn Bay Length (m)	60.0			
Base Capacity (vph)	584	2269	1896	379
Starvation Cap Reductn	0	663	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.18	0.68	0.37	0.53

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Splits and Phases: 11: Plains Road & Cooke Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	95	980	545	85	115	65
Future Volume (vph)	95	980	545	85	115	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.98		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	3282	3226		1375	
Flt Permitted	0.34	1.00	1.00		0.97	
Satd. Flow (perm)	609	3282	3226		1375	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	106	1089	606	94	128	72
RTOR Reduction (vph)	0	0	10	0	22	0
Lane Group Flow (vph)	106	1089	690	0	178	0
Heavy Vehicles (%)	7%	10%	9%	4%	36%	12%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	68.0	68.0	57.5		18.0	
Effective Green, g (s)	69.0	69.0	58.5		19.0	
Actuated g/C Ratio	0.69	0.69	0.58		0.19	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	511	2264	1887		261	
v/s Ratio Prot	0.02	c0.33	0.21			
v/s Ratio Perm	0.13				c0.13	
v/c Ratio	0.21	0.48	0.37		0.68	
Uniform Delay, d1	5.4	7.2	11.0		37.7	
Progression Factor	1.00	1.00	1.00		0.97	
Incremental Delay, d2	0.2	0.7	0.5		7.1	
Delay (s)	5.6	7.9	11.5		43.6	
Level of Service	A	A	B		D	
Approach Delay (s)		7.7	11.5		43.6	
Approach LOS		A	B		D	

Intersection Summary

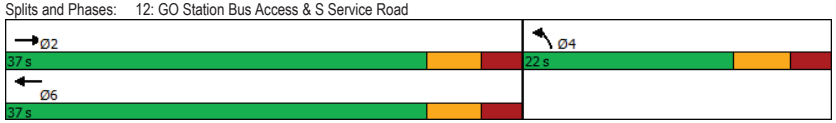
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Configurations			
Traffic Volume (vph)	1355	75	15
Future Volume (vph)	1355	75	15
Lane Group Flow (vph)	1412	77	15
Turn Type	NA	NA	Prot
Protected Phases	2	6	4
Permitted Phases			
Detector Phase	2	6	4
Switch Phase			
Minimum Initial (s)	8.0	8.0	8.0
Minimum Split (s)	31.0	31.0	15.0
Total Split (s)	37.0	37.0	22.0
Total Split (%)	62.7%	62.7%	37.3%
Yellow Time (s)	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	Min	Min	None
v/c Ratio	0.43	0.02	0.07
Control Delay	2.2	1.6	20.1
Queue Delay	0.0	0.0	0.0
Total Delay	2.2	1.6	20.1
Queue Length 50th (m)	0.0	0.0	0.8
Queue Length 95th (m)	60.7	3.2	6.8
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3118	3146	368
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.45	0.02	0.04

Intersection Summary
Cycle Length: 59
Actuated Cycle Length: 43.5
Natural Cycle: 50
Control Type: Semi Act-Uncoord

Splits and Phases: 12: GO Station Bus Access & S Service Road



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1355	15	0	75	15	0
Future Volume (vph)	1355	15	0	75	15	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3508			3539	943	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3508			3539	943	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1397	15	0	77	15	0
RTOR Reduction (vph)	1	0	0	0	0	0
Lane Group Flow (vph)	1411	0	0	77	15	0
Heavy Vehicles (%)	2%	71%	0%	2%	85%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	34.0			34.0	1.2	
Effective Green, g (s)	35.0			35.0	2.2	
Actuated g/C Ratio	0.71			0.71	0.04	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2495			2517	42	
v/s Ratio Prot	c0.40			0.02	c0.02	
v/s Ratio Perm						
v/c Ratio	0.57			0.03	0.36	
Uniform Delay, d1	3.4			2.1	22.8	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.3			0.0	5.1	
Delay (s)	3.7			2.1	28.0	
Level of Service	A			A	C	
Approach Delay (s)	3.7			2.1	28.0	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.9	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	49.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	54.6%	ICU Level of Service	A	
Analysis Period (min)	15			

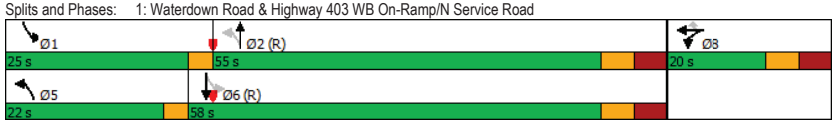
c Critical Lane Group

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	105	90	55	350	390	165	600
Future Volume (vph)	105	90	55	350	390	165	600
Lane Group Flow (vph)	108	93	57	361	943	170	810
Turn Type	Split	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	8	8		5	2	1	6
Permitted Phases			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)	40.0	40.0	40.0	10.0	31.0	10.0	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%
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)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	2.0	7.0	2.0	7.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.52	0.40	0.21	0.67	0.45	0.35	0.41
Control Delay	48.8	43.7	5.1	18.4	10.7	5.4	12.9
Queue Delay	0.0	0.0	0.0	0.2	0.1	0.0	0.0
Total Delay	48.8	43.7	5.1	18.6	10.8	5.4	12.9
Queue Length 50th (m)	20.9	17.6	0.0	26.5	28.1	6.8	41.0
Queue Length 95th (m)	36.5	31.5	5.5	82.2	67.5	15.0	71.0
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	224	253	289	608	2093	662	2006
Starvation Cap Reductn	0	0	0	27	202	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	0.48	0.37	0.20	0.62	0.50	0.26	0.40

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 48 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	105	90	55	350	390	525	165	600	185
Future Volume (vph)	0	0	0	105	90	55	350	390	525	165	600	185
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)				7.0	7.0	7.0	2.0	7.0		2.0	7.0	
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	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	1601	3190		1711	3414	
Flt Permitted				0.95	1.00	1.00	0.30	1.00		0.27	1.00	
Satd. Flow (perm)				1544	1743	1479	501	3190		491	3414	
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)	0	0	0	108	93	57	361	402	541	170	619	191
RTOR Reduction (vph)	0	0	0	0	0	49	0	189	0	0	26	0
Lane Group Flow (vph)	0	0	0	108	93	8	361	754	0	170	784	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				12.4	12.4	12.4	71.2	58.7		66.0	56.1	
Effective Green, g (s)				13.4	13.4	13.4	72.6	59.7		68.0	57.1	
Actuated g/C Ratio				0.13	0.13	0.13	0.73	0.60		0.68	0.57	
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)				206	233	198	512	1904		466	1949	
v/s Ratio Prot				c0.07	0.05		c0.10	c0.24		0.04	0.23	
v/s Ratio Perm						0.01	0.42			0.21		
v/c Ratio				0.52	0.40	0.04	0.71	0.40		0.36	0.40	
Uniform Delay, d1				40.3	39.6	37.7	5.8	10.6		5.9	11.9	
Progression Factor				1.00	1.00	1.00	3.21	1.75		1.00	1.00	
Incremental Delay, d2				2.4	1.1	0.1	3.9	0.6		0.5	0.6	
Delay (s)				42.7	40.7	37.8	22.4	19.2		6.4	12.6	
Level of Service				D	D	D	C	B		A	B	
Approach Delay (s)		0.0			40.9			20.1			11.5	
Approach LOS		A			D			C			B	

Intersection Summary

HCM 2000 Control Delay	18.9	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.47				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	63.6%	ICU Level of Service		B	
Analysis Period (min)	15				

c Critical Lane Group

Queues
Future Total (No South Parking Lot) - Improvements

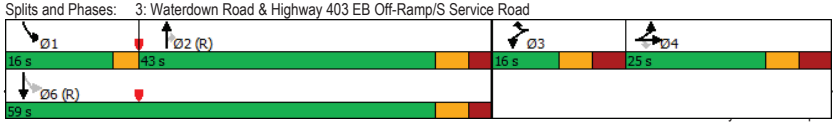
3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	305	290	265	20	70	715	700	380	675
Future Volume (vph)	305	290	265	20	70	715	700	380	675
Lane Group Flow (vph)	321	305	279	21	74	753	737	400	711
Turn Type	Split	NA	Perm	Prot	Prot	NA	Perm	pm+pt	NA
Protected Phases	4	4		3	3	2		1	6
Permitted Phases			4				2	6	
Detector Phase	4	4	4	3	3	2	2	1	6
Switch Phase									
Minimum Initial (s)	8.0	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	16.0	16.0	29.0	29.0	9.0	29.0
Total Split (s)	25.0	25.0	25.0	16.0	16.0	43.0	43.0	16.0	59.0
Total Split (%)	25.0%	25.0%	25.0%	16.0%	16.0%	43.0%	43.0%	16.0%	59.0%
Yellow Time (s)	4.0	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	3.0	0.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-2.5	-1.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	0.5	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Min	C-Min	None	C-Min
v/c Ratio	0.94	0.81	0.53	0.08	0.27	0.58	0.93	0.89	0.39
Control Delay	78.1	57.8	8.9	42.6	2.3	25.7	37.3	45.2	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.1	57.8	8.9	42.6	2.3	25.7	37.3	45.2	15.8
Queue Length 50th (m)	~72.0	61.6	0.7	2.0	0.0	74.9	116.1	68.4	62.8
Queue Length 95th (m)	#126.2	#111.6	23.7	5.8	0.0	89.8	#178.5	#100.1	46.5
Internal Link Dist (m)		253.6				252.8			174.0
Turn Bay Length (m)	135.0			100.0				40.0	
Base Capacity (vph)	341	376	526	258	278	1308	792	450	1840
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.81	0.53	0.08	0.27	0.58	0.93	0.89	0.39

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 54 (54%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road



HCM Signalized Intersection Capacity Analysis
Future Total (No South Parking Lot) - Improvements

3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road
AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	290	265	20	0	70	0	715	700	380	675	0
Future Volume (vph)	305	290	265	20	0	70	0	715	700	380	675	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0	6.0	0.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1694	1863	1521	2869		1439		3471	1553	1662	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.25	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3471	1553	429	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	305	279	21	0	74	0	753	737	400	711	0
RTOR Reduction (vph)	0	0	219	0	0	69	0	0	213	0	0	0
Lane Group Flow (vph)	321	305	60	21	0	5	0	753	524	400	711	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA	Perm	pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	19.2	19.2	19.2	6.4		6.4		35.1	35.1	51.4	51.4	
Effective Green, g (s)	20.2	20.2	20.2	7.4		7.4		36.1	36.1	53.9	52.4	
Actuated g/C Ratio	0.20	0.20	0.20	0.07		0.07		0.36	0.36	0.54	0.52	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0	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	3.0	
Lane Grp Cap (vph)	342	376	307	212		106		1253	560	426	1784	
v/s Ratio Prot	c0.19	0.16		c0.01		0.00		0.22		c0.15	0.21	
v/s Ratio Perm			0.04						c0.34	0.36		
v/c Ratio	0.94	0.81	0.19	0.10		0.05		0.60	0.94	0.94	0.40	
Uniform Delay, d1	39.3	38.1	33.1	43.2		43.0		26.1	30.8	16.1	14.3	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.95	1.12	1.90	1.11	
Incremental Delay, d2	32.7	12.5	0.3	0.2		0.2		2.0	23.8	27.3	0.6	
Delay (s)	72.0	50.6	33.4	43.4		43.2		26.7	58.4	57.8	16.5	
Level of Service	E	D	C	D		D		C	E	E	B	
Approach Delay (s)		52.9			43.3			42.4			31.3	
Approach LOS		D			D			D			C	

Intersection Summary

HCM 2000 Control Delay	41.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		

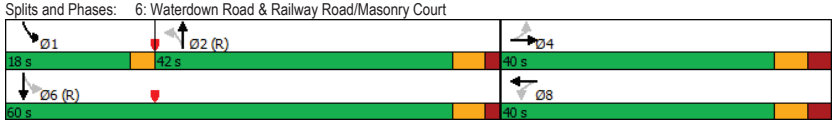
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	15	0	15	0	10	955	245	700
Future Volume (vph)	15	0	15	0	10	955	245	700
Lane Group Flow (vph)	0	21	16	309	11	1059	261	761
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	29.0	29.0	29.0	29.0	35.0	35.0	11.0	35.0
Total Split (s)	40.0	40.0	40.0	40.0	42.0	42.0	18.0	60.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	42.0%	42.0%	18.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)		6.0	6.0	6.0	5.0	5.0	2.0	5.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Recall Mode	None	None	None	None	C-Min	C-Min	None	C-Min
v/c Ratio		0.22	0.13	0.66	0.04	0.51	0.50	0.29
Control Delay		5.1	42.2	10.6	11.4	13.5	6.9	4.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		5.1	42.2	10.6	11.4	13.5	6.9	4.8
Queue Length 50th (m)		0.0	3.1	0.0	0.8	58.8	2.0	3.9
Queue Length 95th (m)		0.0	9.2	17.8	4.3	98.8	30.6	40.6
Internal Link Dist (m)		95.0		120.3		324.2		76.6
Turn Bay Length (m)			25.0		35.0		45.0	
Base Capacity (vph)		173	418	772	257	2061	538	2669
Starvation Cap Reductn		0	0	0	0	0	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		0.12	0.04	0.40	0.04	0.51	0.49	0.29

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 22 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 6: Waterdown Road & Railway Road/Masonry Court



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	0	5	15	0	290	10	955	40	245	700	15
Future Volume (vph)	15	0	5	15	0	290	10	955	40	245	700	15
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1060		1572	1615		1118	3417		1694	3383	
Flt Permitted		0.35		0.74	1.00		0.36	1.00		0.21	1.00	
Satd. Flow (perm)		384		1230	1615		427	3417		367	3383	
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)	16	0	5	16	0	309	11	1016	43	261	745	16
RTOR Reduction (vph)	0	19	0	0	278	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	2	0	16	31	0	11	1057	0	261	760	0
Confl. Peds. (#/hr)									5	5		
Heavy Vehicles (%)	88%	0%	0%	11%	0%	0%	56%	4%	0%	3%	5%	71%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.1		9.1	9.1		59.3	59.3		77.9	77.9	
Effective Green, g (s)		10.1		10.1	10.1		60.3	60.3		78.9	78.9	
Actuated g/C Ratio		0.10		0.10	0.10		0.60	0.60		0.79	0.79	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		38		124	163		257	2060		509	2669	
v/s Ratio Prot					c0.02			c0.31		c0.08	0.22	
v/s Ratio Perm		0.01		0.01			0.03			0.32		
v/c Ratio		0.06		0.13	0.19		0.04	0.51		0.51	0.28	
Uniform Delay, d1		40.6		40.9	41.2		8.1	11.4		5.0	2.9	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.43	1.50	
Incremental Delay, d2		0.6		0.5	0.6		0.3	0.9		0.8	0.2	
Delay (s)		41.3		41.4	41.8		8.4	12.3		8.0	4.6	
Level of Service		D		D	D		A	B		A	A	
Approach Delay (s)		41.3			41.8			12.3			5.4	
Approach LOS		D			D			B			A	

Intersection Summary

HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.47			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	71.7%	ICU Level of Service	C	
Analysis Period (min)	15			

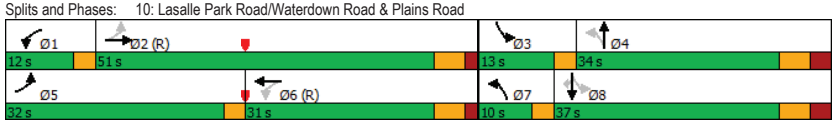
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	500	780	75	330	75	205	265	210	250
Future Volume (vph)	500	780	75	330	75	205	265	210	250
Lane Group Flow (vph)	532	963	80	633	80	277	282	223	266
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	6.0	8.0	6.0	8.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	27.0	9.0	27.0	9.0	34.0	9.0	34.0	34.0
Total Split (s)	32.0	51.0	12.0	31.0	10.0	34.0	13.0	37.0	37.0
Total Split (%)	29.1%	46.4%	10.9%	28.2%	9.1%	30.9%	11.8%	33.6%	33.6%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	3.0	0.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	5.0	2.0	5.0	2.0	6.0	2.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
v/c Ratio	0.91	0.59	0.30	0.72	0.20	0.75	0.84	0.46	0.46
Control Delay	46.6	23.8	17.4	33.4	22.9	52.1	50.5	37.4	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	23.8	17.4	33.4	22.9	52.1	50.5	37.4	6.6
Queue Length 50th (m)	92.0	83.6	7.6	53.0	11.4	56.6	46.6	43.5	0.0
Queue Length 95th (m)	#171.1	112.4	15.5	72.3	21.2	81.8	#90.6	65.0	19.6
Internal Link Dist (m)		134.8		133.0		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	586	1626	289	925	400	461	335	516	602
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.59	0.28	0.68	0.20	0.60	0.84	0.43	0.44

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Lasalle Park Road/Waterdown Road & Plains Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	500	780	125	75	330	265	75	205	55	265	210	250
Future Volume (vph)	500	780	125	75	330	265	75	205	55	265	210	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.93		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1677	3411		1675	3162		1723	1779		1613	1810	1446
Flt Permitted	0.17	1.00		0.30	1.00		0.62	1.00		0.31	1.00	1.00
Satd. Flow (perm)	297	3411		524	3162		1123	1779		522	1810	1446
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)	532	830	133	80	351	282	80	218	59	282	223	266
RTOR Reduction (vph)	0	11	0	0	133	0	0	10	0	0	0	195
Lane Group Flow (vph)	532	952	0	80	500	0	80	267	0	282	223	71
Confl. Peds. (#/hr)	10		10	10		10	5		10	10		5
Confl. Bikes (#/hr)			10			5						
Heavy Vehicles (%)	4%	3%	2%	4%	5%	5%	1%	2%	6%	8%	5%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	59.4	49.9		30.9	24.4		27.9	21.8		37.6	28.5	28.5
Effective Green, g (s)	60.4	50.9		32.9	25.4		29.9	22.8		38.6	29.5	29.5
Actuated g/C Ratio	0.55	0.46		0.30	0.23		0.27	0.21		0.35	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	577	1578		235	730		343	368		320	485	387
v/s Ratio Prot	c0.28	0.28		0.02	c0.16		0.02	c0.15		c0.11	0.12	
v/s Ratio Perm	0.23			0.08			0.05			0.20		0.05
v/c Ratio	0.92	0.60		0.34	0.68		0.23	0.73		0.88	0.46	0.18
Uniform Delay, d1	27.3	22.0		28.4	38.6		30.6	40.7		29.9	33.6	31.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	20.4	1.7		0.9	5.2		0.4	7.0		23.4	0.7	0.2
Delay (s)	47.7	23.7		29.2	43.8		30.9	47.7		53.4	34.3	31.2
Level of Service	D	C		C	D		C	D		D	C	C
Approach Delay (s)		32.3			42.2			43.9			40.2	
Approach LOS		C			D			D			D	

Intersection Summary

HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	93.0%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	332	505	179	637	1042	121	768
v/c Ratio	0.58	0.79	0.27	1.21	0.69	0.42	0.76
Control Delay	34.4	43.1	5.0	132.9	26.9	17.1	38.5
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	34.4	43.1	5.0	132.9	27.1	17.1	38.5
Queue Length 50th (m)	59.4	99.2	0.0	~159.9	112.0	12.3	78.5
Queue Length 95th (m)	93.9	#159.7	15.5	#227.8	118.9	19.8	90.8
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	575	639	653	526	1723	288	1417
Starvation Cap Reductn	0	0	0	0	139	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	0.58	0.79	0.27	1.21	0.66	0.42	0.54

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	315	480	170	605	730	260	115	550	180
Future Volume (vph)	0	0	0	315	480	170	605	730	260	115	550	180
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)				7.0	7.0	7.0	0.5	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	1694	3379		1728	3393	
Flt Permitted				0.95	1.00	1.00	0.19	1.00		0.24	1.00	
Satd. Flow (perm)				1694	1881	1575	330	3379		434	3393	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	332	505	179	637	768	274	121	579	189
RTOR Reduction (vph)	0	0	0	0	0	118	0	37	0	0	35	0
Lane Group Flow (vph)	0	0	0	332	505	61	637	1005	0	121	733	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				36.4	36.4	36.4	57.6	46.6		38.4	30.4	
Effective Green, g (s)				37.4	37.4	37.4	60.1	47.6		40.4	31.4	
Actuated g/C Ratio				0.34	0.34	0.34	0.55	0.43		0.37	0.29	
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)				575	639	535	511	1462		265	968	
v/s Ratio Prot				0.20	c0.27		c0.30	0.30		0.04	c0.22	
v/s Ratio Perm						0.04	0.38			0.13		
v/c Ratio				0.58	0.79	0.11	1.25	0.69		0.46	0.76	
Uniform Delay, d1				29.8	32.8	24.9	27.6	25.2		23.8	35.8	
Progression Factor				1.00	1.00	1.00	0.83	1.02		1.00	1.00	
Incremental Delay, d2				1.4	6.6	0.1	124.1	2.2		1.2	5.5	
Delay (s)				31.2	39.4	25.0	146.9	28.0		25.0	41.3	
Level of Service				C	D	C	F	C		C	D	
Approach Delay (s)		0.0			34.2			73.1			39.1	
Approach LOS		A			C			E			D	

Intersection Summary

HCM 2000 Control Delay	53.6	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)	16.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	383	309	1388	920
v/c Ratio	0.67	0.67	0.56	0.37
Control Delay	47.4	20.6	13.2	8.0
Queue Delay	0.0	0.3	0.5	0.3
Total Delay	47.4	20.9	13.7	8.3
Queue Length 50th (m)	42.2	19.0	81.6	47.7
Queue Length 95th (m)	54.1	46.7	m86.3	57.2
Internal Link Dist (m)			174.0	121.9
Turn Bay Length (m)	145.0	115.0		
Base Capacity (vph)	619	478	2482	2482
Starvation Cap Reductn	0	0	599	891
Spillback Cap Reductn	0	16	278	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.62	0.67	0.74	0.58

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)	0	0	0	360	0	290	0	1305	0	0	865	0
Future Volume (vph)	0	0	0	360	0	290	0	1305	0	0	865	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)				6.0		6.0		6.0			6.0	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frpb, ped/bikes				1.00		1.00		1.00			1.00	
Flpb, ped/bikes				1.00		1.00		1.00			1.00	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3134		1551		3505			3505	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3134		1551		3505			3505	
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)	0	0	0	383	0	309	0	1388	0	0	920	0
RTOR Reduction (vph)	0	0	0	0	0	175	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	383	0	134	0	1388	0	0	920	0
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)									1			2
Heavy Vehicles (%)	0%	0%	0%	8%	100%	3%	0%	3%	0%	0%	3%	0%
Turn Type				Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)				19.1		19.1		76.9			76.9	
Effective Green, g (s)				20.1		20.1		77.9			77.9	
Actuated g/C Ratio				0.18		0.18		0.71			0.71	
Clearance Time (s)				7.0		7.0		7.0			7.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				572		283		2482			2482	
v/s Ratio Prot				c0.12		0.09		c0.40			0.26	
v/s Ratio Perm												
v/c Ratio				0.67		0.47		0.56			0.37	
Uniform Delay, d1				41.9		40.2		7.8			6.4	
Progression Factor				1.00		1.00		1.51			1.11	
Incremental Delay, d2				3.0		1.3		0.5			0.4	
Delay (s)				44.8		41.5		12.1			7.4	
Level of Service				D		D		B			A	
Approach Delay (s)		0.0			43.3			12.1			7.4	
Approach LOS		A			D			B			A	

Intersection Summary

HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	232	162	338	56	288	1253	364	874
v/c Ratio	0.76	0.48	0.74	0.18	0.71	1.03	1.00	0.47
Control Delay	58.8	45.0	24.8	46.3	15.5	63.2	83.4	24.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.8	45.0	24.8	46.3	15.5	63.2	83.4	24.7
Queue Length 50th (m)	48.6	32.1	23.2	6.2	0.0	~153.7	~84.3	80.7
Queue Length 95th (m)	#87.4	55.0	#60.2	11.9	25.7	#198.2	#141.2	104.0
Internal Link Dist (m)		253.6				249.5		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	326	358	474	431	458	1220	365	1871
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	0.71	0.45	0.71	0.13	0.63	1.03	1.00	0.47

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)	230	160	335	55	0	285	0	790	450	360	865	0
Future Volume (vph)	230	160	335	55	0	285	0	790	450	360	865	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00		1.00		1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00		0.85		0.95		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)	1678	1845	1521	3164		1536		3320		1678	3471	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.10	1.00	
Satd. Flow (perm)	1678	1845	1521	3164		1536		3320		177	3471	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	232	162	338	56	0	288	0	798	455	364	874	0
RTOR Reduction (vph)	0	0	181	0	0	260	0	73	0	0	0	0
Lane Group Flow (vph)	232	162	157	56	0	28	0	1180	0	364	874	0
Confl. Peds. (#/hr)			5	5			4					4
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	3%	3%	7%	0%	4%	0%	1%	6%	4%	4%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	19.1	19.1	19.1	9.6		9.6		37.0		58.3	58.3	
Effective Green, g (s)	20.1	20.1	20.1	10.6		10.6		38.0		59.3	59.3	
Actuated g/C Ratio	0.18	0.18	0.18	0.10		0.10		0.35		0.54	0.54	
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)	306	337	277	304		148		1146		358	1871	
v/s Ratio Prot	c0.14	0.09		0.02		c0.02		c0.36		c0.18	0.25	
v/s Ratio Perm			0.10							0.37		
v/c Ratio	0.76	0.48	0.57	0.18		0.19		1.03		1.02	0.47	
Uniform Delay, d1	42.6	40.3	41.0	45.7		45.7		36.0		34.1	15.6	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.94		1.32	1.45	
Incremental Delay, d2	10.3	1.1	2.6	0.3		0.6		33.4		49.7	0.8	
Delay (s)	52.9	41.4	43.6	46.0		46.4		67.2		94.9	23.4	
Level of Service	D	D	D	D		D		E		F	C	
Approach Delay (s)		46.1			46.3			67.2			44.4	
Approach LOS		D			D			E			D	

Intersection Summary

HCM 2000 Control Delay	53.0	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)	22.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	760	26	218
v/c Ratio	0.79	0.03	0.53
Control Delay	18.8	3.1	23.7
Queue Delay	0.0	0.0	0.0
Total Delay	18.8	3.1	23.7
Queue Length 50th (m)	54.8	0.0	19.8
Queue Length 95th (m)	#139.0	2.9	36.7
Internal Link Dist (m)	190.8		55.4
Turn Bay Length (m)			
Base Capacity (vph)	965	939	1149
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.79	0.03	0.19

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)	730	25	175	35	0	0
Future Volume (vph)	730	25	175	35	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)	5.0	5.0		6.0		
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)	1662	1597		1824		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1662	1597		1824		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	760	26	182	36	0	0
RTOR Reduction (vph)	0	11	0	0	0	0
Lane Group Flow (vph)	760	15	0	218	0	0
Heavy Vehicles (%)	5%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	32.3	32.3		12.0		
Effective Green, g (s)	33.3	33.3		13.0		
Actuated g/C Ratio	0.58	0.58		0.23		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	965	928		413		
v/s Ratio Prot	c0.46			c0.12		
v/s Ratio Perm		0.01				
v/c Ratio	0.79	0.02		0.53		
Uniform Delay, d1	9.3	5.1		19.5		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	4.3	0.0		1.2		
Delay (s)	13.6	5.1		20.7		
Level of Service	B	A		C		
Approach Delay (s)	13.3			20.7	0.0	
Approach LOS	B			C	A	

Intersection Summary

HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	11.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	100	1140	25	0	1255
Future Volume (Veh/h)	0	100	1140	25	0	1255
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	109	1239	27	0	1364
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			104			273
pX, platoon unblocked	0.92	0.87			0.87	
vC, conflicting volume	1934	633			1266	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1179	267			998	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	83			100	
cM capacity (veh/h)	168	633			597	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	109	826	440	682	682
Volume Left	0	0	0	0	0
Volume Right	109	0	27	0	0
cSH	633	1700	1700	1700	1700
Volume to Capacity	0.17	0.49	0.26	0.40	0.40
Queue Length 95th (m)	4.9	0.0	0.0	0.0	0.0
Control Delay (s)	11.9	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.9	0.0		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		45.2%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	31	402	10	810	392	902
v/c Ratio	0.21	0.18	0.80	0.04	0.43	0.62	0.33
Control Delay	4.9	41.6	21.1	11.3	10.9	11.9	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	41.6	21.1	11.3	10.9	11.9	8.4
Queue Length 50th (m)	0.0	6.5	13.2	0.6	40.7	26.9	44.3
Queue Length 95th (m)	0.0	14.0	44.4	m1.1	m70.4	85.7	93.6
Internal Link Dist (m)	95.0		120.3		324.2		79.9
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	125	321	631	249	1965	641	2697
Starvation Cap Reductn	0	0	0	0	0	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	0.16	0.10	0.64	0.04	0.41	0.61	0.33

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

HCM Signalized Intersection Capacity Analysis — Future Total (No South Parking Lot)
6: Waterdown Road & Railway Road/Masonry Court — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	10	30	0	390	10	765	20	380	865	10
Future Volume (vph)	10	0	10	30	0	390	10	765	20	380	865	10
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.85		1.00	1.00		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1573		1740	1575		1308	3424		1709	3504	
Flt Permitted		0.21		0.74	1.00		0.32	1.00		0.28	1.00	
Satd. Flow (perm)		338		1363	1575		435	3424		502	3504	
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)	10	0	10	31	0	402	10	789	21	392	892	10
RTOR Reduction (vph)	0	17	0	0	296	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	3	0	31	106	0	10	809	0	392	902	0
Confl. Peds. (#/hr)	2		2	2		2	5		6	6		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	18%	0%	0%	0%	0%	1%	33%	4%	0%	2%	2%	75%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.3		13.3	13.3		60.1	60.1		83.7	83.7	
Effective Green, g (s)		14.3		14.3	14.3		61.1	61.1		84.7	84.7	
Actuated g/C Ratio		0.13		0.13	0.13		0.56	0.56		0.77	0.77	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		43		177	204		241	1901		623	2698	
v/s Ratio Prot					c0.07			c0.24		c0.12	0.26	
v/s Ratio Perm		0.01		0.02			0.02			0.36		
v/c Ratio		0.06		0.18	0.52		0.04	0.43		0.63	0.33	
Uniform Delay, d1		42.0		42.6	44.7		11.1	14.2		5.6	3.9	
Progression Factor		1.00		1.00	1.00		0.66	0.65		1.82	1.76	
Incremental Delay, d2		0.6		0.5	2.4		0.1	0.3		1.8	0.3	
Delay (s)		42.6		43.1	47.0		7.5	9.6		11.9	7.2	
Level of Service		D		D	D		A	A		B	A	
Approach Delay (s)		42.6			46.8			9.5			8.6	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.48			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	82.1%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis — Future Total (No South Parking Lot)
7: — PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	40	205	40	20	0
Future Volume (Veh/h)	0	40	205	40	20	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	43	223	43	22	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	511	22	22			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	511	22	22			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	86			
cM capacity (veh/h)	449	1055	1593			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	266	22
Volume Left	0	223	0
Volume Right	43	0	0
cSH	1055	1593	1700
Volume to Capacity	0.04	0.14	0.01
Queue Length 95th (m)	1.0	3.9	0.0
Control Delay (s)	8.6	6.6	0.0
Lane LOS	A	A	
Approach Delay (s)	8.6	6.6	0.0
Approach LOS	A		

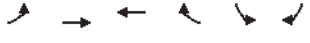
Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	30.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	95	50	45	250	0	105	75	35	5	30	25
Future Volume (Veh/h)	170	95	50	45	250	0	105	75	35	5	30	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.89	0.89	0.89	0.89	0.92	0.89	0.92	0.89	0.92	0.92	0.92
Hourly flow rate (vph)	185	107	56	51	281	0	118	82	39	5	33	27
Pedestrians					15							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	281			163			932	888	150	983	916	281
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	281			104			906	861	91	960	890	281
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	86			96			34	65	96	96	85	96
cM capacity (veh/h)	1282			1437			180	232	920	136	223	758

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	348	332	239	65
Volume Left	185	51	118	5
Volume Right	56	0	39	27
cSH	1282	1437	227	295
Volume to Capacity	0.14	0.04	1.05	0.22
Queue Length 95th (m)	4.0	0.9	82.0	6.6
Control Delay (s)	5.0	1.4	120.2	20.6
Lane LOS	A	A	F	C
Approach Delay (s)	5.0	1.4	120.2	20.6
Approach LOS			F	C

Intersection Summary				
Average Delay	32.8			
Intersection Capacity Utilization	61.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	135	295	0	0	0
Future Volume (Veh/h)	0	135	295	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	147	321	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)		280				
pX, platoon unblocked						
vC, conflicting volume	321				468	321
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	321				468	321
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)	1239				553	720

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	147	321	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1239	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	18.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	211	613	72	1361	113	309	371	222	314
v/c Ratio	0.78	0.39	0.17	1.01	0.31	0.93	1.03	0.43	0.49
Control Delay	43.3	20.9	6.9	51.7	24.7	77.3	89.8	40.9	19.3
Queue Delay	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.3	20.9	6.9	56.7	24.7	77.3	89.8	40.9	19.3
Queue Length 50th (m)	29.8	47.2	2.4	~173.1	16.2	67.1	~78.9	47.2	30.0
Queue Length 95th (m)	#62.0	64.4	m4.6	#213.3	28.9	#121.2	#134.0	69.3	64.1
Internal Link Dist (m)		134.8		136.1		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	298	1587	522	1344	364	334	361	518	635
Starvation Cap Reductn	0	0	0	21	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.39	0.14	1.03	0.31	0.93	1.03	0.43	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.

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)	205	530	65	70	970	350	110	235	65	360	215	305
Future Volume (vph)	205	530	65	70	970	350	110	235	65	360	215	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1616	3468		1640	3356		1694	1789		1710	1900	1491
Flt Permitted	0.09	1.00		0.40	1.00		0.62	1.00		0.19	1.00	1.00
Satd. Flow (perm)	151	3468		696	3356		1105	1789		344	1900	1491
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)	211	546	67	72	1000	361	113	242	67	371	222	314
RTOR Reduction (vph)	0	8	0	0	32	0	0	9	0	0	0	228
Lane Group Flow (vph)	211	605	0	72	1329	0	113	300	0	371	222	86
Confl. Peds. (#/hr)	5		10	10		5			5	5		
Confl. Bikes (#/hr)			10			15						5
Heavy Vehicles (%)	8%	2%	0%	6%	2%	4%	3%	3%	0%	2%	0%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	58.0	48.5		48.5	42.0		26.0	19.0		39.0	29.0	29.0
Effective Green, g (s)	59.0	49.5		50.5	43.0		28.0	20.0		40.0	30.0	30.0
Actuated g/C Ratio	0.54	0.45		0.46	0.39		0.25	0.18		0.36	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	267	1560		383	1311		324	325		348	518	406
v/s Ratio Prot	c0.10	0.17		0.01	c0.40		0.03	c0.17		c0.17	0.12	
v/s Ratio Perm	0.32			0.07			0.06			0.21		0.06
v/c Ratio	0.79	0.39		0.19	1.01		0.35	0.92		1.07	0.43	0.21
Uniform Delay, d1	29.1	20.2		16.8	33.5		32.7	44.2		29.6	32.9	30.9
Progression Factor	1.00	1.00		0.55	0.79		1.00	1.00		1.33	1.15	4.47
Incremental Delay, d2	14.6	0.7		0.2	25.0		0.7	30.7		65.9	0.6	0.3
Delay (s)	43.8	20.9		9.4	51.5		33.4	75.0		105.3	38.4	138.3
Level of Service	D	C		A	D		C	E		F	D	F
Approach Delay (s)		26.7			49.3			63.8			100.4	
Approach LOS		C			D			E			F	

Intersection Summary				
HCM 2000 Control Delay	58.8	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)	15.0	
Intersection Capacity Utilization	102.6%	ICU Level of Service	G	
Analysis Period (min)	15			

c Critical Lane Group



Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	72	856	1443	211
v/c Ratio	0.27	0.35	0.68	0.70
Control Delay	6.7	5.2	16.2	47.4
Queue Delay	0.0	0.2	1.1	0.0
Total Delay	6.7	5.4	17.3	47.4
Queue Length 50th (m)	1.6	16.6	103.5	39.5
Queue Length 95th (m)	m8.7	m50.6	162.4	62.8
Internal Link Dist (m)		136.1	132.2	314.3
Turn Bay Length (m)	60.0			
Base Capacity (vph)	348	2425	2115	403
Starvation Cap Reductn	0	649	0	0
Spillback Cap Reductn	0	0	402	3
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.21	0.48	0.84	0.53

Intersection Summary

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	830	1270	130	130	75
Future Volume (vph)	70	830	1270	130	130	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	3374	3276		1628	
Flt Permitted	0.12	1.00	1.00		0.97	
Satd. Flow (perm)	214	3374	3276		1628	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	72	856	1309	134	134	77
RTOR Reduction (vph)	0	0	5	0	21	0
Lane Group Flow (vph)	72	856	1438	0	190	0
Confl. Peds. (#/hr)	10			10		
Confl. Bikes (#/hr)				10		
Heavy Vehicles (%)	7%	7%	7%	5%	9%	5%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	78.1	78.1	69.3		17.9	
Effective Green, g (s)	79.1	79.1	70.3		18.9	
Actuated g/C Ratio	0.72	0.72	0.64		0.17	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	244	2426	2093		279	
v/s Ratio Prot	0.02	c0.25	c0.44			
v/s Ratio Perm	0.19				c0.12	
v/c Ratio	0.30	0.35	0.69		0.68	
Uniform Delay, d1	8.2	5.8	12.8		42.7	
Progression Factor	1.11	0.76	1.00		0.94	
Incremental Delay, d2	0.5	0.3	1.9		6.7	
Delay (s)	9.5	4.7	14.6		46.8	
Level of Service	A	A	B		D	
Approach Delay (s)		5.1	14.6		46.8	
Approach LOS		A	B		D	

Intersection Summary

HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	1142	388	18
v/c Ratio	0.35	0.12	0.07
Control Delay	1.9	1.4	16.1
Queue Delay	0.0	0.0	0.0
Total Delay	1.9	1.4	16.1
Queue Length 50th (m)	0.0	0.0	0.6
Queue Length 95th (m)	39.2	11.6	6.3
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	2989	3098	433
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.38	0.13	0.04

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	950	20	0	330	10	5
Future Volume (vph)	950	20	0	330	10	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	0.95	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	3481			3610	1018	
Flt Permitted	1.00			1.00	0.97	
Satd. Flow (perm)	3481			3610	1018	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1118	24	0	388	12	6
RTOR Reduction (vph)	2	0	0	0	6	0
Lane Group Flow (vph)	1140	0	0	388	12	0
Heavy Vehicles (%)	2%	67%	0%	0%	100%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	31.3			31.3	1.1	
Effective Green, g (s)	32.3			32.3	2.1	
Actuated g/C Ratio	0.70			0.70	0.05	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2423			2512	46	
v/s Ratio Prot	c0.33			0.11	c0.01	
v/s Ratio Perm						
v/c Ratio	0.47			0.15	0.27	
Uniform Delay, d1	3.2			2.4	21.4	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.1			0.0	3.1	
Delay (s)	3.3			2.4	24.5	
Level of Service	A			A	C	
Approach Delay (s)	3.3			2.4	24.5	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.4	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.46			
Actuated Cycle Length (s)	46.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	43.6%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	332	505	179	637	1042	121	768
v/c Ratio	0.72	0.98	0.32	0.97	0.60	0.44	0.92
Control Delay	46.3	76.8	6.3	52.2	23.4	19.1	56.9
Queue Delay	0.0	0.0	0.0	3.4	0.3	0.0	0.0
Total Delay	46.3	76.8	6.3	55.6	23.7	19.1	56.9
Queue Length 50th (m)	68.0	113.5	0.0	134.6	113.7	9.6	87.0
Queue Length 95th (m)	101.7	#182.6	16.8	#190.0	110.0	16.8	#127.4
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	462	513	559	674	1732	282	834
Starvation Cap Reductn	0	0	0	17	228	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	0.72	0.98	0.32	0.97	0.69	0.43	0.92

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	315	480	170	605	730	260	115	550	180
Future Volume (vph)	0	0	0	315	480	170	605	730	260	115	550	180
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)				7.0	7.0	7.0	2.0	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	1694	3379		1728	3393	
Flt Permitted				0.95	1.00	1.00	0.14	1.00		0.27	1.00	
Satd. Flow (perm)				1694	1881	1575	254	3379		500	3393	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	332	505	179	637	768	274	121	579	189
RTOR Reduction (vph)	0	0	0	0	0	130	0	32	0	0	28	0
Lane Group Flow (vph)	0	0	0	332	505	49	637	1010	0	121	740	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				29.0	29.0	29.0	65.0	54.3		32.8	25.1	
Effective Green, g (s)				30.0	30.0	30.0	66.0	55.3		34.8	26.1	
Actuated g/C Ratio				0.27	0.27	0.27	0.60	0.50		0.32	0.24	
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)				462	513	429	648	1698		255	805	
v/s Ratio Prot				0.20	c0.27		c0.34	0.30		0.04	c0.22	
v/s Ratio Perm						0.03	0.25			0.11		
v/c Ratio				0.72	0.98	0.11	0.98	0.59		0.47	0.92	
Uniform Delay, d1				36.2	39.8	30.0	28.9	19.4		27.6	40.9	
Progression Factor				1.00	1.00	1.00	1.01	1.20		1.00	1.00	
Incremental Delay, d2				5.3	35.4	0.1	27.7	1.3		1.4	17.2	
Delay (s)				41.5	75.2	30.1	56.9	24.5		29.0	58.1	
Level of Service				D	E	C	E	C		C	E	
Approach Delay (s)		0.0			56.2			36.8			54.2	
Approach LOS		A			E			D			D	

Intersection Summary

HCM 2000 Control Delay	46.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	232	162	338	56	288	798	455	364	874
v/c Ratio	0.76	0.48	0.76	0.19	0.71	0.61	0.54	0.80	0.46
Control Delay	59.6	45.5	28.0	47.1	16.1	25.8	7.4	42.0	26.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.6	45.5	28.0	47.1	16.1	25.8	7.4	42.0	26.3
Queue Length 50th (m)	48.1	31.7	26.3	6.2	0.0	85.0	23.9	75.7	93.4
Queue Length 95th (m)	#94.6	56.3	#75.0	12.2	26.4	107.0	28.4	#108.7	95.3
Internal Link Dist (m)		253.6				249.5			174.0
Turn Bay Length (m)	135.0			100.0				40.0	
Base Capacity (vph)	312	343	452	373	435	1356	860	465	1914
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.47	0.75	0.15	0.66	0.59	0.53	0.78	0.46

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)	230	160	335	55	0	285	0	790	450	360	865	0
Future Volume (vph)	230	160	335	55	0	285	0	790	450	360	865	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0	6.0	0.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00		1.00		1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1678	1845	1521	3164		1536		3574	1524	1678	3471	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.22	1.00	
Satd. Flow (perm)	1678	1845	1521	3164		1536		3574	1524	389	3471	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	232	162	338	56	0	288	0	798	455	364	874	0
RTOR Reduction (vph)	0	0	170	0	0	261	0	0	288	0	0	0
Lane Group Flow (vph)	232	162	168	56	0	27	0	798	167	364	874	0
Confl. Peds. (#/hr)			5	5			4					4
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	3%	3%	7%	0%	4%	0%	1%	6%	4%	4%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA	Perm	pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	19.0	19.0	19.0	9.2		9.2		39.3	39.3	58.8	58.8	
Effective Green, g (s)	20.0	20.0	20.0	10.2		10.2		40.3	40.3	61.3	59.8	
Actuated g/C Ratio	0.18	0.18	0.18	0.09		0.09		0.37	0.37	0.56	0.54	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0	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	3.0	
Lane Grp Cap (vph)	305	335	276	293		142		1309	558	439	1886	
v/s Ratio Prot	c0.14	0.09		c0.02		0.02		c0.22		c0.14	0.25	
v/s Ratio Perm			0.11						0.11	0.32		
v/c Ratio	0.76	0.48	0.61	0.19		0.19		0.61	0.30	0.83	0.46	
Uniform Delay, d1	42.7	40.4	41.4	46.1		46.1		28.4	24.8	16.5	15.3	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.81	1.99	2.00	1.61	
Incremental Delay, d2	10.7	1.1	3.8	0.3		0.6		2.0	1.3	11.3	0.7	
Delay (s)	53.4	41.5	45.2	46.4		46.7		24.9	50.5	44.2	25.4	
Level of Service	D	D	D	D		D		C	D	D	C	
Approach Delay (s)		46.9			46.7			34.2			30.9	
Approach LOS		D			D			C			C	

Intersection Summary

HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	31	402	10	810	392	902
v/c Ratio	0.21	0.18	0.80	0.04	0.43	0.62	0.33
Control Delay	4.9	41.6	21.1	11.4	11.0	14.4	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	41.6	21.1	11.4	11.0	14.4	11.3
Queue Length 50th (m)	0.0	6.5	13.2	0.6	39.0	56.8	70.1
Queue Length 95th (m)	0.0	14.0	44.4	m1.1	m74.5	76.2	87.8
Internal Link Dist (m)	95.0		120.3		324.2		79.9
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	125	321	631	249	1965	641	2697
Starvation Cap Reductn	0	0	0	0	0	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	0.16	0.10	0.64	0.04	0.41	0.61	0.33

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)	10	0	10	30	0	390	10	765	20	380	865	10
Future Volume (vph)	10	0	10	30	0	390	10	765	20	380	865	10
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.85		1.00	1.00		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1573		1740	1575		1308	3424		1709	3504	
Flt Permitted		0.21		0.74	1.00		0.32	1.00		0.28	1.00	
Satd. Flow (perm)		338		1363	1575		435	3424		502	3504	
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)	10	0	10	31	0	402	10	789	21	392	892	10
RTOR Reduction (vph)	0	17	0	0	296	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	3	0	31	106	0	10	809	0	392	902	0
Confl. Peds. (#/hr)	2		2	2		2	5		6	6		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	18%	0%	0%	0%	0%	1%	33%	4%	0%	2%	2%	75%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.3		13.3	13.3		60.1	60.1		83.7	83.7	
Effective Green, g (s)		14.3		14.3	14.3		61.1	61.1		84.7	84.7	
Actuated g/C Ratio		0.13		0.13	0.13		0.56	0.56		0.77	0.77	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		43		177	204		241	1901		623	2698	
v/s Ratio Prot					c0.07			c0.24		c0.12	0.26	
v/s Ratio Perm		0.01		0.02			0.02			0.36		
v/c Ratio		0.06		0.18	0.52		0.04	0.43		0.63	0.33	
Uniform Delay, d1		42.0		42.6	44.7		11.1	14.2		5.6	3.9	
Progression Factor		1.00		1.00	1.00		0.67	0.65		2.38	2.40	
Incremental Delay, d2		0.6		0.5	2.4		0.1	0.3		1.8	0.3	
Delay (s)		42.6		43.1	47.0		7.5	9.6		15.1	9.7	
Level of Service		D		D	D		A	A		B	A	
Approach Delay (s)		42.6			46.8			9.6			11.3	
Approach LOS		D			D			A			B	

Intersection Summary				
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.48			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	82.1%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Queues — Future Total (No South Parking Lot) - Improvements

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	211	613	72	1361	113	309	371	222	314
v/c Ratio	0.84	0.39	0.17	0.98	0.31	0.93	0.96	0.43	0.50
Control Delay	52.8	20.9	6.6	42.5	24.7	77.3	72.2	41.1	20.5
Queue Delay	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	20.9	6.6	47.3	24.7	77.3	72.2	41.1	20.5
Queue Length 50th (m)	30.8	47.2	2.4	155.1	16.2	67.1	78.0	48.0	34.0
Queue Length 95th (m)	#71.8	64.4	m4.6	#201.7	28.9	#121.2	#124.8	67.9	64.1
Internal Link Dist (m)		134.8		136.1		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	256	1587	519	1386	364	334	387	518	633
Starvation Cap Reductn	0	0	0	31	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.39	0.14	1.00	0.31	0.93	0.96	0.43	0.50

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.

HCM Signalized Intersection Capacity Analysis — Future Total (No South Parking Lot) - Improvements

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	530	65	70	970	350	110	235	65	360	215	305
Future Volume (vph)	205	530	65	70	970	350	110	235	65	360	215	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		1.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1616	3468		1640	3356		1694	1789		1710	1900	1491
Flt Permitted	0.09	1.00		0.39	1.00		0.62	1.00		0.22	1.00	1.00
Satd. Flow (perm)	147	3468		674	3356		1105	1789		391	1900	1491
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)	211	546	67	72	1000	361	113	242	67	371	222	314
RTOR Reduction (vph)	0	8	0	0	33	0	0	9	0	0	0	227
Lane Group Flow (vph)	211	605	0	72	1328	0	113	300	0	371	222	87
Confl. Peds. (#/hr)	5		10	10		5			5	5		
Confl. Bikes (#/hr)			10			15						5
Heavy Vehicles (%)	8%	2%	0%	6%	2%	4%	3%	3%	0%	2%	0%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	58.0	48.5		49.9	43.4		26.0	19.0		39.0	29.0	29.0
Effective Green, g (s)	59.0	49.5		51.9	44.4		28.0	20.0		41.0	30.0	30.0
Actuated g/C Ratio	0.54	0.45		0.47	0.40		0.25	0.18		0.37	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	247	1560		383	1354		324	325		373	518	406
v/s Ratio Prot	c0.10	0.17		0.01	c0.40		0.03	c0.17		c0.17	0.12	
v/s Ratio Perm	0.36			0.08			0.06			0.20		0.06
v/c Ratio	0.85	0.39		0.19	0.98		0.35	0.92		0.99	0.43	0.21
Uniform Delay, d1	30.2	20.2		16.1	32.4		32.7	44.2		29.0	32.9	30.9
Progression Factor	1.00	1.00		0.52	0.78		1.00	1.00		1.42	1.15	4.62
Incremental Delay, d2	23.8	0.7		0.2	17.2		0.7	30.7		44.0	0.6	0.3
Delay (s)	54.0	20.9		8.6	42.4		33.4	75.0		85.3	38.6	143.0
Level of Service	D	C		A	D		C	E		F	D	F
Approach Delay (s)		29.4			40.7			63.8			93.8	
Approach LOS		C			D			E			F	

Intersection Summary					
HCM 2000 Control Delay	54.3	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)	15.0		
Intersection Capacity Utilization	102.6%	ICU Level of Service	G		
Analysis Period (min)	15				

c Critical Lane Group

Queues — Future Background (With South Parking Lot)

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	103	93	57	412	912	170	810
v/c Ratio	0.51	0.41	0.21	0.72	0.43	0.34	0.42
Control Delay	48.7	44.4	5.2	23.7	7.4	5.6	13.7
Queue Delay	0.0	0.0	0.0	0.3	0.1	0.0	0.0
Total Delay	48.7	44.4	5.2	24.0	7.5	5.6	13.7
Queue Length 50th (m)	19.9	17.7	0.0	34.2	19.4	6.7	41.5
Queue Length 95th (m)	35.2	31.8	5.6	93.1	54.7	14.7	76.1
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	221	249	286	636	2113	685	1993
Starvation Cap Reductn	0	0	0	28	231	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	0.47	0.37	0.20	0.68	0.48	0.25	0.41

Intersection Summary

HCM Signalized Intersection Capacity Analysis — Future Background (With South Parking Lot)

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	90	55	400	385	500	165	600	185
Future Volume (vph)	0	0	0	100	90	55	400	385	500	165	600	185
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)				7.0	7.0	7.0	1.0	7.0		2.0	7.0	
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	0.92		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	1601	3194		1711	3414	
Flt Permitted				0.95	1.00	1.00	0.30	1.00		0.30	1.00	
Satd. Flow (perm)				1544	1743	1479	506	3194		535	3414	
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)	0	0	0	103	93	57	412	397	515	170	619	191
RTOR Reduction (vph)	0	0	0	0	0	50	0	178	0	0	26	0
Lane Group Flow (vph)	0	0	0	103	93	7	412	734	0	170	784	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				12.1	12.1	12.1	71.9	59.6		64.4	55.1	
Effective Green, g (s)				13.1	13.1	13.1	73.9	60.6		66.4	56.1	
Actuated g/C Ratio				0.13	0.13	0.13	0.74	0.61		0.66	0.56	
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)				202	228	193	546	1935		476	1915	
v/s Ratio Prot				c0.07	0.05		c0.12	0.23		0.04	c0.23	
v/s Ratio Perm						0.01	0.44			0.20		
v/c Ratio				0.51	0.41	0.04	0.75	0.38		0.36	0.41	
Uniform Delay, d1				40.5	39.9	38.0	5.6	10.1		6.3	12.5	
Progression Factor				1.00	1.00	1.00	3.82	1.26		1.00	1.00	
Incremental Delay, d2				2.0	1.2	0.1	5.2	0.5		0.5	0.6	
Delay (s)				42.5	41.1	38.0	26.5	13.2		6.8	13.2	
Level of Service				D	D	D	C	B		A	B	
Approach Delay (s)		0.0			41.0			17.4			12.1	
Approach LOS		A			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.48			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	66.3%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBT	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	5	422	182	1156	729
v/c Ratio	0.02	0.70	0.41	0.51	0.32
Control Delay	0.2	43.8	8.0	10.9	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.2	43.8	8.0	10.9	5.7
Queue Length 50th (m)	0.0	41.5	0.0	48.3	13.8
Queue Length 95th (m)	0.0	55.6	17.2	m46.5	38.2
Internal Link Dist (m)	106.5			174.0	121.9
Turn Bay Length (m)		145.0	115.0		
Base Capacity (vph)	233	675	470	2258	2279
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.02	0.63	0.39	0.51	0.32

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)	0	0	5	405	0	175	0	1110	0	0	700	0
Future Volume (vph)	0	0	5	405	0	175	0	1110	0	0	700	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)		6.0		6.0		6.0		6.0			6.0	
Lane Util. Factor		1.00		0.97		1.00		0.95			0.95	
Frt		0.86		1.00		0.85		1.00			1.00	
Flt Protected		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (prot)		984		3134		1521		3438			3471	
Flt Permitted		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (perm)		984		3134		1521		3438			3471	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	5	422	0	182	0	1156	0	0	729	0
RTOR Reduction (vph)	0	5	0	0	0	147	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	422	0	35	0	1156	0	0	729	0
Heavy Vehicles (%)	0%	0%	67%	8%	0%	5%	0%	5%	0%	0%	4%	0%
Turn Type		NA		Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)		1.6		18.3		18.3		59.1			59.1	
Effective Green, g (s)		2.6		19.3		19.3		60.1			60.1	
Actuated g/C Ratio		0.03		0.19		0.19		0.60			0.60	
Clearance Time (s)		7.0		7.0		7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)		25		604		293		2066			2086	
v/s Ratio Prot		c0.00		c0.13		0.02		c0.34			0.21	
v/s Ratio Perm												
v/c Ratio		0.01		0.70		0.12		0.56			0.35	
Uniform Delay, d1		47.4		37.6		33.3		12.0			10.1	
Progression Factor		1.00		1.00		1.00		1.02			0.60	
Incremental Delay, d2		0.1		3.5		0.2		0.1			0.4	
Delay (s)		47.5		41.2		33.5		12.3			6.5	
Level of Service		D		D		C		B			A	
Approach Delay (s)		47.5			38.9			12.3			6.5	
Approach LOS		D			D			B			A	

Intersection Summary					
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.57				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0		
Intersection Capacity Utilization	63.2%	ICU Level of Service	B		
Analysis Period (min)	15				

c Critical Lane Group

Queues — Future Background (With South Parking Lot)

3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	321	305	505	21	74	1432	400	768
v/c Ratio	0.76	0.66	0.85	0.08	0.27	1.31	1.03	0.46
Control Delay	47.2	40.8	29.6	42.6	2.3	162.2	82.4	19.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	40.8	29.6	42.6	2.3	162.2	82.4	19.4
Queue Length 50th (m)	59.0	54.3	42.7	2.0	0.0	~183.4	~91.0	74.3
Queue Length 95th (m)	90.6	83.0	#100.2	5.8	0.0	#219.1	#153.8	66.8
Internal Link Dist (m)		253.6				353.3		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	435	478	604	372	329	1091	387	1679
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	0.74	0.64	0.84	0.06	0.22	1.31	1.03	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.

HCM Signalized Intersection Capacity Analysis — Future Background (With South Parking Lot)

3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	290	480	20	0	70	0	735	625	380	730	0
Future Volume (vph)	305	290	480	20	0	70	0	735	625	380	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
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)	1694	1863	1521	2869		1439		3232		1662	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.14	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3232		238	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	305	505	21	0	74	0	774	658	400	768	0
RTOR Reduction (vph)	0	0	216	0	0	69	0	158	0	0	0	0
Lane Group Flow (vph)	321	305	289	21	0	5	0	1274	0	400	768	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	23.9	23.9	23.9	6.4		6.4		26.4		46.7	46.7	
Effective Green, g (s)	24.9	24.9	24.9	7.4		7.4		27.4		47.7	47.7	
Actuated g/C Ratio	0.25	0.25	0.25	0.07		0.07		0.27		0.48	0.48	
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)	421	463	378	212		106		885		374	1624	
v/s Ratio Prot	0.19	0.16		c0.01		0.00		c0.39		c0.20	0.23	
v/s Ratio Perm			c0.19							0.31		
v/c Ratio	0.76	0.66	0.76	0.10		0.05		1.44		1.07	0.47	
Uniform Delay, d1	34.8	33.7	34.8	43.2		43.0		36.3		29.0	17.7	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.38		1.04	1.01	
Incremental Delay, d2	8.0	3.4	8.9	0.2		0.2		202.2		64.4	0.9	
Delay (s)	42.8	37.1	43.7	43.4		43.2		216.1		94.7	18.8	
Level of Service	D	D	D	D		D		F		F	B	
Approach Delay (s)		41.7			43.3			216.1			44.7	
Approach LOS		D			D			F			D	

Intersection Summary					
HCM 2000 Control Delay	107.9	HCM 2000 Level of Service	F		
HCM 2000 Volume to Capacity ratio	1.00				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0		
Intersection Capacity Utilization	99.2%	ICU Level of Service	F		
Analysis Period (min)	15				

c Critical Lane Group

Queues
Future Background (With South Parking Lot)

4: GO Station Access/Highway 403 EB Off-Ramp & S Service Road
AM Peak Hour



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	1077	214	48
v/c Ratio	0.73	0.15	0.16
Control Delay	11.3	1.3	23.0
Queue Delay	0.0	0.0	0.0
Total Delay	11.3	1.3	23.0
Queue Length 50th (m)	0.0	0.0	4.0
Queue Length 95th (m)	#173.5	6.3	11.8
Internal Link Dist (m)	190.8		55.4
Turn Bay Length (m)			
Base Capacity (vph)	1472	1410	1221
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.73	0.15	0.04

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
Future Background (With South Parking Lot)

4: GO Station Access/Highway 403 EB Off-Ramp & S Service Road
AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	905	180	15	25	0	0
Future Volume (vph)	905	180	15	25	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)	5.0	5.0		6.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.98		
Satd. Flow (prot)	1694	1597		1865		
Flt Permitted	0.95	1.00		0.98		
Satd. Flow (perm)	1694	1597		1865		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	1077	214	18	30	0	0
RTOR Reduction (vph)	0	42	0	0	0	0
Lane Group Flow (vph)	1077	172	0	48	0	0
Heavy Vehicles (%)	3%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	44.0	44.0		3.0		
Effective Green, g (s)	45.0	45.0		4.0		
Actuated g/C Ratio	0.75	0.75		0.07		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	1270	1197		124		
v/s Ratio Prot	c0.64			c0.03		
v/s Ratio Perm		0.11				
v/c Ratio	0.85	0.14		0.39		
Uniform Delay, d1	5.2	2.1		26.8		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	5.5	0.1		2.0		
Delay (s)	10.6	2.2		28.8		
Level of Service	B	A		C		
Approach Delay (s)	9.2			28.8	0.0	
Approach LOS	A			C	A	

Intersection Summary

HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	21	426	11	1064	548	761
v/c Ratio	0.22	0.11	0.80	0.07	0.87	0.79	0.30
Control Delay	5.5	34.2	20.8	22.2	39.0	30.8	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.5	34.2	20.8	22.2	39.0	30.8	9.4
Queue Length 50th (m)	0.0	3.9	16.3	1.4	102.3	96.0	53.0
Queue Length 95th (m)	0.0	9.4	46.3	5.6	130.2 m	#173.3	m68.6
Internal Link Dist (m)	95.0		120.3		324.2		353.3
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	130	418	773	157	1266	694	2505
Starvation Cap Reductn	0	0	0	0	0	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	0.16	0.05	0.55	0.07	0.84	0.79	0.30

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)	15	0	5	20	0	400	10	945	55	515	700	15
Future Volume (vph)	15	0	5	20	0	400	10	945	55	515	700	15
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1060		1572	1615		1118	3410		1694	3383	
Flt Permitted		0.23		0.74	1.00		0.36	1.00		0.11	1.00	
Satd. Flow (perm)		259		1230	1615		427	3410		190	3383	
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)	16	0	5	21	0	426	11	1005	59	548	745	16
RTOR Reduction (vph)	0	18	0	0	289	0	0	5	0	0	1	0
Lane Group Flow (vph)	0	3	0	21	137	0	11	1059	0	548	760	0
Confl. Peds. (#/hr)									5	5		
Heavy Vehicles (%)	88%	0%	0%	11%	0%	0%	56%	4%	0%	3%	5%	71%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		14.0		14.0	14.0		34.6	34.6		73.0	73.0	
Effective Green, g (s)		15.0		15.0	15.0		35.6	35.6		74.0	74.0	
Actuated g/C Ratio		0.15		0.15	0.15		0.36	0.36		0.74	0.74	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		38		184	242		152	1213		688	2503	
v/s Ratio Prot					c0.08			c0.31		c0.29	0.22	
v/s Ratio Perm		0.01		0.02			0.03			0.30		
v/c Ratio		0.08		0.11	0.57		0.07	0.87		0.80	0.30	
Uniform Delay, d1		36.6		36.8	39.5		21.3	30.1		22.2	4.4	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.76	
Incremental Delay, d2		0.9		0.3	3.0		0.9	8.9		5.2	0.3	
Delay (s)		37.5		37.0	42.5		22.2	39.0		27.4	7.9	
Level of Service		D		D	D		C	D		C	A	
Approach Delay (s)		37.5			42.2			38.8			16.1	
Approach LOS		D			D			D			B	

Intersection Summary

HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis Future Background (With South Parking Lot)
8: Cooke Boulevard & Masonry Court AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	470	45	35	225	0	110	0	40	0	5	25
Future Volume (Veh/h)	5	470	45	35	225	0	110	0	40	0	5	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.82	0.82	0.82	0.82	0.92	0.82	0.92	0.82	0.92	0.92	0.92
Hourly flow rate (vph)	5	573	55	43	274	0	134	0	49	0	5	27
Pedestrians					5							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked				0.88			0.88	0.88	0.88	0.88	0.88	
vC, conflicting volume	274			628			1000	970	606	1024	998	274
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274			504			929	895	479	957	927	274
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			30	100	90	100	98	96
cM capacity (veh/h)	1289			938			192	233	515	180	223	765

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	633	317	183	32
Volume Left	5	43	134	0
Volume Right	55	0	49	27
cSH	1289	938	231	555
Volume to Capacity	0.00	0.05	0.79	0.06
Queue Length 95th (m)	0.1	1.2	46.4	1.5
Control Delay (s)	0.1	1.7	61.6	11.9
Lane LOS	A	A	F	B
Approach Delay (s)	0.1	1.7	61.6	11.9
Approach LOS			F	B

Intersection Summary				
Average Delay	10.5			
Intersection Capacity Utilization	Err%	ICU Level of Service	H	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis Future Background (With South Parking Lot)
9: Masonry Court AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	510	260	0	0	0
Future Volume (Veh/h)	0	510	260	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	554	283	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)		280				
pX, platoon unblocked					0.94	
vC, conflicting volume	283				837	283
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	283				795	283
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)	1279				335	756

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	554	283	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1279	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	30.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues — Future Background (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	548	957	80	611	80	277	282	223	271
v/c Ratio	0.92	0.59	0.30	0.72	0.20	0.75	0.83	0.46	0.46
Control Delay	48.3	23.9	17.7	33.6	22.7	52.1	48.8	37.2	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	23.9	17.7	33.6	22.7	52.1	48.8	37.2	6.5
Queue Length 50th (m)	97.4	83.8	7.7	50.6	11.3	56.6	46.0	43.1	0.0
Queue Length 95th (m)	#178.7	111.4	15.5	69.1	21.2	81.8	#90.6	65.0	19.9
Internal Link Dist (m)		134.8		133.0		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	596	1616	285	907	401	461	340	516	606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.59	0.28	0.67	0.20	0.60	0.83	0.43	0.45

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis — Future Background (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	515	775	125	75	320	255	75	205	55	265	210	255
Future Volume (vph)	515	775	125	75	320	255	75	205	55	265	210	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.93		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1677	3411		1675	3163		1723	1779		1613	1810	1446
Flt Permitted	0.17	1.00		0.30	1.00		0.62	1.00		0.31	1.00	1.00
Satd. Flow (perm)	301	3411		527	3163		1123	1779		522	1810	1446
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)	548	824	133	80	340	271	80	218	59	282	223	271
RTOR Reduction (vph)	0	11	0	0	133	0	0	10	0	0	0	198
Lane Group Flow (vph)	548	946	0	80	478	0	80	267	0	282	223	73
Confl. Peds. (#/hr)	10		10	10		10	5		10	10		5
Confl. Bikes (#/hr)			10			5						
Heavy Vehicles (%)	4%	3%	2%	4%	5%	5%	1%	2%	6%	8%	5%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	59.1	49.6		29.8	23.3		27.9	21.8		37.9	28.8	28.8
Effective Green, g (s)	60.1	50.6		31.8	24.3		29.9	22.8		38.9	29.8	29.8
Actuated g/C Ratio	0.55	0.46		0.29	0.22		0.27	0.21		0.35	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	587	1569		230	698		343	368		324	490	391
v/s Ratio Prot	c0.29	0.28		0.02	c0.15		0.02	c0.15		c0.11	0.12	
v/s Ratio Perm	0.22			0.08			0.05			0.20		0.05
v/c Ratio	0.93	0.60		0.35	0.68		0.23	0.73		0.87	0.46	0.19
Uniform Delay, d1	27.6	22.2		29.2	39.3		30.6	40.7		29.4	33.3	30.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.0	1.7		0.9	5.4		0.4	7.0		21.6	0.7	0.2
Delay (s)	49.6	23.9		30.1	44.7		30.9	47.7		51.0	34.0	31.0
Level of Service	D	C		C	D		C	D		D	C	C
Approach Delay (s)		33.3			43.0			43.9			39.2	
Approach LOS		C			D			D			D	

Intersection Summary					
HCM 2000 Control Delay	37.8	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.80				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0		
Intersection Capacity Utilization	93.2%	ICU Level of Service	F		
Analysis Period (min)	15				
c Critical Lane Group					



Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	100	1089	683	155
v/c Ratio	0.17	0.46	0.33	0.64
Control Delay	4.4	7.0	9.7	38.1
Queue Delay	0.0	0.5	0.0	0.0
Total Delay	4.4	7.5	9.7	38.1
Queue Length 50th (m)	4.1	40.9	30.4	24.7
Queue Length 95th (m)	10.8	68.8	52.5	m38.8
Internal Link Dist (m)		133.0	135.9	318.4
Turn Bay Length (m)	60.0			
Base Capacity (vph)	626	2378	2075	382
Starvation Cap Reductn	0	746	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.16	0.67	0.33	0.41

Intersection Summary

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	90	980	535	80	85	55
Future Volume (vph)	90	980	535	80	85	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.98		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	3282	3228		1380	
Flt Permitted	0.36	1.00	1.00		0.97	
Satd. Flow (perm)	642	3282	3228		1380	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	100	1089	594	89	94	61
RTOR Reduction (vph)	0	0	8	0	27	0
Lane Group Flow (vph)	100	1089	675	0	128	0
Heavy Vehicles (%)	7%	10%	9%	4%	36%	12%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	71.5	71.5	62.5		14.5	
Effective Green, g (s)	72.5	72.5	63.5		15.5	
Actuated g/C Ratio	0.72	0.72	0.64		0.16	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	538	2379	2049		213	
v/s Ratio Prot	0.01	c0.33	0.21			
v/s Ratio Perm	0.12				c0.09	
v/c Ratio	0.19	0.46	0.33		0.60	
Uniform Delay, d1	4.2	5.7	8.4		39.4	
Progression Factor	1.00	1.00	1.00		0.85	
Incremental Delay, d2	0.2	0.6	0.4		4.6	
Delay (s)	4.3	6.3	8.9		38.2	
Level of Service	A	A	A		D	
Approach Delay (s)		6.1	8.9		38.2	
Approach LOS		A	A		D	

Intersection Summary				
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	45.2%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	1335	77	15
v/c Ratio	0.41	0.02	0.07
Control Delay	2.1	1.5	19.9
Queue Delay	0.0	0.0	0.0
Total Delay	2.1	1.5	19.9
Queue Length 50th (m)	0.0	0.0	0.8
Queue Length 95th (m)	55.4	3.2	6.8
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3133	3163	373
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.43	0.02	0.04

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1280	15	0	75	15	0
Future Volume (vph)	1280	15	0	75	15	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3507			3539	943	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3507			3539	943	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1320	15	0	77	15	0
RTOR Reduction (vph)	1	0	0	0	0	0
Lane Group Flow (vph)	1334	0	0	77	15	0
Heavy Vehicles (%)	2%	71%	0%	2%	85%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	33.6			33.6	1.2	
Effective Green, g (s)	34.6			34.6	2.2	
Actuated g/C Ratio	0.71			0.71	0.05	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2486			2509	42	
v/s Ratio Prot	c0.38			0.02	c0.02	
v/s Ratio Perm						
v/c Ratio	0.54			0.03	0.36	
Uniform Delay, d1	3.3			2.1	22.6	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.2			0.0	5.1	
Delay (s)	3.6			2.1	27.8	
Level of Service	A			A	C	
Approach Delay (s)	3.6			2.1	27.8	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.53			
Actuated Cycle Length (s)	48.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	52.5%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Queues — Future Background (With South Parking Lot) - Improvements

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	103	93	57	412	912	170	810
v/c Ratio	0.50	0.40	0.21	0.40	0.45	0.33	0.39
Control Delay	48.2	44.0	5.1	6.1	9.1	5.0	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	48.2	44.0	5.1	6.1	9.2	5.0	10.7
Queue Length 50th (m)	19.9	17.7	0.0	8.1	15.4	6.8	37.8
Queue Length 95th (m)	35.0	31.6	5.5	33.2	69.7	15.0	61.3
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	509	575	546	1070	2041	529	2098
Starvation Cap Reductn	0	0	0	0	219	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	0.20	0.16	0.10	0.39	0.50	0.32	0.39

Intersection Summary

HCM Signalized Intersection Capacity Analysis — Future Background (With South Parking Lot) - Improvements

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	90	55	400	385	500	165	600	185
Future Volume (vph)	0	0	0	100	90	55	400	385	500	165	600	185
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)				7.0	7.0	7.0	1.0	7.0		2.0	7.0	
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	0.92		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	3105	3194		1711	3414	
Flt Permitted				0.95	1.00	1.00	0.33	1.00		0.26	1.00	
Satd. Flow (perm)				1544	1743	1479	1070	3194		472	3414	
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)	0	0	0	103	93	57	412	397	515	170	619	191
RTOR Reduction (vph)	0	0	0	0	0	49	0	158	0	0	19	0
Lane Group Flow (vph)	0	0	0	103	93	8	412	754	0	170	791	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				12.2	12.2	12.2	66.9	58.0		70.7	59.9	
Effective Green, g (s)				13.2	13.2	13.2	70.9	59.0		72.7	60.9	
Actuated g/C Ratio				0.13	0.13	0.13	0.71	0.59		0.73	0.61	
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)				203	230	195	980	1884		489	2079	
v/s Ratio Prot				c0.07	0.05		c0.05	0.24		c0.04	0.23	
v/s Ratio Perm						0.01	c0.25			0.21		
v/c Ratio				0.51	0.40	0.04	0.42	0.40		0.35	0.38	
Uniform Delay, d1				40.4	39.8	37.9	5.0	11.0		4.8	9.9	
Progression Factor				1.00	1.00	1.00	1.67	1.23		1.00	1.00	
Incremental Delay, d2				2.0	1.2	0.1	0.3	0.6		0.4	0.5	
Delay (s)				42.4	41.0	37.9	8.6	14.1		5.3	10.5	
Level of Service				D	D	D	A	B		A	B	
Approach Delay (s)		0.0			40.9			12.4			9.6	
Approach LOS		A			D			B			A	

Intersection Summary					
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.43				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	57.5%	ICU Level of Service		B	
Analysis Period (min)	15				

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	321	305	505	21	74	774	658	400	768
v/c Ratio	0.79	0.69	0.93	0.10	0.32	0.54	0.79	0.50	0.41
Control Delay	58.5	50.7	49.3	52.9	3.6	29.6	24.6	14.5	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.5	50.7	49.3	52.9	3.6	29.6	24.6	14.5	17.7
Queue Length 50th (m)	74.0	68.2	70.9	2.5	0.0	80.2	83.0	24.7	61.4
Queue Length 95th (m)	#125.6	103.6	#145.2	6.9	0.2	101.0	#157.5	31.8	73.3
Internal Link Dist (m)		253.6				353.3			174.0
Turn Bay Length (m)	135.0			100.0				40.0	
Base Capacity (vph)	410	451	546	215	233	1464	839	865	1916
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.68	0.92	0.10	0.32	0.53	0.78	0.46	0.40

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)	305	290	480	20	0	70	0	735	625	380	730	0
Future Volume (vph)	305	290	480	20	0	70	0	735	625	380	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0	6.0	0.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1694	1863	1521	2869		1439		3471	1553	3224	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.25	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3471	1553	842	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	305	505	21	0	74	0	774	658	400	768	0
RTOR Reduction (vph)	0	0	179	0	0	69	0	0	190	0	0	0
Lane Group Flow (vph)	321	305	326	21	0	5	0	774	468	400	768	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA	Perm	pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	27.7	27.7	27.7	6.4		6.4		47.3	47.3	62.9	62.9	
Effective Green, g (s)	28.7	28.7	28.7	7.4		7.4		48.3	48.3	65.4	63.9	
Actuated g/C Ratio	0.24	0.24	0.24	0.06		0.06		0.40	0.40	0.55	0.53	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0	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	3.0	
Lane Grp Cap (vph)	405	445	363	176		88		1397	625	758	1813	
v/s Ratio Prot	0.19	0.16		c0.01		0.00		0.22		c0.07	0.23	
v/s Ratio Perm			c0.21						c0.30	0.22		
v/c Ratio	0.79	0.69	0.90	0.12		0.05		0.55	0.75	0.53	0.42	
Uniform Delay, d1	42.9	41.5	44.2	53.2		53.0		27.6	30.7	15.7	16.9	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.2	4.3	23.8	0.3		0.2		1.6	8.0	0.7	0.7	
Delay (s)	53.1	45.9	68.0	53.5		53.2		29.2	38.7	16.3	17.7	
Level of Service	D	D	E	D		D		C	D	B	B	
Approach Delay (s)		57.8			53.3			33.5			17.2	
Approach LOS		E			D			C			B	

Intersection Summary				
HCM 2000 Control Delay	36.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.5	
Intersection Capacity Utilization	79.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	21	426	11	1064	548	761
v/c Ratio	0.22	0.15	0.75	0.08	0.92	0.70	0.29
Control Delay	5.2	40.3	12.4	24.2	44.7	23.5	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	40.3	12.4	24.2	44.7	23.5	3.9
Queue Length 50th (m)	0.0	4.0	0.0	1.4	101.7	68.6	16.0
Queue Length 95th (m)	0.0	10.3	24.8	6.1	#157.3	#137.3	35.9
Internal Link Dist (m)	95.0		120.3		324.2		353.3
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	158	418	836	144	1162	782	2626
Starvation Cap Reductn	0	0	0	0	0	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	0.13	0.05	0.51	0.08	0.92	0.70	0.29

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)	15	0	5	20	0	400	10	945	55	515	700	15
Future Volume (vph)	15	0	5	20	0	400	10	945	55	515	700	15
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1060		1572	1615		1118	3410		1694	3383	
Flt Permitted		0.31		0.74	1.00		0.36	1.00		0.11	1.00	
Satd. Flow (perm)		340		1230	1615		427	3410		198	3383	
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)	16	0	5	21	0	426	11	1005	59	548	745	16
RTOR Reduction (vph)	0	19	0	0	377	0	0	4	0	0	1	0
Lane Group Flow (vph)	0	2	0	21	49	0	11	1060	0	548	760	0
Confl. Peds. (#/hr)									5	5		
Heavy Vehicles (%)	88%	0%	0%	11%	0%	0%	56%	4%	0%	3%	5%	71%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.4		10.4	10.4		33.0	33.0		76.6	76.6	
Effective Green, g (s)		11.4		11.4	11.4		34.0	34.0		77.6	77.6	
Actuated g/C Ratio		0.11		0.11	0.11		0.34	0.34		0.78	0.78	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		38		140	184		145	1159		775	2625	
v/s Ratio Prot					c0.03			c0.31		c0.29	0.22	
v/s Ratio Perm		0.01		0.02			0.03			0.25		
v/c Ratio		0.06		0.15	0.26		0.08	0.91		0.71	0.29	
Uniform Delay, d1		39.5		39.9	40.5		22.4	31.6		18.5	3.2	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.7		0.5	0.8		1.0	12.5		3.0	0.3	
Delay (s)		40.2		40.4	41.2		23.4	44.2		21.4	3.5	
Level of Service		D		D	D		C	D		C	A	
Approach Delay (s)		40.2			41.2			43.9			11.0	
Approach LOS		D			D			D			B	

Intersection Summary

HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	548	957	80	611	80	277	282	223	271
v/c Ratio	0.92	0.59	0.30	0.72	0.20	0.75	0.83	0.46	0.46
Control Delay	48.3	23.9	17.7	33.6	22.7	52.1	48.8	37.2	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	23.9	17.7	33.6	22.7	52.1	48.8	37.2	6.5
Queue Length 50th (m)	97.4	83.8	7.7	50.6	11.3	56.6	46.0	43.1	0.0
Queue Length 95th (m)	#178.7	111.4	15.5	69.1	21.2	81.8	#90.6	65.0	19.9
Internal Link Dist (m)		134.8		133.0		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	596	1616	285	907	401	461	340	516	606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.59	0.28	0.67	0.20	0.60	0.83	0.43	0.45

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)	515	775	125	75	320	255	75	205	55	265	210	255
Future Volume (vph)	515	775	125	75	320	255	75	205	55	265	210	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.93		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1677	3411		1675	3163		1723	1779		1613	1810	1446
Flt Permitted	0.17	1.00		0.30	1.00		0.62	1.00		0.31	1.00	1.00
Satd. Flow (perm)	301	3411		527	3163		1123	1779		522	1810	1446
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)	548	824	133	80	340	271	80	218	59	282	223	271
RTOR Reduction (vph)	0	11	0	0	133	0	0	10	0	0	0	198
Lane Group Flow (vph)	548	946	0	80	478	0	80	267	0	282	223	73
Confl. Peds. (#/hr)	10		10	10		10	5		10	10		5
Confl. Bikes (#/hr)			10			5						
Heavy Vehicles (%)	4%	3%	2%	4%	5%	5%	1%	2%	6%	8%	5%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	59.1	49.6		29.8	23.3		27.9	21.8		37.9	28.8	28.8
Effective Green, g (s)	60.1	50.6		31.8	24.3		29.9	22.8		38.9	29.8	29.8
Actuated g/C Ratio	0.55	0.46		0.29	0.22		0.27	0.21		0.35	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	587	1569		230	698		343	368		324	490	391
v/s Ratio Prot	c0.29	0.28		0.02	c0.15		0.02	c0.15		c0.11	0.12	
v/s Ratio Perm	0.22			0.08			0.05			0.20		0.05
v/c Ratio	0.93	0.60		0.35	0.68		0.23	0.73		0.87	0.46	0.19
Uniform Delay, d1	27.6	22.2		29.2	39.3		30.6	40.7		29.4	33.3	30.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.0	1.7		0.9	5.4		0.4	7.0		21.6	0.7	0.2
Delay (s)	49.6	23.9		30.1	44.7		30.9	47.7		51.0	34.0	31.0
Level of Service	D	C		C	D		C	D		D	C	C
Approach Delay (s)		33.3			43.0			43.9			39.2	
Approach LOS		C			D			D			D	

Intersection Summary					
HCM 2000 Control Delay	37.8	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.80				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0		
Intersection Capacity Utilization	93.2%	ICU Level of Service	F		
Analysis Period (min)	15				
c Critical Lane Group					

Queues — Future Background (With South Parking Lot)

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — PM Peak Hour



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	305	505	179	874	1021	121	757
v/c Ratio	0.53	0.79	0.27	1.65	0.68	0.42	0.76
Control Delay	32.7	42.4	4.9	321.4	30.3	17.1	38.8
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	32.7	42.4	4.9	321.4	30.5	17.1	38.8
Queue Length 50th (m)	53.4	99.2	0.0	~273.2	110.5	12.3	77.2
Queue Length 95th (m)	84.2	#156.1	15.3	#347.5	117.9	20.2	90.2
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	579	643	656	530	1724	293	1417
Starvation Cap Reductn	0	0	0	0	175	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	0.53	0.79	0.27	1.65	0.66	0.41	0.53

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 — Future Background (With South Parking Lot)

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	290	480	170	830	725	245	115	540	180
Future Volume (vph)	0	0	0	290	480	170	830	725	245	115	540	180
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)				7.0	7.0	7.0	0.5	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	1694	3387		1728	3391	
Flt Permitted				0.95	1.00	1.00	0.19	1.00		0.25	1.00	
Satd. Flow (perm)				1694	1881	1575	336	3387		457	3391	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	305	505	179	874	763	258	121	568	189
RTOR Reduction (vph)	0	0	0	0	0	118	0	35	0	0	36	0
Lane Group Flow (vph)	0	0	0	305	505	61	874	986	0	121	721	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				36.6	36.6	36.6	57.4	46.4		38.0	30.0	
Effective Green, g (s)				37.6	37.6	37.6	59.9	47.4		40.0	31.0	
Actuated g/C Ratio				0.34	0.34	0.34	0.54	0.43		0.36	0.28	
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)				579	642	538	515	1459		270	955	
v/s Ratio Prot				0.18	c0.27		c0.42	0.29		0.04	c0.21	
v/s Ratio Perm						0.04	0.51			0.13		
v/c Ratio				0.53	0.79	0.11	1.70	0.68		0.45	0.76	
Uniform Delay, d1				29.1	32.6	24.8	27.5	25.1		24.0	36.0	
Progression Factor				1.00	1.00	1.00	0.92	1.17		1.00	1.00	
Incremental Delay, d2				0.9	6.3	0.1	320.1	2.0		1.2	5.5	
Delay (s)				29.9	38.9	24.9	345.5	31.3		25.2	41.6	
Level of Service				C	D	C	F	C		C	D	
Approach Delay (s)		0.0			33.6			176.2			39.3	
Approach LOS		A			C			F			D	

Intersection Summary

HCM 2000 Control Delay	106.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	107.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Queues — Future Background (With South Parking Lot)

2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp — PM Peak Hour



Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	330	309	1606	883
v/c Ratio	0.65	0.74	0.63	0.35
Control Delay	49.1	26.2	10.1	6.5
Queue Delay	0.0	4.0	0.6	0.2
Total Delay	49.1	30.2	10.7	6.8
Queue Length 50th (m)	36.4	22.3	92.8	37.6
Queue Length 95th (m)	49.2	52.5	m40.7	48.8
Internal Link Dist (m)			174.0	121.9
Turn Bay Length (m)	145.0	115.0		
Base Capacity (vph)	583	453	2556	2556
Starvation Cap Reductn	0	0	516	820
Spillback Cap Reductn	0	81	427	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.83	0.79	0.51

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis — Future Background (With South Parking Lot)

2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	310	0	290	0	1510	0	0	830	0
Future Volume (vph)	0	0	0	310	0	290	0	1510	0	0	830	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)				6.0		6.0		6.0			6.0	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frpb, ped/bikes				1.00		1.00		1.00			1.00	
Flpb, ped/bikes				1.00		1.00		1.00			1.00	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3134		1551		3505			3505	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3134		1551		3505			3505	
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)	0	0	0	330	0	309	0	1606	0	0	883	0
RTOR Reduction (vph)	0	0	0	0	0	169	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	330	0	140	0	1606	0	0	883	0
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)									1			2
Heavy Vehicles (%)	0%	0%	0%	8%	100%	3%	0%	3%	0%	0%	3%	0%
Turn Type				Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)				16.8		16.8		79.2			79.2	
Effective Green, g (s)				17.8		17.8		80.2			80.2	
Actuated g/C Ratio				0.16		0.16		0.73			0.73	
Clearance Time (s)				7.0		7.0		7.0			7.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				507		250		2555			2555	
v/s Ratio Prot				c0.11		0.09		c0.46			0.25	
v/s Ratio Perm												
v/c Ratio				0.65		0.56		0.63			0.35	
Uniform Delay, d1				43.2		42.5		7.5			5.4	
Progression Factor				1.00		1.00		1.21			1.08	
Incremental Delay, d2				3.0		2.7		0.3			0.3	
Delay (s)				46.2		45.2		9.3			6.1	
Level of Service				D		D		A			A	
Approach Delay (s)		0.0			45.7			9.3			6.1	
Approach LOS		A			D			A			A	

Intersection Summary

HCM 2000 Control Delay	15.8	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.67				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		18.0	
Intersection Capacity Utilization	69.8%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	232	162	379	56	288	1495	364	788
v/c Ratio	0.76	0.48	0.79	0.18	0.71	1.24	1.00	0.42
Control Delay	59.0	45.1	28.3	46.1	16.0	137.8	83.9	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.0	45.1	28.3	46.1	16.0	137.8	83.9	21.4
Queue Length 50th (m)	48.6	32.1	28.2	6.2	0.6	~220.7	~84.1	70.6
Queue Length 95th (m)	#87.4	55.0	#77.8	11.9	26.5	#266.4	#139.2	72.4
Internal Link Dist (m)		253.6				353.3		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	325	357	491	431	455	1209	365	1871
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	0.71	0.45	0.77	0.13	0.63	1.24	1.00	0.42

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)	230	160	375	55	0	285	0	995	485	360	780	0
Future Volume (vph)	230	160	375	55	0	285	0	995	485	360	780	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00		1.00		1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00		0.85		0.95		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)	1678	1845	1521	3164		1536		3344		1678	3471	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.10	1.00	
Satd. Flow (perm)	1678	1845	1521	3164		1536		3344		177	3471	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	232	162	379	56	0	288	0	1005	490	364	788	0
RTOR Reduction (vph)	0	0	199	0	0	258	0	54	0	0	0	0
Lane Group Flow (vph)	232	162	180	56	0	30	0	1441	0	364	788	0
Confl. Peds. (#/hr)			5	5			4					4
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	3%	3%	7%	0%	4%	0%	1%	6%	4%	4%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	19.1	19.1	19.1	9.6		9.6		37.0		58.3	58.3	
Effective Green, g (s)	20.1	20.1	20.1	10.6		10.6		38.0		59.3	59.3	
Actuated g/C Ratio	0.18	0.18	0.18	0.10		0.10		0.35		0.54	0.54	
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)	306	337	277	304		148		1155		358	1871	
v/s Ratio Prot	c0.14	0.09		0.02		c0.02		c0.43		c0.18	0.23	
v/s Ratio Perm			0.12							0.37		
v/c Ratio	0.76	0.48	0.65	0.18		0.21		1.25		1.02	0.42	
Uniform Delay, d1	42.6	40.3	41.7	45.7		45.8		36.0		34.1	15.1	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.75		1.32	1.30	
Incremental Delay, d2	10.3	1.1	5.2	0.3		0.7		117.2		50.2	0.7	
Delay (s)	52.9	41.4	46.8	46.0		46.5		144.3		95.4	20.3	
Level of Service	D	D	D	D		D		F		F	C	
Approach Delay (s)		47.5			46.4			144.3			44.0	
Approach LOS		D			D			F			D	

Intersection Summary

HCM 2000 Control Delay	84.8	HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	0.95				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		22.0	
Intersection Capacity Utilization	97.4%	ICU Level of Service		F	
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	797	26	218
v/c Ratio	0.83	0.03	0.53
Control Delay	21.0	3.1	23.7
Queue Delay	0.0	0.0	0.0
Total Delay	21.0	3.1	23.7
Queue Length 50th (m)	60.1	0.0	19.8
Queue Length 95th (m)	#148.8	2.9	36.7
Internal Link Dist (m)	190.8		55.4
Turn Bay Length (m)			
Base Capacity (vph)	965	939	1149
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.83	0.03	0.19

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)	765	25	175	35	0	0
Future Volume (vph)	765	25	175	35	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)	5.0	5.0		6.0		
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)	1662	1597		1824		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1662	1597		1824		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	797	26	182	36	0	0
RTOR Reduction (vph)	0	11	0	0	0	0
Lane Group Flow (vph)	797	15	0	218	0	0
Heavy Vehicles (%)	5%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	32.3	32.3		12.0		
Effective Green, g (s)	33.3	33.3		13.0		
Actuated g/C Ratio	0.58	0.58		0.23		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	965	928		413		
v/s Ratio Prot	c0.48			c0.12		
v/s Ratio Perm		0.01				
v/c Ratio	0.83	0.02		0.53		
Uniform Delay, d1	9.7	5.1		19.5		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	5.9	0.0		1.2		
Delay (s)	15.5	5.1		20.7		
Level of Service	B	A		C		
Approach Delay (s)	15.2			20.7	0.0	
Approach LOS	B			C	A	

Intersection Summary

HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	63.1%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Queues — Future Background (With South Parking Lot)

6: Waterdown Road & Railway Road/Masonry Court — PM Peak Hour

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	46	758	10	784	351	897
v/c Ratio	0.04	0.08	0.86	0.08	0.75	1.02	0.55
Control Delay	0.2	21.4	27.4	21.1	29.4	84.3	35.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.2	21.4	27.4	21.1	29.4	84.3	35.7
Queue Length 50th (m)	0.0	6.0	90.1	1.4	79.5	~69.3	95.2
Queue Length 95th (m)	0.0	15.3	#191.5	m1.5	m90.1	m#108.4	95.3
Internal Link Dist (m)	95.0		120.3		324.2		353.3
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	463	590	880	218	1712	346	2325
Starvation Cap Reductn	0	0	0	0	0	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	0.04	0.08	0.86	0.05	0.46	1.01	0.39

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 — Future Background (With South Parking Lot)

6: Waterdown Road & Railway Road/Masonry Court — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	10	45	0	735	10	735	25	340	860	10
Future Volume (vph)	10	0	10	45	0	735	10	735	25	340	860	10
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.85		1.00	1.00		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1574		1740	1575		1308	3420		1710	3504	
Flt Permitted		0.61		0.74	1.00		0.32	1.00		0.16	1.00	
Satd. Flow (perm)		991		1363	1575		437	3420		282	3504	
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)	10	0	10	46	0	758	10	758	26	351	887	10
RTOR Reduction (vph)	0	11	0	0	198	0	0	3	0	0	1	0
Lane Group Flow (vph)	0	9	0	46	560	0	10	781	0	351	896	0
Confl. Peds. (#/hr)	2		2	2		2	5		6	6		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	18%	0%	0%	0%	0%	1%	33%	4%	0%	2%	2%	75%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.7		46.7	46.7		32.4	32.4		50.3	50.3	
Effective Green, g (s)		47.7		47.7	47.7		33.4	33.4		51.3	51.3	
Actuated g/C Ratio		0.43		0.43	0.43		0.30	0.30		0.47	0.47	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		429		591	682		132	1038		337	1634	
v/s Ratio Prot					c0.36			c0.23		c0.15	0.26	
v/s Ratio Perm		0.01		0.03			0.02			0.33		
v/c Ratio		0.02		0.08	0.82		0.08	0.75		1.04	0.55	
Uniform Delay, d1		17.8		18.3	27.4		27.3	34.6		27.0	21.0	
Progression Factor		1.00		1.00	1.00		0.84	0.81		1.49	1.68	
Incremental Delay, d2		0.0		0.1	7.9		0.5	2.2		57.1	1.2	
Delay (s)		17.8		18.3	35.3		23.4	30.0		97.3	36.5	
Level of Service		B		B	D		C	C		F	D	
Approach Delay (s)		17.8			34.3			29.9			53.6	
Approach LOS		B			C			C			D	

Intersection Summary					
HCM 2000 Control Delay	41.4	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)		13.0	
Intersection Capacity Utilization	101.2%	ICU Level of Service		G	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	210	50	55	625	0	105	20	40	5	5	10
Future Volume (Veh/h)	20	210	50	55	625	0	105	20	40	5	5	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.89	0.89	0.89	0.89	0.92	0.89	0.92	0.89	0.92	0.92	0.92
Hourly flow rate (vph)	22	236	56	62	702	0	118	22	45	5	5	11
Pedestrians					15							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked				0.89			0.89	0.89	0.89	0.89	0.89	
vC, conflicting volume	702			292			1148	1134	279	1205	1162	702
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	702			136			1102	1087	122	1167	1118	702
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			95			20	88	94	96	97	97
cM capacity (veh/h)	895			1293			148	178	818	121	170	438

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	314	764	185	21
Volume Left	22	62	118	5
Volume Right	56	0	45	11
cSH	895	1293	190	219
Volume to Capacity	0.02	0.05	0.97	0.10
Queue Length 95th (m)	0.6	1.2	64.3	2.5
Control Delay (s)	0.9	1.2	109.7	23.2
Lane LOS	A	A	F	C
Approach Delay (s)	0.9	1.2	109.7	23.2
Approach LOS			F	C

Intersection Summary				
Average Delay			17.1	
Intersection Capacity Utilization			71.3%	ICU Level of Service
Analysis Period (min)			15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	255	680	0	0	0
Future Volume (Veh/h)	0	255	680	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	277	739	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)		280				
pX, platoon unblocked						
vC, conflicting volume	739				1016	739
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	739				1016	739
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)	867				264	417

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	277	739	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	867	1700	1700
Volume to Capacity	0.00	0.43	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			39.1%	ICU Level of Service
Analysis Period (min)			15	

Queues — Future Background (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	216	603	72	1330	113	309	366	222	330
v/c Ratio	0.79	0.38	0.17	0.99	0.31	0.93	1.01	0.43	0.51
Control Delay	44.5	20.8	6.6	49.7	24.7	77.3	63.6	15.8	9.2
Queue Delay	0.0	0.0	0.0	20.4	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	20.8	6.6	70.2	24.7	77.3	63.6	15.8	9.2
Queue Length 50th (m)	31.0	46.2	4.9	~172.8	16.2	67.1	~7.2	32.0	55.3
Queue Length 95th (m)	#64.8	63.4	m4.1	#209.7	28.9	#121.2	#119.2	65.2	64.3
Internal Link Dist (m)		134.8		136.1		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	298	1585	526	1337	364	334	361	518	646
Starvation Cap Reductn	0	0	0	81	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.38	0.14	1.06	0.31	0.93	1.01	0.43	0.51

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 — Future Background (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	520	65	70	965	325	110	235	65	355	215	320
Future Volume (vph)	210	520	65	70	965	325	110	235	65	355	215	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1616	3467		1639	3365		1694	1789		1710	1900	1491
Flt Permitted	0.09	1.00		0.41	1.00		0.62	1.00		0.19	1.00	1.00
Satd. Flow (perm)	152	3467		710	3365		1105	1789		344	1900	1491
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)	216	536	67	72	995	335	113	242	67	366	222	330
RTOR Reduction (vph)	0	8	0	0	29	0	0	9	0	0	0	240
Lane Group Flow (vph)	216	595	0	72	1301	0	113	300	0	366	222	90
Confl. Peds. (#/hr)	5		10	10		5			5	5		
Confl. Bikes (#/hr)			10			15						5
Heavy Vehicles (%)	8%	2%	0%	6%	2%	4%	3%	3%	0%	2%	0%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	58.0	48.5		48.3	41.8		26.0	19.0		39.0	29.0	29.0
Effective Green, g (s)	59.0	49.5		50.3	42.8		28.0	20.0		40.0	30.0	30.0
Actuated g/C Ratio	0.54	0.45		0.46	0.39		0.25	0.18		0.36	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	270	1560		388	1309		324	325		348	518	406
v/s Ratio Prot	c0.10	0.17		0.01	c0.39		0.03	c0.17		c0.17	0.12	
v/s Ratio Perm	0.33			0.07			0.06			0.21		0.06
v/c Ratio	0.80	0.38		0.19	0.99		0.35	0.92		1.05	0.43	0.22
Uniform Delay, d1	29.3	20.1		17.0	33.5		32.7	44.2		29.6	32.9	31.0
Progression Factor	1.00	1.00		0.52	0.85		1.00	1.00		0.32	0.40	1.77
Incremental Delay, d2	15.5	0.7		0.2	20.8		0.7	30.7		61.2	0.5	0.3
Delay (s)	44.8	20.8		9.0	49.3		33.4	75.0		70.6	13.7	55.2
Level of Service	D	C		A	D		C	E		E	B	E
Approach Delay (s)		27.1			47.2			63.8			51.3	
Approach LOS		C			D			E			D	

Intersection Summary

HCM 2000 Control Delay	45.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Queues — Future Background (With South Parking Lot)

11: Plains Road & Cooke Boulevard — PM Peak Hour

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	62	851	1372	196
v/c Ratio	0.21	0.35	0.63	0.69
Control Delay	4.7	4.5	14.2	51.5
Queue Delay	0.0	0.2	0.8	0.0
Total Delay	4.7	4.7	15.0	51.6
Queue Length 50th (m)	1.5	14.8	90.6	38.0
Queue Length 95th (m)	m7.3	m49.3	141.7	m40.6
Internal Link Dist (m)		136.1	132.2	314.3
Turn Bay Length (m)	60.0			
Base Capacity (vph)	372	2460	2168	405
Starvation Cap Reductn	0	732	0	0
Spillback Cap Reductn	0	0	438	3
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.49	0.79	0.49

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis — Future Background (With South Parking Lot)

11: Plains Road & Cooke Boulevard — PM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	825	1245	85	115	75
Future Volume (vph)	60	825	1245	85	115	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	3374	3294		1625	
Flt Permitted	0.14	1.00	1.00		0.97	
Satd. Flow (perm)	248	3374	3294		1625	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	62	851	1284	88	119	77
RTOR Reduction (vph)	0	0	3	0	23	0
Lane Group Flow (vph)	62	851	1369	0	173	0
Confl. Peds. (#/hr)	10			10		
Confl. Bikes (#/hr)				10		
Heavy Vehicles (%)	7%	7%	7%	5%	9%	5%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	79.2	79.2	70.7		16.8	
Effective Green, g (s)	80.2	80.2	71.7		17.8	
Actuated g/C Ratio	0.73	0.73	0.65		0.16	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	265	2459	2147		262	
v/s Ratio Prot	0.01	c0.25	c0.42			
v/s Ratio Perm	0.16				c0.11	
v/c Ratio	0.23	0.35	0.64		0.66	
Uniform Delay, d1	6.8	5.4	11.4		43.2	
Progression Factor	0.86	0.70	1.00		1.08	
Incremental Delay, d2	0.3	0.3	1.5		5.7	
Delay (s)	6.1	4.1	12.9		52.5	
Level of Service	A	A	B		D	
Approach Delay (s)		4.2	12.9		52.5	
Approach LOS		A	B		D	

Intersection Summary

HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	1183	388	18
v/c Ratio	0.36	0.11	0.07
Control Delay	1.9	1.4	16.6
Queue Delay	0.0	0.0	0.0
Total Delay	1.9	1.4	16.6
Queue Length 50th (m)	0.0	0.0	0.6
Queue Length 95th (m)	41.2	11.5	6.4
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3088	3199	427
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.38	0.12	0.04

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	985	20	0	330	10	5
Future Volume (vph)	985	20	0	330	10	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	0.95	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	3483			3610	1018	
Flt Permitted	1.00			1.00	0.97	
Satd. Flow (perm)	3483			3610	1018	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1159	24	0	388	12	6
RTOR Reduction (vph)	2	0	0	0	6	0
Lane Group Flow (vph)	1182	0	0	388	12	0
Heavy Vehicles (%)	2%	67%	0%	0%	100%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	31.9			31.9	1.1	
Effective Green, g (s)	32.9			32.9	2.1	
Actuated g/C Ratio	0.70			0.70	0.04	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2438			2527	45	
v/s Ratio Prot	c0.34			0.11	c0.01	
v/s Ratio Perm						
v/c Ratio	0.48			0.15	0.27	
Uniform Delay, d1	3.2			2.4	21.7	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.2			0.0	3.3	
Delay (s)	3.4			2.4	25.0	
Level of Service	A			A	C	
Approach Delay (s)	3.4			2.4	25.0	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.4	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.47			
Actuated Cycle Length (s)	47.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	44.5%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Queues — Future Background (With South Parking Lot)

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — PM Peak Hour



Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	305	505	179	874	1021	121	757
v/c Ratio	0.63	0.94	0.31	0.76	0.60	0.37	0.68
Control Delay	41.7	66.9	6.2	22.6	24.9	15.0	35.5
Queue Delay	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	41.7	66.9	6.2	22.7	25.3	15.0	35.5
Queue Length 50th (m)	61.2	113.5	0.0	51.9	104.2	9.6	72.7
Queue Length 95th (m)	92.4	#182.6	16.8	78.9	106.6	16.8	#111.7
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	482	535	576	1352	1724	328	1111
Starvation Cap Reductn	0	0	0	20	292	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	0.63	0.94	0.31	0.66	0.71	0.37	0.68

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis — Future Background (With South Parking Lot)

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	290	480	170	830	725	245	115	540	180
Future Volume (vph)	0	0	0	290	480	170	830	725	245	115	540	180
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)				7.0	7.0	7.0	0.5	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	3285	3387		1728	3391	
Flt Permitted				0.95	1.00	1.00	0.22	1.00		0.28	1.00	
Satd. Flow (perm)				1694	1881	1575	760	3387		510	3391	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	305	505	179	874	763	258	121	568	189
RTOR Reduction (vph)	0	0	0	0	0	128	0	31	0	0	27	0
Lane Group Flow (vph)	0	0	0	305	505	51	874	990	0	121	730	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				30.3	30.3	30.3	63.7	53.0		41.9	34.2	
Effective Green, g (s)				31.3	31.3	31.3	66.2	54.0		43.9	35.2	
Actuated g/C Ratio				0.28	0.28	0.28	0.60	0.49		0.40	0.32	
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)				482	535	448	1123	1662		299	1085	
v/s Ratio Prot				0.18	c0.27		c0.21	0.29		0.03	c0.22	
v/s Ratio Perm						0.03	0.26			0.13		
v/c Ratio				0.63	0.94	0.11	0.78	0.60		0.40	0.67	
Uniform Delay, d1				34.3	38.5	29.1	17.5	20.1		21.4	32.4	
Progression Factor				1.00	1.00	1.00	1.42	1.24		1.00	1.00	
Incremental Delay, d2				2.7	25.5	0.1	2.7	1.2		0.9	3.3	
Delay (s)				37.0	64.0	29.2	27.7	26.3		22.3	35.7	
Level of Service				D	E	C	C	C		C	D	
Approach Delay (s)		0.0			49.4			26.9			33.9	
Approach LOS		A			D			C			C	

Intersection Summary

HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	232	162	379	56	288	1005	490	364	788
v/c Ratio	0.80	0.51	0.86	0.20	0.74	0.66	0.55	0.54	0.41
Control Delay	64.7	47.4	39.2	48.1	19.1	21.8	3.8	17.7	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.7	47.4	39.2	48.1	19.1	21.8	3.8	17.7	14.9
Queue Length 50th (m)	48.0	31.7	35.4	6.2	2.1	105.4	15.3	25.9	59.7
Queue Length 95th (m)	#94.6	56.3	#94.6	12.6	#35.8	m122.7	m8.6	32.3	55.8
Internal Link Dist (m)		253.6				353.3			174.0
Turn Bay Length (m)	135.0			100.0				40.0	
Base Capacity (vph)	297	327	445	297	396	1540	888	770	1977
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.50	0.85	0.19	0.73	0.65	0.55	0.47	0.40

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)	230	160	375	55	0	285	0	995	485	360	780	0
Future Volume (vph)	230	160	375	55	0	285	0	995	485	360	780	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0	6.0	0.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00		1.00		1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1678	1845	1521	3164		1536		3574	1524	3255	3471	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.17	1.00	
Satd. Flow (perm)	1678	1845	1521	3164		1536		3574	1524	566	3471	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	232	162	379	56	0	288	0	1005	490	364	788	0
RTOR Reduction (vph)	0	0	177	0	0	253	0	0	233	0	0	0
Lane Group Flow (vph)	232	162	202	56	0	35	0	1005	257	364	788	0
Confl. Peds. (#/hr)			5	5			4					4
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	3%	3%	7%	0%	4%	0%	1%	6%	4%	4%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA	Perm	pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	18.1	18.1	18.1	8.8		8.8		46.1	46.1	60.1	60.1	
Effective Green, g (s)	19.1	19.1	19.1	9.8		9.8		47.1	47.1	62.6	61.1	
Actuated g/C Ratio	0.17	0.17	0.17	0.09		0.09		0.43	0.43	0.57	0.56	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0	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	3.0	
Lane Grp Cap (vph)	291	320	264	281		136		1530	652	652	1927	
v/s Ratio Prot	c0.14	0.09		0.02		c0.02		c0.28		c0.07	0.23	
v/s Ratio Perm			0.13						0.17	0.25		
v/c Ratio	0.80	0.51	0.77	0.20		0.26		0.66	0.39	0.56	0.41	
Uniform Delay, d1	43.6	41.2	43.3	46.5		46.7		25.0	21.6	14.6	14.1	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.79	0.47	1.50	1.00	
Incremental Delay, d2	14.0	1.3	12.4	0.4		1.0		1.5	1.2	1.0	0.6	
Delay (s)	57.6	42.4	55.8	46.8		47.7		21.2	11.3	22.8	14.7	
Level of Service	E	D	E	D		D		C	B	C	B	
Approach Delay (s)		53.5			47.6			18.0			17.3	
Approach LOS		D			D			B			B	

Intersection Summary

HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	46	758	10	784	351	897
v/c Ratio	0.08	0.11	0.91	0.05	0.55	0.72	0.42
Control Delay	0.6	29.1	27.8	16.2	17.4	25.7	20.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.6	29.1	27.8	16.2	17.4	25.7	20.1
Queue Length 50th (m)	0.0	7.0	53.6	1.2	64.8	57.6	85.0
Queue Length 95th (m)	0.0	17.8	#149.5	m1.3	m80.9	m62.9	m88.7
Internal Link Dist (m)	95.0		120.3		324.2		353.3
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	260	402	833	182	1428	642	2328
Starvation Cap Reductn	0	0	0	0	0	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	0.08	0.11	0.91	0.05	0.55	0.55	0.39

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)	10	0	10	45	0	735	10	735	25	340	860	10
Future Volume (vph)	10	0	10	45	0	735	10	735	25	340	860	10
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.85		1.00	1.00		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1574		1740	1575		1308	3420		1710	3504	
Flt Permitted		0.46		0.74	1.00		0.32	1.00		0.24	1.00	
Satd. Flow (perm)		741		1363	1575		437	3420		425	3504	
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)	10	0	10	46	0	758	10	758	26	351	887	10
RTOR Reduction (vph)	0	14	0	0	369	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	6	0	46	389	0	10	782	0	351	896	0
Confl. Peds. (#/hr)	2		2	2		2	5		6	6		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	18%	0%	0%	0%	0%	1%	33%	4%	0%	2%	2%	75%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.4		31.4	31.4		44.9	44.9		65.6	65.6	
Effective Green, g (s)		32.4		32.4	32.4		45.9	45.9		66.6	66.6	
Actuated g/C Ratio		0.29		0.29	0.29		0.42	0.42		0.61	0.61	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		218		401	463		182	1427		475	2121	
v/s Ratio Prot					c0.25			c0.23		c0.13	0.26	
v/s Ratio Perm		0.01		0.03			0.02			0.32		
v/c Ratio		0.03		0.11	0.84		0.05	0.55		0.74	0.42	
Uniform Delay, d1		27.6		28.3	36.4		19.1	24.2		13.4	11.5	
Progression Factor		1.00		1.00	1.00		0.70	0.66		1.64	1.65	
Incremental Delay, d2		0.1		0.1	12.9		0.2	0.5		5.2	0.5	
Delay (s)		27.6		28.5	49.3		13.6	16.3		27.1	19.6	
Level of Service		C		C	D		B	B		C	B	
Approach Delay (s)		27.6			48.1			16.3			21.7	
Approach LOS		C			D			B			C	

Intersection Summary					
HCM 2000 Control Delay	27.6	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.68				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		13.0	
Intersection Capacity Utilization	101.2%	ICU Level of Service		G	
Analysis Period (min)	15				
c Critical Lane Group					

Queues — Future Background (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	216	603	72	1330	113	309	366	222	330
v/c Ratio	0.96	0.39	0.17	0.95	0.31	0.97	0.94	0.42	0.53
Control Delay	76.8	21.7	6.5	38.3	23.9	87.6	53.3	27.8	17.7
Queue Delay	0.0	0.0	0.0	8.4	0.0	0.0	0.0	0.0	0.0
Total Delay	76.8	21.7	6.5	46.7	23.9	87.6	53.3	27.8	17.7
Queue Length 50th (m)	32.8	47.1	0.0	153.2	15.9	67.9	74.1	45.2	48.3
Queue Length 95th (m)	#82.4	64.6	m4.4	#192.4	28.4	#125.1	#125.6	67.9	67.0
Internal Link Dist (m)		134.8		136.1		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	226	1541	503	1406	370	319	391	528	622
Starvation Cap Reductn	0	0	0	78	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.39	0.14	1.00	0.31	0.97	0.94	0.42	0.53

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.

HCM Signalized Intersection Capacity Analysis — Future Background (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	520	65	70	965	325	110	235	65	355	215	320
Future Volume (vph)	210	520	65	70	965	325	110	235	65	355	215	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1616	3467		1640	3365		1694	1789		1710	1900	1491
Flt Permitted	0.09	1.00		0.38	1.00		0.62	1.00		0.19	1.00	1.00
Satd. Flow (perm)	146	3467		652	3365		1105	1789		340	1900	1491
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)	216	536	67	72	995	335	113	242	67	366	222	330
RTOR Reduction (vph)	0	8	0	0	30	0	0	9	0	0	0	209
Lane Group Flow (vph)	216	595	0	72	1300	0	113	300	0	366	222	121
Confl. Peds. (#/hr)	5		10	10		5			5	5		
Confl. Bikes (#/hr)			10			15						5
Heavy Vehicles (%)	8%	2%	0%	6%	2%	4%	3%	3%	0%	2%	0%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	56.6	47.0		50.2	43.6		26.0	18.2		40.4	29.6	29.6
Effective Green, g (s)	57.6	48.0		52.2	44.6		28.0	19.2		41.4	30.6	30.6
Actuated g/C Ratio	0.52	0.44		0.47	0.41		0.25	0.17		0.38	0.28	0.28
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	223	1512		377	1364		328	312		379	528	414
v/s Ratio Prot	c0.10	0.17		0.01	c0.39		0.03	c0.17		c0.18	0.12	
v/s Ratio Perm	0.41			0.08			0.06			0.19		0.08
v/c Ratio	0.97	0.39		0.19	0.95		0.34	0.96		0.97	0.42	0.29
Uniform Delay, d1	31.6	21.1		16.0	31.7		32.7	45.0		29.9	32.5	31.2
Progression Factor	1.00	1.00		0.50	0.81		1.00	1.00		0.76	0.77	2.38
Incremental Delay, d2	50.8	0.8		0.2	13.1		0.6	40.4		35.7	0.5	0.4
Delay (s)	82.4	21.9		8.1	38.9		33.4	85.4		58.3	25.3	74.5
Level of Service	F	C		A	D		C	F		E	C	E
Approach Delay (s)		37.8			37.3			71.5			56.2	
Approach LOS		D			D			E			E	

Intersection Summary					
HCM 2000 Control Delay	46.3	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.95				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0		
Intersection Capacity Utilization	101.7%	ICU Level of Service	G		
Analysis Period (min)	15				

c Critical Lane Group

Queues — Future Total (With South Parking Lot)

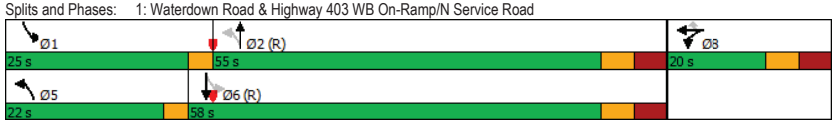
1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	105	90	55	450	400	165	605
Future Volume (vph)	105	90	55	450	400	165	605
Lane Group Flow (vph)	108	93	57	464	953	170	815
Turn Type	Split	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	8	8		5	2	1	6
Permitted Phases			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)	40.0	40.0	40.0	10.0	31.0	10.0	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%
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)	-1.0	-1.0	-1.0	-2.0	-1.0	-1.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	1.0	7.0	2.0	7.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.52	0.40	0.21	0.79	0.45	0.35	0.44
Control Delay	48.8	43.7	5.1	29.1	8.4	6.5	16.0
Queue Delay	0.0	0.0	0.0	0.4	0.1	0.0	0.0
Total Delay	48.8	43.7	5.1	29.4	8.5	6.5	16.0
Queue Length 50th (m)	20.9	17.6	0.0	50.4	27.4	6.8	44.2
Queue Length 95th (m)	36.5	31.5	5.5	104.3	53.9	15.0	86.0
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	224	253	289	636	2106	673	1948
Starvation Cap Reductn	0	0	0	21	215	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	0.48	0.37	0.20	0.75	0.50	0.25	0.42

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 48 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road



HCM Signalized Intersection Capacity Analysis — Future Total (With South Parking Lot)

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	105	90	55	450	400	525	165	605	185
Future Volume (vph)	0	0	0	105	90	55	450	400	525	165	605	185
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)				7.0	7.0	7.0	1.0	7.0		2.0	7.0	
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	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	1601	3193		1711	3415	
Flt Permitted				0.95	1.00	1.00	0.29	1.00		0.29	1.00	
Satd. Flow (perm)				1544	1743	1479	489	3193		528	3415	
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)	0	0	0	108	93	57	464	412	541	170	624	191
RTOR Reduction (vph)	0	0	0	0	0	49	0	181	0	0	28	0
Lane Group Flow (vph)	0	0	0	108	93	8	464	772	0	170	787	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				12.4	12.4	12.4	71.6	59.3		61.5	52.2	
Effective Green, g (s)				13.4	13.4	13.4	73.6	60.3		63.5	53.2	
Actuated g/C Ratio				0.13	0.13	0.13	0.74	0.60		0.64	0.53	
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)				206	233	198	564	1925		457	1816	
v/s Ratio Prot				c0.07	0.05		c0.15	0.24		0.04	c0.23	
v/s Ratio Perm						0.01	0.45			0.20		
v/c Ratio				0.52	0.40	0.04	0.82	0.40		0.37	0.43	
Uniform Delay, d1				40.3	39.6	37.7	6.8	10.4		7.4	14.2	
Progression Factor				1.00	1.00	1.00	3.21	1.36		1.00	1.00	
Incremental Delay, d2				2.4	1.1	0.1	8.2	0.5		0.5	0.8	
Delay (s)				42.7	40.7	37.8	29.9	14.6		7.9	15.0	
Level of Service				D	D	D	C	B		A	B	
Approach Delay (s)		0.0			40.9			19.6			13.8	
Approach LOS		A			D			B			B	

Intersection Summary

HCM 2000 Control Delay	19.5	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.52				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	69.2%	ICU Level of Service		C	
Analysis Period (min)	15				

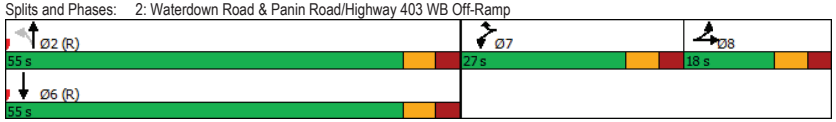
c Critical Lane Group

Lane Group	EBT	WBL	WBR	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	0	435	175	1200	710
Future Volume (vph)	0	435	175	1200	710
Lane Group Flow (vph)	5	453	182	1250	740
Turn Type	NA	Prot	Prot	NA	NA
Protected Phases	8	7	7	2	6
Permitted Phases					
Detector Phase	8	7	7	2	6
Switch Phase					
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	15.0	15.0	15.0	31.0	31.0
Total Split (s)	18.0	27.0	27.0	55.0	55.0
Total Split (%)	18.0%	27.0%	27.0%	55.0%	55.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lead	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	None	None	None	C-Min	C-Min
v/c Ratio	0.03	0.74	0.41	0.56	0.33
Control Delay	0.2	45.4	8.1	10.6	5.1
Queue Delay	0.0	0.0	0.0	0.3	0.0
Total Delay	0.2	45.4	8.1	10.9	5.1
Queue Length 50th (m)	0.0	44.5	0.0	60.2	14.5
Queue Length 95th (m)	0.0	61.6	17.7	m43.1	13.0
Internal Link Dist (m)	106.5			174.0	121.9
Turn Bay Length (m)		145.0	115.0		
Base Capacity (vph)	226	667	467	2248	2269
Starvation Cap Reductn	0	0	0	411	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.02	0.68	0.39	0.68	0.33

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 55 (55%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	5	435	0	175	0	1200	0	0	710	0
Future Volume (vph)	0	0	5	435	0	175	0	1200	0	0	710	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)		6.0		6.0		6.0		6.0			6.0	
Lane Util. Factor		1.00		0.97		1.00		0.95			0.95	
Frt		0.86		1.00		0.85		1.00			1.00	
Flt Protected		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (prot)		984		3134		1521		3438			3471	
Flt Permitted		1.00		0.95		1.00		1.00			1.00	
Satd. Flow (perm)		984		3134		1521		3438			3471	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	5	453	0	182	0	1250	0	0	740	0
RTOR Reduction (vph)	0	5	0	0	0	146	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	453	0	36	0	1250	0	0	740	0
Heavy Vehicles (%)	0%	0%	67%	8%	0%	5%	0%	5%	0%	0%	4%	0%
Turn Type		NA		Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)		1.6		18.6		18.6		58.8			58.8	
Effective Green, g (s)		2.6		19.6		19.6		59.8			59.8	
Actuated g/C Ratio		0.03		0.20		0.20		0.60			0.60	
Clearance Time (s)		7.0		7.0		7.0		7.0			7.0	
Vehicle Extension (s)		3.0		3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)		25		614		298		2055			2075	
v/s Ratio Prot		c0.00		c0.14		0.02		c0.36			0.21	
v/s Ratio Perm												
v/c Ratio		0.01		0.74		0.12		0.61			0.36	
Uniform Delay, d1		47.4		37.8		33.1		12.7			10.3	
Progression Factor		1.00		1.00		1.00		0.96			0.54	
Incremental Delay, d2		0.1		4.6		0.2		0.1			0.4	
Delay (s)		47.5		42.4		33.3		12.3			5.9	
Level of Service		D		D		C		B			A	
Approach Delay (s)		47.5			39.8			12.3			5.9	
Approach LOS		D			D			B			A	

Intersection Summary

HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues — Future Total (With South Parking Lot)

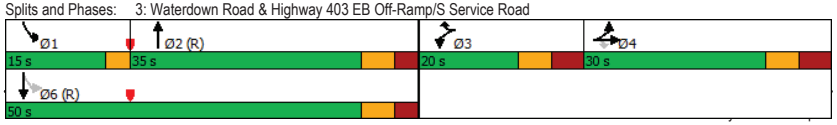
3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	305	290	490	20	70	825	380	770
Future Volume (vph)	305	290	490	20	70	825	380	770
Lane Group Flow (vph)	321	305	516	21	74	1647	400	811
Turn Type	Split	NA	Perm	Prot	Prot	NA	pm+pt	NA
Protected Phases	4	4		3	3	2	1	6
Permitted Phases			4				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	16.0	16.0	29.0	9.0	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%
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)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	6.0	2.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.76	0.65	0.88	0.08	0.27	1.50	1.04	0.48
Control Delay	46.6	40.5	33.4	42.6	2.3	248.5	84.4	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	40.5	33.4	42.6	2.3	248.5	84.4	19.6
Queue Length 50th (m)	59.0	54.3	48.1	2.0	0.0	~231.3	~88.4	79.4
Queue Length 95th (m)	90.6	83.0	#108.7	5.8	0.0	#267.8	#153.7	79.9
Internal Link Dist (m)		253.6				252.8		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	438	482	599	372	329	1097	384	1673
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	0.73	0.63	0.86	0.06	0.22	1.50	1.04	0.48

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 54 (54%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road



HCM Signalized Intersection Capacity Analysis — Future Total (With South Parking Lot)

3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	290	490	20	0	70	0	825	740	380	770	0
Future Volume (vph)	305	290	490	20	0	70	0	825	740	380	770	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
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)	1694	1863	1521	2869		1439		3225		1662	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.14	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3225		238	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	305	516	21	0	74	0	868	779	400	811	0
RTOR Reduction (vph)	0	0	208	0	0	69	0	166	0	0	0	0
Lane Group Flow (vph)	321	305	308	21	0	5	0	1481	0	400	811	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	24.1	24.1	24.1	6.4		6.4		26.4		46.5	46.5	
Effective Green, g (s)	25.1	25.1	25.1	7.4		7.4		27.4		47.5	47.5	
Actuated g/C Ratio	0.25	0.25	0.25	0.07		0.07		0.27		0.48	0.48	
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)	425	467	381	212		106		883		370	1617	
v/s Ratio Prot	0.19	0.16		c0.01		0.00		c0.46		c0.20	0.24	
v/s Ratio Perm			c0.20							0.32		
v/c Ratio	0.76	0.65	0.81	0.10		0.05		1.68		1.08	0.50	
Uniform Delay, d1	34.6	33.5	35.2	43.2		43.0		36.3		28.9	18.1	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.48		1.04	0.99	
Incremental Delay, d2	7.5	3.3	11.9	0.2		0.2		308.7		68.0	1.0	
Delay (s)	42.1	36.8	47.1	43.4		43.2		326.1		98.2	19.0	
Level of Service	D	D	D	D		D		F		F	B	
Approach Delay (s)		42.9			43.3			326.1			45.2	
Approach LOS		D			D			F			D	

Intersection Summary

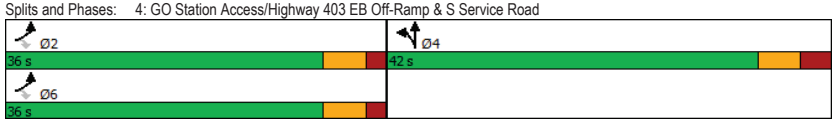
HCM 2000 Control Delay	157.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	NBT	Ø2	Ø6
Lane Configurations					
Traffic Volume (vph)	1025	180	25		
Future Volume (vph)	1025	180	25		
Lane Group Flow (vph)	1220	214	48		
Turn Type	Prot	Perm	NA		
Protected Phases	2 6		4	2	6
Permitted Phases		2 6			
Detector Phase	2 6	2 6	4		
Switch Phase					
Minimum Initial (s)			8.0	8.0	8.0
Minimum Split (s)			15.0	29.0	29.0
Total Split (s)			42.0	36.0	36.0
Total Split (%)			53.8%	46%	46%
Yellow Time (s)			4.0	4.0	4.0
All-Red Time (s)			3.0	2.0	2.0
Lost Time Adjust (s)			-1.0		
Total Lost Time (s)			6.0		
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode			None	Min	Min
v/c Ratio	0.83	0.15	0.16		
Control Delay	15.7	1.5	23.0		
Queue Delay	0.0	0.0	0.0		
Total Delay	15.7	1.5	23.0		
Queue Length 50th (m)	0.0	0.0	4.0		
Queue Length 95th (m)	#208.5	7.1	11.8		
Internal Link Dist (m)	190.8		55.4		
Turn Bay Length (m)					
Base Capacity (vph)	1472	1407	1221		
Starvation Cap Reductn	0	0	0		
Spillback Cap Reductn	0	0	0		
Storage Cap Reductn	0	0	0		
Reduced v/c Ratio	0.83	0.15	0.04		

Intersection Summary
Cycle Length: 78
Actuated Cycle Length: 55.6
Natural Cycle: 90
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: GO Station Access/Highway 403 EB Off-Ramp & S Service Road



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1025	180	15	25	0	0
Future Volume (vph)	1025	180	15	25	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)	5.0	5.0		6.0		
Lane Util. Factor	1.00	1.00		1.00		
Frt	1.00	0.85		1.00		
Flt Protected	0.95	1.00		0.98		
Satd. Flow (prot)	1694	1597		1865		
Flt Permitted	0.95	1.00		0.98		
Satd. Flow (perm)	1694	1597		1865		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	1220	214	18	30	0	0
RTOR Reduction (vph)	0	37	0	0	0	0
Lane Group Flow (vph)	1220	177	0	48	0	0
Heavy Vehicles (%)	3%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	44.0	44.0		3.0		
Effective Green, g (s)	45.0	45.0		4.0		
Actuated g/C Ratio	0.75	0.75		0.07		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	1270	1197		124		
v/s Ratio Prot	c0.72			c0.03		
v/s Ratio Perm		0.11				
v/c Ratio	0.96	0.15		0.39		
Uniform Delay, d1	6.7	2.1		26.8		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	16.7	0.1		2.0		
Delay (s)	23.4	2.2		28.8		
Level of Service	C	A		C		
Approach Delay (s)	20.2			28.8	0.0	
Approach LOS	C			C	A	

Intersection Summary				
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	72.6%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	180	1385	10	0	1280
Future Volume (Veh/h)	0	180	1385	10	0	1280
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	196	1505	11	0	1391
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			101			277
pX, platoon unblocked	0.78	0.71			0.71	
vC, conflicting volume	2206	758			1516	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1105	0			903	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	74			100	
cM capacity (veh/h)	161	768			530	

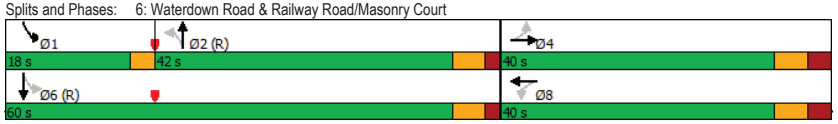
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	196	1003	513	696	696
Volume Left	0	0	0	0	0
Volume Right	196	0	11	0	0
cSH	768	1700	1700	1700	1700
Volume to Capacity	0.26	0.59	0.30	0.41	0.41
Queue Length 95th (m)	8.1	0.0	0.0	0.0	0.0
Control Delay (s)	11.3	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.3	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		56.4%	ICU Level of Service B
Analysis Period (min)		15	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	15	0	20	0	10	955	565	700
Future Volume (vph)	15	0	20	0	10	955	565	700
Lane Group Flow (vph)	0	21	21	452	11	1075	601	761
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	29.0	29.0	29.0	29.0	35.0	35.0	11.0	35.0
Total Split (s)	40.0	40.0	40.0	40.0	42.0	42.0	18.0	60.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	42.0%	42.0%	18.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)		6.0	6.0	6.0	5.0	5.0	2.0	5.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Recall Mode	None	None	None	None	C-Min	C-Min	None	C-Min
v/c Ratio		0.23	0.10	0.82	0.07	0.88	0.91	0.31
Control Delay		5.7	31.9	22.6	22.2	39.4	42.4	10.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		5.7	31.9	22.6	22.2	39.4	42.4	10.6
Queue Length 50th (m)		0.0	3.8	21.3	1.4	103.8	111.2	53.9
Queue Length 95th (m)		0.0	9.0	51.9	5.6	132.2	m#208.1	m73.3
Internal Link Dist (m)		95.0		120.3		324.2		76.6
Turn Bay Length (m)			25.0		35.0		45.0	
Base Capacity (vph)		121	418	772	157	1266	663	2447
Starvation Cap Reductn		0	0	0	0	0	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		0.17	0.05	0.59	0.07	0.85	0.91	0.31

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 22 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
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.

Splits and Phases: 6: Waterdown Road & Railway Road/Masonry Court



HCM Signalized Intersection Capacity Analysis — Future Total (With South Parking Lot)
6: Waterdown Road & Railway Road/Masonry Court — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	0	5	20	0	425	10	955	55	565	700	15
Future Volume (vph)	15	0	5	20	0	425	10	955	55	565	700	15
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1060		1572	1615		1118	3410		1694	3383	
Flt Permitted		0.21		0.74	1.00		0.36	1.00		0.11	1.00	
Satd. Flow (perm)		232		1230	1615		427	3410		189	3383	
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)	16	0	5	21	0	452	11	1016	59	601	745	16
RTOR Reduction (vph)	0	17	0	0	282	0	0	5	0	0	1	0
Lane Group Flow (vph)	0	4	0	21	170	0	11	1070	0	601	760	0
Confl. Peds. (#/hr)									5	5		
Heavy Vehicles (%)	88%	0%	0%	11%	0%	0%	56%	4%	0%	3%	5%	71%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.7		15.7	15.7		34.7	34.7		71.3	71.3	
Effective Green, g (s)		16.7		16.7	16.7		35.7	35.7		72.3	72.3	
Actuated g/C Ratio		0.17		0.17	0.17		0.36	0.36		0.72	0.72	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		38		205	269		152	1217		657	2445	
v/s Ratio Prot					c0.11			c0.31		c0.32	0.22	
v/s Ratio Perm		0.02		0.02			0.03			0.34		
v/c Ratio		0.09		0.10	0.63		0.07	0.88		0.91	0.31	
Uniform Delay, d1		35.2		35.3	38.8		21.2	30.1		25.3	4.9	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.01	1.73	
Incremental Delay, d2		1.1		0.2	4.8		0.9	9.2		14.6	0.3	
Delay (s)		36.3		35.5	43.5		22.1	39.4		40.2	8.8	
Level of Service		D		D	D		C	D		D	A	
Approach Delay (s)		36.3			43.2			39.2			22.7	
Approach LOS		D			D			D			C	

Intersection Summary				
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	98.3%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis — Future Total (With South Parking Lot)
7: East Site Driveway — AM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	80	70	5	30	0
Future Volume (Veh/h)	0	80	70	5	30	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	87	76	5	33	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	190	33	33			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	190	33	33			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	95			
cM capacity (veh/h)	761	1041	1579			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	87	81	33
Volume Left	0	76	0
Volume Right	87	0	0
cSH	1041	1579	1700
Volume to Capacity	0.08	0.05	0.02
Queue Length 95th (m)	2.2	1.2	0.0
Control Delay (s)	8.8	7.0	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	7.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	470	45	35	225	0	110	20	40	0	60	50
Future Volume (Veh/h)	55	470	45	35	225	0	110	20	40	0	60	50
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.82	0.82	0.82	0.82	0.92	0.82	0.92	0.82	0.92	0.92	0.92
Hourly flow rate (vph)	60	573	55	43	274	0	134	22	49	0	65	54
Pedestrians					5							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked				0.84			0.84	0.84	0.84	0.84	0.84	
vC, conflicting volume	274			628			1167	1080	606	1146	1108	274
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274			467			1106	1003	441	1080	1036	274
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			95			0	88	91	100	63	93
cM capacity (veh/h)	1289			933			96	186	522	126	178	765

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	688	317	205	119
Volume Left	60	43	134	0
Volume Right	55	0	49	54
cSH	1289	933	127	273
Volume to Capacity	0.05	0.05	1.61	0.44
Queue Length 95th (m)	1.2	1.2	119.1	16.7
Control Delay (s)	1.2	1.7	369.8	28.0
Lane LOS	A	A	F	D
Approach Delay (s)	1.2	1.7	369.8	28.0
Approach LOS			F	D

Intersection Summary				
Average Delay	60.6			
Intersection Capacity Utilization	60.5%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	510	260	0	0	0
Future Volume (Veh/h)	0	510	260	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	554	283	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)		282				
pX, platoon unblocked					0.93	
vC, conflicting volume	283				837	283
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	283				789	283
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)	1279				335	756

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	554	283	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1279	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	30.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues — Future Total (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	515	780	75	330	75	205	265	210	255
Future Volume (vph)	515	780	75	330	75	205	265	210	255
Lane Group Flow (vph)	548	963	80	633	80	277	282	223	271
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	6.0	8.0	6.0	8.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	27.0	9.0	27.0	9.0	34.0	9.0	34.0	34.0
Total Split (s)	32.0	51.0	12.0	31.0	10.0	34.0	13.0	37.0	37.0
Total Split (%)	29.1%	46.4%	10.9%	28.2%	9.1%	30.9%	11.8%	33.6%	33.6%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	3.0	0.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	5.0	2.0	5.0	2.0	6.0	2.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
v/c Ratio	0.92	0.59	0.30	0.75	0.20	0.75	0.84	0.46	0.46
Control Delay	49.0	23.7	17.6	35.0	22.9	52.1	51.1	37.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.0	23.7	17.6	35.0	22.9	52.1	51.1	37.5	6.6
Queue Length 50th (m)	99.4	83.6	7.6	53.0	11.4	56.6	46.6	43.5	0.0
Queue Length 95th (m)	#182.8	112.4	15.5	72.3	21.2	81.8	#90.6	65.0	19.9
Internal Link Dist (m)		134.8		133.0		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	597	1629	283	890	400	461	334	516	606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.59	0.28	0.71	0.20	0.60	0.84	0.43	0.45

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

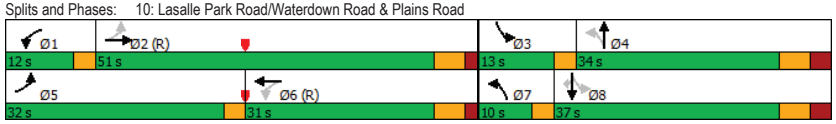
Natural Cycle: 90

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 10: Lasalle Park Road/Waterdown Road & Plains Road



HCM Signalized Intersection Capacity Analysis — Future Total (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	515	780	125	75	330	265	75	205	55	265	210	255
Future Volume (vph)	515	780	125	75	330	265	75	205	55	265	210	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.93		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1677	3411		1675	3162		1723	1779		1613	1810	1446
Flt Permitted	0.15	1.00		0.30	1.00		0.62	1.00		0.31	1.00	1.00
Satd. Flow (perm)	271	3411		524	3162		1123	1779		522	1810	1446
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)	548	830	133	80	351	282	80	218	59	282	223	271
RTOR Reduction (vph)	0	11	0	0	135	0	0	10	0	0	0	199
Lane Group Flow (vph)	548	952	0	80	498	0	80	267	0	282	223	72
Confl. Peds. (#/hr)	10		10	10		10	5		10	10		5
Confl. Bikes (#/hr)			10			5						
Heavy Vehicles (%)	4%	3%	2%	4%	5%	5%	1%	2%	6%	8%	5%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	59.5	50.0		29.6	23.1		27.9	21.8		37.5	28.4	28.4
Effective Green, g (s)	60.5	51.0		31.6	24.1		29.9	22.8		38.5	29.4	29.4
Actuated g/C Ratio	0.55	0.46		0.29	0.22		0.27	0.21		0.35	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	588	1581		229	692		343	368		318	483	386
v/s Ratio Prot	c0.29	0.28		0.02	c0.16		0.02	c0.15		c0.11	0.12	
v/s Ratio Perm	0.22			0.08			0.05			0.20		0.05
v/c Ratio	0.93	0.60		0.35	0.72		0.23	0.73		0.89	0.46	0.19
Uniform Delay, d1	28.3	22.0		29.3	39.8		30.6	40.7		30.1	33.7	31.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	21.8	1.7		0.9	6.4		0.4	7.0		24.3	0.7	0.2
Delay (s)	50.1	23.7		30.3	46.2		30.9	47.7		54.4	34.4	31.3
Level of Service	D	C		C	D		C	D		D	C	C
Approach Delay (s)		33.2			44.4			43.9			40.6	
Approach LOS		C			D			D			D	

Intersection Summary

HCM 2000 Control Delay	38.4	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0		
Intersection Capacity Utilization	93.8%	ICU Level of Service	F		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	95	980	545	125
Future Volume (vph)	95	980	545	125
Lane Group Flow (vph)	106	1089	712	211
Turn Type	pm+pt	NA	NA	Perm
Protected Phases	5	2	6	
Permitted Phases	2			8
Detector Phase	5	2	6	8
Switch Phase				
Minimum Initial (s)	6.0	8.0	8.0	8.0
Minimum Split (s)	9.0	26.0	26.0	29.0
Total Split (s)	15.0	68.0	53.0	32.0
Total Split (%)	15.0%	68.0%	53.0%	32.0%
Yellow Time (s)	3.0	4.0	4.0	4.0
All-Red Time (s)	0.0	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	None	C-Min	C-Min	None
v/c Ratio	0.20	0.49	0.38	0.72
Control Delay	6.1	9.4	13.0	43.0
Queue Delay	0.0	0.5	0.0	0.0
Total Delay	6.1	9.9	13.0	43.0
Queue Length 50th (m)	5.5	49.6	37.1	36.8
Queue Length 95th (m)	13.9	82.3	63.6	m52.3
Internal Link Dist (m)		133.0	135.9	318.4
Turn Bay Length (m)	60.0			
Base Capacity (vph)	570	2246	1863	380
Starvation Cap Reductn	0	642	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.19	0.68	0.38	0.56

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Plains Road & Cooke Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	95	980	545	95	125	65
Future Volume (vph)	95	980	545	95	125	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.98		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	3282	3221		1373	
Flt Permitted	0.34	1.00	1.00		0.97	
Satd. Flow (perm)	595	3282	3221		1373	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	106	1089	606	106	139	72
RTOR Reduction (vph)	0	0	11	0	20	0
Lane Group Flow (vph)	106	1089	701	0	191	0
Heavy Vehicles (%)	7%	10%	9%	4%	36%	12%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	67.1	67.1	56.5		18.9	
Effective Green, g (s)	68.1	68.1	57.5		19.9	
Actuated g/C Ratio	0.68	0.68	0.58		0.20	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	499	2235	1852		273	
v/s Ratio Prot	0.02	c0.33	0.22			
v/s Ratio Perm	0.13				c0.14	
v/c Ratio	0.21	0.49	0.38		0.70	
Uniform Delay, d1	5.7	7.6	11.5		37.3	
Progression Factor	1.00	1.00	1.00		0.91	
Incremental Delay, d2	0.2	0.8	0.6		7.5	
Delay (s)	5.9	8.4	12.1		41.5	
Level of Service	A	A	B		D	
Approach Delay (s)		8.2	12.1		41.5	
Approach LOS		A	B		D	

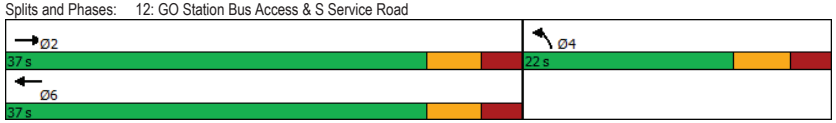
Intersection Summary				
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	48.0%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	EBT	WBT	NBL
Lane Configurations			
Traffic Volume (vph)	1400	75	15
Future Volume (vph)	1400	75	15
Lane Group Flow (vph)	1458	77	15
Turn Type	NA	NA	Prot
Protected Phases	2	6	4
Permitted Phases			
Detector Phase	2	6	4
Switch Phase			
Minimum Initial (s)	8.0	8.0	8.0
Minimum Split (s)	31.0	31.0	15.0
Total Split (s)	37.0	37.0	22.0
Total Split (%)	62.7%	62.7%	37.3%
Yellow Time (s)	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0
Lead/Lag			
Lead-Lag Optimize?			
Recall Mode	Min	Min	None
v/c Ratio	0.44	0.02	0.07
Control Delay	2.3	1.6	20.3
Queue Delay	0.0	0.0	0.0
Total Delay	2.3	1.6	20.3
Queue Length 50th (m)	0.0	0.0	0.8
Queue Length 95th (m)	64.1	3.2	6.8
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3109	3136	363
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.47	0.02	0.04

Intersection Summary
Cycle Length: 59
Actuated Cycle Length: 44
Natural Cycle: 50
Control Type: Semi Act-Uncoord

Splits and Phases: 12: GO Station Bus Access & S Service Road



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1400	15	0	75	15	0
Future Volume (vph)	1400	15	0	75	15	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3509			3539	943	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3509			3539	943	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1443	15	0	77	15	0
RTOR Reduction (vph)	1	0	0	0	0	0
Lane Group Flow (vph)	1457	0	0	77	15	0
Heavy Vehicles (%)	2%	71%	0%	2%	85%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	34.5			34.5	1.2	
Effective Green, g (s)	35.5			35.5	2.2	
Actuated g/C Ratio	0.71			0.71	0.04	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2506			2527	41	
v/s Ratio Prot	c0.42			0.02	c0.02	
v/s Ratio Perm						
v/c Ratio	0.58			0.03	0.37	
Uniform Delay, d1	3.5			2.1	23.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.3			0.0	5.5	
Delay (s)	3.8			2.1	28.5	
Level of Service	A			A	C	
Approach Delay (s)	3.8			2.1	28.5	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	4.0	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	49.7	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

Queues — Future Total (With South Parking Lot) - Improvements

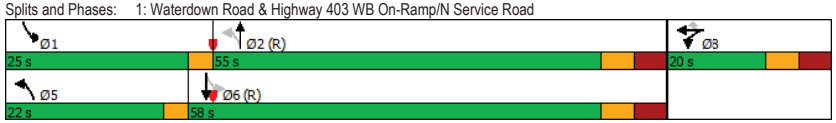
1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	105	90	55	450	400	165	605
Future Volume (vph)	105	90	55	450	400	165	605
Lane Group Flow (vph)	108	93	57	464	953	170	815
Turn Type	Split	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	8	8		5	2	1	6
Permitted Phases			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)	40.0	40.0	40.0	10.0	31.0	10.0	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%
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)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	7.0	7.0	7.0	2.0	7.0	2.0	7.0
Lead/Lag				Lead	Lag	Lead	Lag
Lead-Lag Optimize?				Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.52	0.40	0.21	0.47	0.46	0.35	0.39
Control Delay	48.8	43.7	5.1	7.6	8.9	5.2	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	48.8	43.7	5.1	7.6	9.0	5.2	11.0
Queue Length 50th (m)	20.9	17.6	0.0	10.1	16.5	6.8	38.5
Queue Length 95th (m)	36.5	31.5	5.5	42.5	73.7	15.0	62.8
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	224	253	289	1214	2084	644	2072
Starvation Cap Reductn	0	0	0	0	244	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	0.48	0.37	0.20	0.38	0.52	0.26	0.39

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 48 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Splits and Phases: 1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road



HCM Signalized Intersection Capacity Analysis — Future Total (With South Parking Lot) - Improvements

1: Waterdown Road & Highway 403 WB On-Ramp/N Service Road — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	105	90	55	450	400	525	165	605	185
Future Volume (vph)	0	0	0	105	90	55	450	400	525	165	605	185
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)				7.0	7.0	7.0	2.0	7.0		2.0	7.0	
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	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1544	1743	1479	3105	3193		1711	3415	
Flt Permitted				0.95	1.00	1.00	0.32	1.00		0.25	1.00	
Satd. Flow (perm)				1544	1743	1479	1030	3193		458	3415	
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)	0	0	0	108	93	57	464	412	541	170	624	191
RTOR Reduction (vph)	0	0	0	0	0	49	0	185	0	0	24	0
Lane Group Flow (vph)	0	0	0	108	93	8	464	768	0	170	791	0
Heavy Vehicles (%)	0%	0%	0%	13%	9%	8%	9%	4%	3%	2%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				12.4	12.4	12.4	68.1	58.5		69.1	59.0	
Effective Green, g (s)				13.4	13.4	13.4	70.1	59.5		71.1	60.0	
Actuated g/C Ratio				0.13	0.13	0.13	0.70	0.60		0.71	0.60	
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)				206	233	198	941	1899		464	2049	
v/s Ratio Prot				c0.07	0.05		c0.05	0.24		c0.04	0.23	
v/s Ratio Perm						0.01	c0.29			0.22		
v/c Ratio				0.52	0.40	0.04	0.49	0.40		0.37	0.39	
Uniform Delay, d1				40.3	39.6	37.7	5.5	10.8		5.2	10.4	
Progression Factor				1.00	1.00	1.00	1.85	1.37		1.00	1.00	
Incremental Delay, d2				2.4	1.1	0.1	0.3	0.5		0.5	0.6	
Delay (s)				42.7	40.7	37.8	10.5	15.3		5.7	11.0	
Level of Service				D	D	D	B	B		A	B	
Approach Delay (s)		0.0			40.9			13.7			10.1	
Approach LOS		A			D			B			B	

Intersection Summary

HCM 2000 Control Delay	15.0	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.49				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	58.8%	ICU Level of Service		B	
Analysis Period (min)	15				

c Critical Lane Group

Queues — Future Total (With South Parking Lot) - Improvements

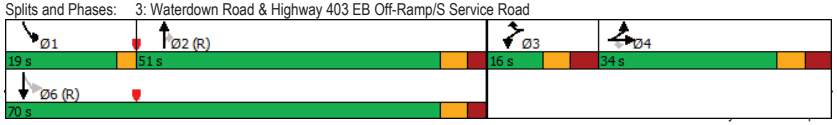
3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	305	290	490	20	70	825	740	380	770
Future Volume (vph)	305	290	490	20	70	825	740	380	770
Lane Group Flow (vph)	321	305	516	21	74	868	779	400	811
Turn Type	Split	NA	Perm	Prot	Prot	NA	Perm	pm+pt	NA
Protected Phases	4	4		3	3	2		1	6
Permitted Phases			4				2	6	
Detector Phase	4	4	4	3	3	2	2	1	6
Switch Phase									
Minimum Initial (s)	8.0	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	16.0	16.0	29.0	29.0	9.0	29.0
Total Split (s)	34.0	34.0	34.0	16.0	16.0	51.0	51.0	19.0	70.0
Total Split (%)	28.3%	28.3%	28.3%	13.3%	13.3%	42.5%	42.5%	15.8%	58.3%
Yellow Time (s)	4.0	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	3.0	0.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-2.5	-1.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	6.0	6.0	0.5	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Min	C-Min	None	C-Min
v/c Ratio	0.79	0.68	0.97	0.10	0.32	0.60	0.94	0.55	0.44
Control Delay	59.0	51.2	59.6	52.9	3.6	30.3	41.4	14.8	17.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.0	51.2	59.6	52.9	3.6	30.3	41.4	14.8	17.5
Queue Length 50th (m)	76.6	70.5	~83.6	2.5	0.0	88.7	128.7	23.2	62.3
Queue Length 95th (m)	#125.6	103.6	#158.3	6.9	0.2	115.8	#226.5	31.8	78.4
Internal Link Dist (m)		253.6				252.8			174.0
Turn Bay Length (m)	135.0			100.0				40.0	
Base Capacity (vph)	405	446	531	215	233	1444	827	799	1857
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.68	0.97	0.10	0.32	0.60	0.94	0.50	0.44

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 54 (45%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road



HCM Signalized Intersection Capacity Analysis — Future Total (With South Parking Lot) - Improvements

3: Waterdown Road & Highway 403 EB Off-Ramp/S Service Road — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	290	490	20	0	70	0	825	740	380	770	0
Future Volume (vph)	305	290	490	20	0	70	0	825	740	380	770	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0	6.0	0.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1694	1863	1521	2869		1439		3471	1553	3224	3406	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.20	1.00	
Satd. Flow (perm)	1694	1863	1521	2869		1439		3471	1553	694	3406	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	305	516	21	0	74	0	868	779	400	811	0
RTOR Reduction (vph)	0	0	167	0	0	69	0	0	186	0	0	0
Lane Group Flow (vph)	321	305	349	21	0	5	0	868	593	400	811	0
Heavy Vehicles (%)	3%	2%	5%	18%	0%	11%	0%	4%	4%	5%	6%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA	Perm	pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	27.7	27.7	27.7	6.4		6.4		47.4	47.4	62.9	62.9	
Effective Green, g (s)	28.7	28.7	28.7	7.4		7.4		48.4	48.4	65.4	63.9	
Actuated g/C Ratio	0.24	0.24	0.24	0.06		0.06		0.40	0.40	0.55	0.53	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0	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	3.0	
Lane Grp Cap (vph)	405	445	363	176		88		1399	626	694	1813	
v/s Ratio Prot	0.19	0.16		c0.01		0.00		0.25		c0.07	0.24	
v/s Ratio Perm			c0.23						c0.38	0.24		
v/c Ratio	0.79	0.69	0.96	0.12		0.05		0.62	0.95	0.58	0.45	
Uniform Delay, d1	42.9	41.5	45.1	53.2		53.0		28.5	34.6	16.5	17.2	
Progression Factor	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.2	4.3	36.8	0.3		0.2		2.1	25.2	1.2	0.8	
Delay (s)	53.1	45.9	81.8	53.5		53.2		30.6	59.8	17.7	18.0	
Level of Service	D	D	F	D		D		C	E	B	B	
Approach Delay (s)		64.1			53.3			44.4			17.9	
Approach LOS		E			D			D			B	

Intersection Summary

HCM 2000 Control Delay	42.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

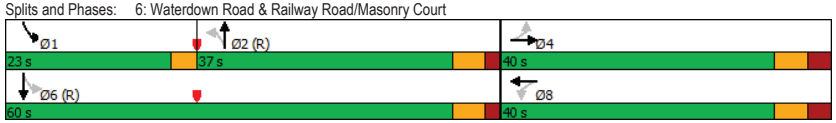
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	15	0	20	0	10	955	565	700
Future Volume (vph)	15	0	20	0	10	955	565	700
Lane Group Flow (vph)	0	21	21	452	11	1075	601	761
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	29.0	29.0	29.0	29.0	35.0	35.0	11.0	35.0
Total Split (s)	40.0	40.0	40.0	40.0	37.0	37.0	23.0	60.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	37.0%	37.0%	23.0%	60.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)		6.0	6.0	6.0	5.0	5.0	2.0	5.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Recall Mode	None	None	None	None	C-Min	C-Min	None	C-Min
v/c Ratio		0.22	0.14	0.77	0.08	0.98	0.76	0.29
Control Delay		5.3	37.9	14.2	25.9	57.6	26.2	4.5
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		5.3	37.9	14.2	25.9	57.6	26.2	4.5
Queue Length 50th (m)		0.0	4.0	3.1	1.6	113.1	72.7	16.0
Queue Length 95th (m)		0.0	9.9	31.1	6.1	#160.0	#173.8	41.1
Internal Link Dist (m)		95.0		120.3		324.2		76.6
Turn Bay Length (m)			25.0		35.0		45.0	
Base Capacity (vph)		147	418	836	136	1095	796	2586
Starvation Cap Reductn		0	0	0	0	0	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		0.14	0.05	0.54	0.08	0.98	0.76	0.29

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 22 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Waterdown Road & Railway Road/Masonry Court



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	0	5	20	0	425	10	955	55	565	700	15
Future Volume (vph)	15	0	5	20	0	425	10	955	55	565	700	15
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.96		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1060		1572	1615		1118	3410		1694	3383	
Flt Permitted		0.28		0.74	1.00		0.36	1.00		0.12	1.00	
Satd. Flow (perm)		308		1230	1615		427	3410		210	3383	
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)	16	0	5	21	0	452	11	1016	59	601	745	16
RTOR Reduction (vph)	0	18	0	0	381	0	0	4	0	0	1	0
Lane Group Flow (vph)	0	3	0	21	71	0	11	1071	0	601	760	0
Confl. Peds. (#/hr)									5	5		
Heavy Vehicles (%)	88%	0%	0%	11%	0%	0%	56%	4%	0%	3%	5%	71%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.6		11.6	11.6		31.0	31.0		75.4	75.4	
Effective Green, g (s)		12.6		12.6	12.6		32.0	32.0		76.4	76.4	
Actuated g/C Ratio		0.13		0.13	0.13		0.32	0.32		0.76	0.76	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		38		154	203		136	1091		789	2584	
v/s Ratio Prot					c0.04			c0.31		c0.32	0.22	
v/s Ratio Perm		0.01		0.02			0.03			0.26		
v/c Ratio		0.07		0.14	0.35		0.08	0.98		0.76	0.29	
Uniform Delay, d1		38.5		38.9	40.0		23.7	33.7		19.2	3.6	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8		0.4	1.0		1.2	23.2		4.4	0.3	
Delay (s)		39.3		39.3	41.0		24.9	56.9		23.6	3.9	
Level of Service		D		D	D		C	E		C	A	
Approach Delay (s)		39.3			40.9			56.6			12.6	
Approach LOS		D			D			E			B	

Intersection Summary

HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	98.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	55	470	35	225	110	20	60
Future Volume (vph)	55	470	35	225	110	20	60
Lane Group Flow (vph)	0	688	0	317	0	205	119
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA
Protected Phases		4		8		2	6
Permitted Phases	4		8		2		
Detector Phase	4	4	8	8	2	2	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	70.0	70.0	70.0	70.0	30.0	30.0	30.0
Total Split (%)	70.0%	70.0%	70.0%	70.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		-1.0		-1.0		-1.0	-1.0
Total Lost Time (s)		3.5		3.5		3.5	3.5
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	None	None	None	Max	Max	Max
v/c Ratio		0.82		0.39		0.38	0.16
Control Delay		22.7		11.9		17.5	11.4
Queue Delay		0.0		0.0		0.0	0.0
Total Delay		22.7		11.9		17.5	11.4
Queue Length 50th (m)		68.2		23.9		16.0	5.9
Queue Length 95th (m)		89.4		34.4		43.1	20.1
Internal Link Dist (m)		120.3		113.3		318.4	76.9
Turn Bay Length (m)							
Base Capacity (vph)		1681		1618		544	745
Starvation Cap Reductn		56		0		0	0
Spillback Cap Reductn		0		0		0	0
Storage Cap Reductn		0		0		0	0
Reduced v/c Ratio		0.42		0.20		0.38	0.16

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 65.3
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 8: Cooke Boulevard & Masonry Court



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	470	45	35	225	0	110	20	40	0	60	50
Future Volume (vph)	55	470	45	35	225	0	110	20	40	0	60	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6
Total Lost time (s)		3.5			3.5			3.5			3.5	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.97			0.94	
Flt Protected		1.00			0.99			0.97			1.00	
Satd. Flow (prot)		1843			1887			1667			1749	
Flt Permitted		0.95			0.89			0.75			1.00	
Satd. Flow (perm)		1753			1687			1298			1749	
Peak-hour factor, PHF	0.92	0.82	0.82	0.82	0.82	0.92	0.82	0.92	0.82	0.92	0.92	0.92
Adj. Flow (vph)	60	573	55	43	274	0	134	22	49	0	65	54
RTOR Reduction (vph)	0	5	0	0	0	0	0	9	0	0	24	0
Lane Group Flow (vph)	0	683	0	0	317	0	0	196	0	0	95	0
Confl. Peds. (#/hr)									5			
Heavy Vehicles (%)	2%	0%	17%	0%	0%	2%	9%	2%	0%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		30.2			30.2			25.9			25.9	
Effective Green, g (s)		31.2			31.2			26.9			26.9	
Actuated g/C Ratio		0.48			0.48			0.41			0.41	
Clearance Time (s)		4.5			4.5			4.5			4.5	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		840			808			536			722	
v/s Ratio Prot											0.05	
v/s Ratio Perm		c0.39			0.19			c0.15				
v/c Ratio		0.81			0.39			0.37			0.13	
Uniform Delay, d1		14.5			10.9			13.2			11.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		6.1			0.3			1.9			0.4	
Delay (s)		20.5			11.2			15.1			12.2	
Level of Service		C			B			B			B	
Approach Delay (s)		20.5			11.2			15.1			12.2	
Approach LOS		C			B			B			B	

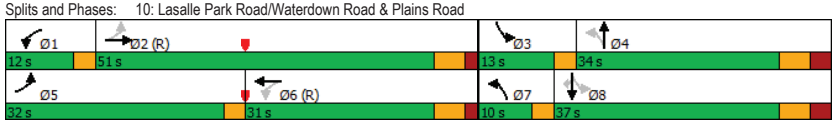
Intersection Summary				
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	65.1	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	60.5%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	515	780	75	330	75	205	265	210	255
Future Volume (vph)	515	780	75	330	75	205	265	210	255
Lane Group Flow (vph)	548	963	80	633	80	277	282	223	271
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	6.0	8.0	6.0	8.0	6.0	8.0	6.0	8.0	8.0
Minimum Split (s)	9.0	27.0	9.0	27.0	9.0	34.0	9.0	34.0	34.0
Total Split (s)	32.0	51.0	12.0	31.0	10.0	34.0	13.0	37.0	37.0
Total Split (%)	29.1%	46.4%	10.9%	28.2%	9.1%	30.9%	11.8%	33.6%	33.6%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	0.0	2.0	0.0	2.0	0.0	3.0	0.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	5.0	2.0	5.0	2.0	6.0	2.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
v/c Ratio	0.92	0.59	0.30	0.75	0.20	0.75	0.84	0.46	0.46
Control Delay	49.0	23.7	17.6	35.0	22.9	52.1	51.1	37.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.0	23.7	17.6	35.0	22.9	52.1	51.1	37.5	6.6
Queue Length 50th (m)	99.4	83.6	7.6	53.0	11.4	56.6	46.6	43.5	0.0
Queue Length 95th (m)	#182.8	112.4	15.5	72.3	21.2	81.8	#90.6	65.0	19.9
Internal Link Dist (m)		134.8		133.0		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	597	1629	283	890	400	461	334	516	606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.59	0.28	0.71	0.20	0.60	0.84	0.43	0.45

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Lasalle Park Road/Waterdown Road & Plains Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	515	780	125	75	330	265	75	205	55	265	210	255
Future Volume (vph)	515	780	125	75	330	265	75	205	55	265	210	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.93		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1677	3411		1675	3162		1723	1779		1613	1810	1446
Flt Permitted	0.15	1.00		0.30	1.00		0.62	1.00		0.31	1.00	1.00
Satd. Flow (perm)	271	3411		524	3162		1123	1779		522	1810	1446
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)	548	830	133	80	351	282	80	218	59	282	223	271
RTOR Reduction (vph)	0	11	0	0	135	0	0	10	0	0	0	199
Lane Group Flow (vph)	548	952	0	80	498	0	80	267	0	282	223	72
Confl. Peds. (#/hr)	10		10	10		10	5		10	10		5
Confl. Bikes (#/hr)			10			5						
Heavy Vehicles (%)	4%	3%	2%	4%	5%	5%	1%	2%	6%	8%	5%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	59.5	50.0		29.6	23.1		27.9	21.8		37.5	28.4	28.4
Effective Green, g (s)	60.5	51.0		31.6	24.1		29.9	22.8		38.5	29.4	29.4
Actuated g/C Ratio	0.55	0.46		0.29	0.22		0.27	0.21		0.35	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	588	1581		229	692		343	368		318	483	386
v/s Ratio Prot	c0.29	0.28		0.02	c0.16		0.02	c0.15		c0.11	0.12	
v/s Ratio Perm	0.22			0.08			0.05			0.20		0.05
v/c Ratio	0.93	0.60		0.35	0.72		0.23	0.73		0.89	0.46	0.19
Uniform Delay, d1	28.3	22.0		29.3	39.8		30.6	40.7		30.1	33.7	31.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	21.8	1.7		0.9	6.4		0.4	7.0		24.3	0.7	0.2
Delay (s)	50.1	23.7		30.3	46.2		30.9	47.7		54.4	34.4	31.3
Level of Service	D	C		C	D		C	D		D	C	C
Approach Delay (s)		33.2			44.4			43.9			40.6	
Approach LOS		C			D			D			D	

Intersection Summary

HCM 2000 Control Delay	38.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	93.8%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	332	505	179	905	1048	121	773
v/c Ratio	0.58	0.80	0.28	1.72	0.69	0.43	0.76
Control Delay	34.8	43.7	5.0	353.7	30.0	17.0	38.2
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	34.8	43.7	5.0	353.7	30.3	17.0	38.2
Queue Length 50th (m)	59.4	99.2	0.0	~279.2	112.6	12.3	79.1
Queue Length 95th (m)	94.0	#160.1	15.5	#390.7	119.2	19.7	91.6
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	571	634	649	525	1723	288	1416
Starvation Cap Reductn	0	0	0	0	179	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	0.58	0.80	0.28	1.72	0.68	0.42	0.55

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	315	480	170	860	735	260	115	555	180
Future Volume (vph)	0	0	0	315	480	170	860	735	260	115	555	180
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)				7.0	7.0	7.0	0.5	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	1694	3380		1728	3394	
Flt Permitted				0.95	1.00	1.00	0.19	1.00		0.24	1.00	
Satd. Flow (perm)				1694	1881	1575	330	3380		429	3394	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	332	505	179	905	774	274	121	584	189
RTOR Reduction (vph)	0	0	0	0	0	119	0	37	0	0	34	0
Lane Group Flow (vph)	0	0	0	332	505	60	905	1011	0	121	739	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				36.1	36.1	36.1	57.9	46.9		38.8	30.8	
Effective Green, g (s)				37.1	37.1	37.1	60.4	47.9		40.8	31.8	
Actuated g/C Ratio				0.34	0.34	0.34	0.55	0.44		0.37	0.29	
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)				571	634	531	511	1471		265	981	
v/s Ratio Prot				0.20	c0.27		c0.43	0.30		0.04	c0.22	
v/s Ratio Perm						0.04	0.54			0.13		
v/c Ratio				0.58	0.80	0.11	1.77	0.69		0.46	0.75	
Uniform Delay, d1				30.0	33.0	25.1	27.5	25.0		23.5	35.5	
Progression Factor				1.00	1.00	1.00	0.92	1.17		1.00	1.00	
Incremental Delay, d2				1.5	6.9	0.1	352.8	1.9		1.2	5.3	
Delay (s)				31.6	39.9	25.2	378.2	31.2		24.8	40.9	
Level of Service				C	D	C	F	C		C	D	
Approach Delay (s)		0.0			34.6			192.0			38.7	
Approach LOS		A			C			F			D	

Intersection Summary

HCM 2000 Control Delay	115.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	109.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues — Future Total (With South Parking Lot)

2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp — PM Peak Hour



Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	420	309	1665	926
v/c Ratio	0.74	0.70	0.67	0.37
Control Delay	50.9	23.7	9.5	7.9
Queue Delay	0.0	2.8	0.6	0.2
Total Delay	50.9	26.6	10.1	8.0
Queue Length 50th (m)	46.1	21.8	91.9	41.4
Queue Length 95th (m)	64.4	54.9	m33.6	52.4
Internal Link Dist (m)			174.0	121.9
Turn Bay Length (m)	145.0	115.0		
Base Capacity (vph)	600	458	2486	2486
Starvation Cap Reductn	0	0	410	684
Spillback Cap Reductn	0	71	361	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.70	0.80	0.80	0.51

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis — Future Total (With South Parking Lot)

2: Waterdown Road & Panin Road/Highway 403 WB Off-Ramp — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	395	0	290	0	1565	0	0	870	0
Future Volume (vph)	0	0	0	395	0	290	0	1565	0	0	870	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)				6.0		6.0		6.0			6.0	
Lane Util. Factor				0.97		1.00		0.95			0.95	
Frpb, ped/bikes				1.00		1.00		1.00			1.00	
Flpb, ped/bikes				1.00		1.00		1.00			1.00	
Frt				1.00		0.85		1.00			1.00	
Flt Protected				0.95		1.00		1.00			1.00	
Satd. Flow (prot)				3134		1551		3505			3505	
Flt Permitted				0.95		1.00		1.00			1.00	
Satd. Flow (perm)				3134		1551		3505			3505	
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)	0	0	0	420	0	309	0	1665	0	0	926	0
RTOR Reduction (vph)	0	0	0	0	0	164	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	420	0	145	0	1665	0	0	926	0
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)									1			2
Heavy Vehicles (%)	0%	0%	0%	8%	100%	3%	0%	3%	0%	0%	3%	0%
Turn Type				Prot		Prot		NA			NA	
Protected Phases	8	8		7		7		2			6	
Permitted Phases							2					
Actuated Green, G (s)				19.0		19.0		77.0			77.0	
Effective Green, g (s)				20.0		20.0		78.0			78.0	
Actuated g/C Ratio				0.18		0.18		0.71			0.71	
Clearance Time (s)				7.0		7.0		7.0			7.0	
Vehicle Extension (s)				3.0		3.0		3.0			3.0	
Lane Grp Cap (vph)				569		282		2485			2485	
v/s Ratio Prot				c0.13		0.09		c0.48			0.26	
v/s Ratio Perm												
v/c Ratio				0.74		0.52		0.67			0.37	
Uniform Delay, d1				42.5		40.6		8.9			6.3	
Progression Factor				1.00		1.00		1.00			1.13	
Incremental Delay, d2				5.0		1.6		0.1			0.4	
Delay (s)				47.5		42.2		9.0			7.5	
Level of Service				D		D		A			A	
Approach Delay (s)		0.0			45.3			9.0			7.5	
Approach LOS		A			D			A			A	

Intersection Summary

HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	232	162	414	56	288	1622	364	914
v/c Ratio	0.71	0.45	0.89	0.18	0.71	1.34	1.06	0.50
Control Delay	54.3	43.3	42.4	46.1	16.4	182.2	96.9	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.3	43.3	42.4	46.1	16.4	182.2	96.9	21.4
Queue Length 50th (m)	46.7	30.8	44.0	6.2	1.1	~250.8	~87.4	85.5
Queue Length 95th (m)	#87.4	55.0	#108.9	11.9	27.1	#296.6	#140.2	109.1
Internal Link Dist (m)		253.6				249.5		174.0
Turn Bay Length (m)	135.0			100.0			40.0	
Base Capacity (vph)	341	375	479	431	453	1213	344	1828
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	0.68	0.43	0.86	0.13	0.64	1.34	1.06	0.50

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)	230	160	410	55	0	285	0	1050	555	360	905	0
Future Volume (vph)	230	160	410	55	0	285	0	1050	555	360	905	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0		2.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00		1.00		1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00		0.85		0.95		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)	1678	1845	1521	3164		1536		3332		1678	3471	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00		0.10	1.00	
Satd. Flow (perm)	1678	1845	1521	3164		1536		3332		177	3471	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	232	162	414	56	0	288	0	1061	561	364	914	0
RTOR Reduction (vph)	0	0	172	0	0	256	0	63	0	0	0	0
Lane Group Flow (vph)	232	162	242	56	0	32	0	1559	0	364	914	0
Confl. Peds. (#/hr)			5	5			4					4
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	3%	3%	7%	0%	4%	0%	1%	6%	4%	4%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA		pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	20.4	20.4	20.4	9.6		9.6		37.0		57.0	57.0	
Effective Green, g (s)	21.4	21.4	21.4	10.6		10.6		38.0		58.0	58.0	
Actuated g/C Ratio	0.19	0.19	0.19	0.10		0.10		0.35		0.53	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)	326	358	295	304		148		1151		338	1830	
v/s Ratio Prot	0.14	0.09		0.02		c0.02		c0.47		c0.18	0.26	
v/s Ratio Perm			c0.16							0.39		
v/c Ratio	0.71	0.45	0.82	0.18		0.22		1.35		1.08	0.50	
Uniform Delay, d1	41.4	39.1	42.5	45.7		45.9		36.0		34.0	16.7	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.79		1.20	1.17	
Incremental Delay, d2	7.2	0.9	16.6	0.3		0.7		164.2		68.4	0.9	
Delay (s)	48.6	40.0	59.1	46.0		46.6		192.6		109.1	20.4	
Level of Service	D	D	E	D		D		F		F	C	
Approach Delay (s)		52.2			46.5			192.6			45.6	
Approach LOS		D			D			F			D	

Intersection Summary

HCM 2000 Control Delay	105.8	HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	1.02				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		22.0	
Intersection Capacity Utilization	101.2%	ICU Level of Service		G	
Analysis Period (min)	15				

c Critical Lane Group



Lane Group	EBL	EBR	NBT
Lane Group Flow (vph)	875	26	218
v/c Ratio	0.91	0.03	0.53
Control Delay	28.6	3.2	23.7
Queue Delay	0.0	0.0	0.0
Total Delay	28.6	3.2	23.7
Queue Length 50th (m)	72.4	0.1	19.8
Queue Length 95th (m)	#170.1	2.9	36.7
Internal Link Dist (m)	190.8		55.4
Turn Bay Length (m)			
Base Capacity (vph)	965	938	1149
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.91	0.03	0.19

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)	840	25	175	35	0	0
Future Volume (vph)	840	25	175	35	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)	5.0	5.0		6.0		
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)	1662	1597		1824		
Flt Permitted	0.95	1.00		0.96		
Satd. Flow (perm)	1662	1597		1824		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	875	26	182	36	0	0
RTOR Reduction (vph)	0	10	0	0	0	0
Lane Group Flow (vph)	875	16	0	218	0	0
Heavy Vehicles (%)	5%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	Split	NA		
Protected Phases	2 6		4	4		
Permitted Phases		2 6				
Actuated Green, G (s)	32.3	32.3		12.0		
Effective Green, g (s)	33.3	33.3		13.0		
Actuated g/C Ratio	0.58	0.58		0.23		
Clearance Time (s)				7.0		
Vehicle Extension (s)				3.0		
Lane Grp Cap (vph)	965	928		413		
v/s Ratio Prot	c0.53			c0.12		
v/s Ratio Perm		0.01				
v/c Ratio	0.91	0.02		0.53		
Uniform Delay, d1	10.6	5.1		19.5		
Progression Factor	1.00	1.00		1.00		
Incremental Delay, d2	11.9	0.0		1.2		
Delay (s)	22.5	5.1		20.7		
Level of Service	C	A		C		
Approach Delay (s)	22.0			20.7	0.0	
Approach LOS	C			C	A	

Intersection Summary				
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	67.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	110	1495	25	0	1370
Future Volume (Veh/h)	0	110	1495	25	0	1370
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	120	1625	27	0	1489
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			104			273
pX, platoon unblocked	0.87	0.79			0.79	
vC, conflicting volume	2383	826			1652	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1439	253			1296	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	80			100	
cM capacity (veh/h)	108	591			420	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	120	1083	569	744	744
Volume Left	0	0	0	0	0
Volume Right	120	0	27	0	0
cSH	591	1700	1700	1700	1700
Volume to Capacity	0.20	0.64	0.33	0.44	0.44
Queue Length 95th (m)	6.0	0.0	0.0	0.0	0.0
Control Delay (s)	12.6	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	12.6	0.0		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		55.6%	ICU Level of Service	B
Analysis Period (min)		15		



Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	46	773	10	810	515	897
v/c Ratio	0.05	0.08	0.90	0.07	0.75	1.48	0.54
Control Delay	0.2	22.1	31.9	20.3	28.8	259.1	32.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.2	22.1	31.9	20.3	28.8	259.1	32.9
Queue Length 50th (m)	0.0	6.1	99.5	1.3	82.4	~142.0	91.6
Queue Length 95th (m)	0.0	15.5	#203.8	m1.5	m91.6	m#193.2	m92.4
Internal Link Dist (m)	95.0		120.3		324.2		79.9
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	424	575	862	218	1712	347	2325
Starvation Cap Reductn	0	0	0	0	0	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	0.05	0.08	0.90	0.05	0.47	1.48	0.39

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 — Future Total (With South Parking Lot)
6: Waterdown Road & Railway Road/Masonry Court — PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	10	45	0	750	10	760	25	500	860	10
Future Volume (vph)	10	0	10	45	0	750	10	760	25	500	860	10
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.85		1.00	1.00		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1574		1740	1575		1308	3421		1710	3504	
Flt Permitted		0.57		0.74	1.00		0.32	1.00		0.15	1.00	
Satd. Flow (perm)		923		1363	1575		437	3421		274	3504	
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)	10	0	10	46	0	773	10	784	26	515	887	10
RTOR Reduction (vph)	0	12	0	0	197	0	0	3	0	0	1	0
Lane Group Flow (vph)	0	8	0	46	576	0	10	807	0	515	896	0
Confl. Peds. (#/hr)	2		2	2		2	5		6	6		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	18%	0%	0%	0%	0%	1%	33%	4%	0%	2%	2%	75%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		45.5		45.5	45.5		33.5	33.5		51.5	51.5	
Effective Green, g (s)		46.5		46.5	46.5		34.5	34.5		52.5	52.5	
Actuated g/C Ratio		0.42		0.42	0.42		0.31	0.31		0.48	0.48	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		390		576	665		137	1072		339	1672	
v/s Ratio Prot					c0.37			c0.24		c0.22	0.26	
v/s Ratio Perm		0.01		0.03			0.02			0.50		
v/c Ratio		0.02		0.08	0.87		0.07	0.75		1.52	0.54	
Uniform Delay, d1		18.5		19.0	28.9		26.5	33.9		27.2	20.2	
Progression Factor		1.00		1.00	1.00		0.83	0.81		1.35	1.62	
Incremental Delay, d2		0.0		0.1	11.4		0.4	2.0		246.1	1.0	
Delay (s)		18.5		19.0	40.3		22.5	29.4		282.9	33.7	
Level of Service		B		B	D		C	C		F	C	
Approach Delay (s)		18.5			39.1			29.3			124.6	
Approach LOS		B			D			C			F	

Intersection Summary				
HCM 2000 Control Delay	75.7	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	111.0%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis — Future Total (With South Parking Lot)
7: — PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	50	220	40	20	0
Future Volume (Veh/h)	0	50	220	40	20	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	239	43	22	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	543	22	22			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	543	22	22			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	95	85			
cM capacity (veh/h)	426	1055	1593			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	54	282	22
Volume Left	0	239	0
Volume Right	54	0	0
cSH	1055	1593	1700
Volume to Capacity	0.05	0.15	0.01
Queue Length 95th (m)	1.3	4.2	0.0
Control Delay (s)	8.6	6.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.6	6.7	0.0
Approach LOS	A		

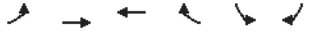
Intersection Summary					
Average Delay	6.6				
Intersection Capacity Utilization	31.0%	ICU Level of Service		A	
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	210	50	55	625	0	105	80	40	5	40	25
Future Volume (Veh/h)	180	210	50	55	625	0	105	80	40	5	40	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.89	0.89	0.89	0.89	0.92	0.89	0.92	0.89	0.92	0.92	0.92
Hourly flow rate (vph)	196	236	56	62	702	0	118	87	45	5	43	27
Pedestrians					15							
Lane Width (m)					3.6							
Walking Speed (m/s)					1.2							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		144										
pX, platoon unblocked				0.79			0.79	0.79	0.79	0.79	0.79	
vC, conflicting volume	702			292			1530	1482	279	1586	1510	702
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	702			0			1539	1477	0	1609	1513	702
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			95			0	0	95	0	39	94
cM capacity (veh/h)	895			1286			29	74	846	0	70	438

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	488	764	250	75
Volume Left	196	62	118	5
Volume Right	56	0	45	27
cSH	895	1286	47	0
Volume to Capacity	0.22	0.05	5.36	Err
Queue Length 95th (m)	6.7	1.2	Err	Err
Control Delay (s)	5.7	1.2	Err	Err
Lane LOS	A	A	F	F
Approach Delay (s)	5.7	1.2	Err	Err
Approach LOS			F	F

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	89.4%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	255	680	0	0	0
Future Volume (Veh/h)	0	255	680	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	277	739	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)		280				
pX, platoon unblocked						
vC, conflicting volume	739				1016	739
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	739				1016	739
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)	867				264	417

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	277	739	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	867	1700	1700
Volume to Capacity	0.00	0.43	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	39.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues — Future Total (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	216	613	72	1361	113	309	366	222	330
v/c Ratio	0.79	0.39	0.17	1.02	0.31	0.93	1.01	0.43	0.51
Control Delay	44.5	20.9	7.0	52.4	24.7	77.3	63.3	16.6	9.0
Queue Delay	0.0	0.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	20.9	7.0	57.2	24.7	77.3	63.3	16.6	9.0
Queue Length 50th (m)	31.0	47.2	1.6	~175.0	16.2	67.1	~7.3	32.4	52.2
Queue Length 95th (m)	#64.8	64.4	m4.6	#213.6	28.9	#121.2	#119.3	66.8	62.9
Internal Link Dist (m)		134.8		136.1		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	298	1587	522	1337	364	334	361	518	646
Starvation Cap Reductn	0	0	0	19	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.39	0.14	1.03	0.31	0.93	1.01	0.43	0.51

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 — Future Total (With South Parking Lot)

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	530	65	70	970	350	110	235	65	355	215	320
Future Volume (vph)	210	530	65	70	970	350	110	235	65	355	215	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1616	3468		1639	3356		1694	1789		1710	1900	1491
Flt Permitted	0.09	1.00		0.40	1.00		0.62	1.00		0.19	1.00	1.00
Satd. Flow (perm)	152	3468		699	3356		1105	1789		344	1900	1491
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)	216	546	67	72	1000	361	113	242	67	366	222	330
RTOR Reduction (vph)	0	8	0	0	32	0	0	9	0	0	0	240
Lane Group Flow (vph)	216	605	0	72	1329	0	113	300	0	366	222	90
Confl. Peds. (#/hr)	5		10	10		5			5	5		
Confl. Bikes (#/hr)			10			15						5
Heavy Vehicles (%)	8%	2%	0%	6%	2%	4%	3%	3%	0%	2%	0%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	58.0	48.5		48.3	41.8		26.0	19.0		39.0	29.0	29.0
Effective Green, g (s)	59.0	49.5		50.3	42.8		28.0	20.0		40.0	30.0	30.0
Actuated g/C Ratio	0.54	0.45		0.46	0.39		0.25	0.18		0.36	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	270	1560		383	1305		324	325		348	518	406
v/s Ratio Prot	c0.10	0.17		0.01	c0.40		0.03	c0.17		c0.17	0.12	
v/s Ratio Perm	0.33			0.07			0.06			0.21		0.06
v/c Ratio	0.80	0.39		0.19	1.02		0.35	0.92		1.05	0.43	0.22
Uniform Delay, d1	29.4	20.2		17.0	33.6		32.7	44.2		29.6	32.9	31.0
Progression Factor	1.00	1.00		0.55	0.77		1.00	1.00		0.30	0.42	1.71
Incremental Delay, d2	15.5	0.7		0.2	26.1		0.7	30.7		61.2	0.5	0.3
Delay (s)	44.9	20.9		9.5	52.0		33.4	75.0		70.2	14.5	53.2
Level of Service	D	C		A	D		C	E		E	B	D
Approach Delay (s)		27.1			49.8			63.8			50.6	
Approach LOS		C			D			E			D	

Intersection Summary

HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	102.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	72	851	1448	226
v/c Ratio	0.27	0.35	0.69	0.73
Control Delay	7.1	5.5	16.8	50.5
Queue Delay	0.0	0.2	1.4	0.0
Total Delay	7.1	5.7	18.2	50.6
Queue Length 50th (m)	1.8	23.0	107.4	41.2
Queue Length 95th (m)	m8.6	m50.2	163.4	m47.1
Internal Link Dist (m)		136.1	132.2	314.3
Turn Bay Length (m)	60.0			
Base Capacity (vph)	343	2400	2091	403
Starvation Cap Reductn	0	615	0	0
Spillback Cap Reductn	0	0	415	3
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.21	0.48	0.86	0.56

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	825	1270	135	140	80
Future Volume (vph)	70	825	1270	135	140	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1687	3374	3274		1628	
Flt Permitted	0.12	1.00	1.00		0.97	
Satd. Flow (perm)	208	3374	3274		1628	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	72	851	1309	139	144	82
RTOR Reduction (vph)	0	0	6	0	20	0
Lane Group Flow (vph)	72	851	1442	0	206	0
Confl. Peds. (#/hr)	10			10		
Confl. Bikes (#/hr)				10		
Heavy Vehicles (%)	7%	7%	7%	5%	9%	5%
Bus Blockages (#/hr)	0	0	6	6	0	0
Turn Type	pm+pt	NA	NA		Perm	
Protected Phases	5	2	6			
Permitted Phases	2				8	
Actuated Green, G (s)	77.3	77.3	68.5		18.7	
Effective Green, g (s)	78.3	78.3	69.5		19.7	
Actuated g/C Ratio	0.71	0.71	0.63		0.18	
Clearance Time (s)	3.0	7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	239	2401	2068		291	
v/s Ratio Prot	0.02	c0.25	c0.44			
v/s Ratio Perm	0.20				c0.13	
v/c Ratio	0.30	0.35	0.70		0.71	
Uniform Delay, d1	8.6	6.1	13.3		42.5	
Progression Factor	1.15	0.77	1.00		1.01	
Incremental Delay, d2	0.5	0.3	2.0		7.3	
Delay (s)	10.4	5.0	15.3		50.1	
Level of Service	B	A	B		D	
Approach Delay (s)		5.4	15.3		50.1	
Approach LOS		A	B		D	

Intersection Summary				
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	1271	388	18
v/c Ratio	0.39	0.11	0.07
Control Delay	2.0	1.3	16.9
Queue Delay	0.0	0.0	0.0
Total Delay	2.0	1.3	16.9
Queue Length 50th (m)	0.0	0.0	0.6
Queue Length 95th (m)	45.6	11.5	6.5
Internal Link Dist (m)	215.9	190.8	64.4
Turn Bay Length (m)			
Base Capacity (vph)	3064	3171	421
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.41	0.12	0.04

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1060	20	0	330	10	5
Future Volume (vph)	1060	20	0	330	10	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.6	3.3	3.5
Total Lost time (s)	6.0			6.0	6.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	0.95	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	3487			3610	1018	
Flt Permitted	1.00			1.00	0.97	
Satd. Flow (perm)	3487			3610	1018	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1247	24	0	388	12	6
RTOR Reduction (vph)	1	0	0	0	6	0
Lane Group Flow (vph)	1270	0	0	388	12	0
Heavy Vehicles (%)	2%	67%	0%	0%	100%	0%
Turn Type	NA			NA	Prot	
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	32.4			32.4	1.1	
Effective Green, g (s)	33.4			33.4	2.1	
Actuated g/C Ratio	0.70			0.70	0.04	
Clearance Time (s)	7.0			7.0	7.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2451			2538	45	
v/s Ratio Prot	c0.36			0.11	c0.01	
v/s Ratio Perm						
v/c Ratio	0.52			0.15	0.27	
Uniform Delay, d1	3.3			2.3	22.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.2			0.0	3.3	
Delay (s)	3.5			2.4	25.2	
Level of Service	A			A	C	
Approach Delay (s)	3.5			2.4	25.2	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	3.5	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	46.6%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Lane Group	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	332	505	179	905	1048	121	773
v/c Ratio	0.69	0.95	0.31	0.77	0.62	0.39	0.72
Control Delay	44.5	68.8	6.2	22.9	28.5	15.6	37.7
Queue Delay	0.0	0.0	0.0	0.1	0.5	0.0	0.0
Total Delay	44.5	68.8	6.2	22.9	29.0	15.6	37.7
Queue Length 50th (m)	68.0	113.5	0.0	59.1	106.7	9.6	77.0
Queue Length 95th (m)	101.7	#182.6	16.8	82.3	116.9	16.8	#117.1
Internal Link Dist (m)		247.0			121.9		158.7
Turn Bay Length (m)	170.0		135.0	100.0		85.0	
Base Capacity (vph)	478	531	572	1335	1723	316	1071
Starvation Cap Reductn	0	0	0	21	293	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	0.69	0.95	0.31	0.69	0.73	0.38	0.72

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	315	480	170	860	735	260	115	555	180
Future Volume (vph)	0	0	0	315	480	170	860	735	260	115	555	180
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)				7.0	7.0	7.0	0.5	7.0		2.0	7.0	
Lane Util. Factor				1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes				1.00	1.00	0.99	1.00	0.99		1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt				1.00	1.00	0.85	1.00	0.96		1.00	0.96	
Flt Protected				0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)				1694	1881	1575	3285	3380		1728	3394	
Flt Permitted				0.95	1.00	1.00	0.20	1.00		0.27	1.00	
Satd. Flow (perm)				1694	1881	1575	697	3380		497	3394	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	332	505	179	905	774	274	121	584	189
RTOR Reduction (vph)	0	0	0	0	0	129	0	33	0	0	26	0
Lane Group Flow (vph)	0	0	0	332	505	50	905	1015	0	121	747	0
Confl. Peds. (#/hr)	2					2	4					4
Confl. Bikes (#/hr)									1			1
Heavy Vehicles (%)	0%	0%	0%	3%	1%	0%	3%	1%	5%	1%	2%	2%
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				8	8		5	2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)				30.0	30.0	30.0	64.0	53.3		40.6	32.9	
Effective Green, g (s)				31.0	31.0	31.0	66.5	54.3		42.6	33.9	
Actuated g/C Ratio				0.28	0.28	0.28	0.60	0.49		0.39	0.31	
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)				477	530	443	1141	1668		289	1045	
v/s Ratio Prot				0.20	c0.27		c0.22	0.30		0.03	c0.22	
v/s Ratio Perm						0.03	0.26			0.13		
v/c Ratio				0.70	0.95	0.11	0.79	0.61		0.42	0.71	
Uniform Delay, d1				35.3	38.8	29.3	19.8	20.2		22.2	33.8	
Progression Factor				1.00	1.00	1.00	1.24	1.43		1.00	1.00	
Incremental Delay, d2				4.4	27.5	0.1	2.9	1.2		1.0	4.2	
Delay (s)				39.7	66.3	29.4	27.5	30.1		23.2	37.9	
Level of Service				D	E	C	C	C		C	D	
Approach Delay (s)		0.0			51.1			28.9			35.9	
Approach LOS		A			D			C			D	

Intersection Summary

HCM 2000 Control Delay	36.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	232	162	414	56	288	1061	561	364	914
v/c Ratio	0.66	0.42	0.91	0.21	0.76	0.76	0.67	0.60	0.50
Control Delay	52.3	43.6	51.2	48.7	20.6	24.2	6.0	22.7	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	43.6	51.2	48.7	20.6	24.2	6.0	22.7	17.2
Queue Length 50th (m)	49.0	32.3	56.6	6.2	3.0	77.7	6.4	24.0	72.0
Queue Length 95th (m)	#94.6	56.3	#129.3	12.6	#37.6	m115.2	m14.7	38.0	93.1
Internal Link Dist (m)		253.6				249.5			174.0
Turn Bay Length (m)	135.0			100.0			80.0	40.0	
Base Capacity (vph)	349	384	455	287	388	1458	857	692	1956
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.42	0.91	0.20	0.74	0.73	0.65	0.53	0.47

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)	230	160	410	55	0	285	0	1050	555	360	905	0
Future Volume (vph)	230	160	410	55	0	285	0	1050	555	360	905	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	3.3	3.6	3.6
Total Lost time (s)	7.0	7.0	7.0	7.0		7.0		6.0	6.0	0.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97		1.00		0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00		1.00		1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1678	1845	1521	3164		1536		3574	1524	3255	3471	
Flt Permitted	0.95	1.00	1.00	0.95		1.00		1.00	1.00	0.12	1.00	
Satd. Flow (perm)	1678	1845	1521	3164		1536		3574	1524	422	3471	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	232	162	414	56	0	288	0	1061	561	364	914	0
RTOR Reduction (vph)	0	0	139	0	0	251	0	0	242	0	0	0
Lane Group Flow (vph)	232	162	275	56	0	37	0	1061	319	364	914	0
Confl. Peds. (#/hr)			5	5			4					4
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	3%	3%	7%	0%	4%	0%	1%	6%	4%	4%	0%
Turn Type	Split	NA	Perm	Prot		Prot		NA	Perm	pm+pt	NA	
Protected Phases	4	4		3		3		2		1	6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	21.9	21.9	21.9	8.4		8.4		42.2	42.2	56.7	56.7	
Effective Green, g (s)	22.9	22.9	22.9	9.4		9.4		43.2	43.2	59.2	57.7	
Actuated g/C Ratio	0.21	0.21	0.21	0.09		0.09		0.39	0.39	0.54	0.52	
Clearance Time (s)	8.0	8.0	8.0	8.0		8.0		7.0	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	3.0	
Lane Grp Cap (vph)	349	384	316	270		131		1403	598	587	1820	
v/s Ratio Prot	0.14	0.09		0.02		c0.02		c0.30		c0.08	0.26	
v/s Ratio Perm			c0.18						0.21	0.25		
v/c Ratio	0.66	0.42	0.87	0.21		0.29		0.76	0.53	0.62	0.50	
Uniform Delay, d1	40.0	37.8	42.1	46.8		47.2		28.9	25.7	17.7	16.9	
Progression Factor	1.00	1.00	1.00	1.00		1.00		0.74	0.41	1.51	0.98	
Incremental Delay, d2	4.7	0.8	22.1	0.4		1.2		2.7	2.4	1.8	0.9	
Delay (s)	44.7	38.6	64.3	47.2		48.4		24.2	13.0	28.5	17.5	
Level of Service	D	D	E	D		D		C	B	C	B	
Approach Delay (s)		53.5			48.2			20.3			20.6	
Approach LOS		D			D			C			C	

Intersection Summary

HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	20	46	773	10	810	515	897
v/c Ratio	0.08	0.12	0.94	0.07	0.71	0.92	0.42
Control Delay	0.6	31.8	33.1	21.0	26.0	46.0	18.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.6	31.8	33.1	21.0	26.0	46.0	18.7
Queue Length 50th (m)	0.0	7.6	65.2	1.5	88.0	97.5	77.6
Queue Length 95th (m)	0.0	18.5	#162.3	m1.6	m91.0	m#125.4	m75.0
Internal Link Dist (m)	95.0		120.3		324.2		79.9
Turn Bay Length (m)		25.0		35.0		45.0	
Base Capacity (vph)	255	393	824	158	1243	603	2325
Starvation Cap Reductn	0	0	0	0	0	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	0.08	0.12	0.94	0.06	0.65	0.85	0.39

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)	10	0	10	45	0	750	10	760	25	500	860	10
Future Volume (vph)	10	0	10	45	0	750	10	760	25	500	860	10
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)		6.0		6.0	6.0		5.0	5.0		2.0	5.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.85		1.00	1.00		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1574		1740	1575		1308	3421		1710	3504	
Flt Permitted		0.46		0.74	1.00		0.32	1.00		0.17	1.00	
Satd. Flow (perm)		735		1363	1575		437	3421		305	3504	
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)	10	0	10	46	0	773	10	784	26	515	887	10
RTOR Reduction (vph)	0	14	0	0	370	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	6	0	46	403	0	10	808	0	515	896	0
Confl. Peds. (#/hr)	2		2	2		2	5		6	6		5
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	18%	0%	0%	0%	0%	1%	33%	4%	0%	2%	2%	75%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	5	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		30.8		30.8	30.8		35.7	35.7		66.2	66.2	
Effective Green, g (s)		31.8		31.8	31.8		36.7	36.7		67.2	67.2	
Actuated g/C Ratio		0.29		0.29	0.29		0.33	0.33		0.61	0.61	
Clearance Time (s)		7.0		7.0	7.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		212		394	455		145	1141		550	2140	
v/s Ratio Prot					c0.26			c0.24		c0.24	0.26	
v/s Ratio Perm		0.01		0.03			0.02			0.33		
v/c Ratio		0.03		0.12	0.89		0.07	0.71		0.94	0.42	
Uniform Delay, d1		28.0		28.8	37.4		25.0	32.0		26.0	11.2	
Progression Factor		1.00		1.00	1.00		0.81	0.77		1.12	1.65	
Incremental Delay, d2		0.1		0.1	18.4		0.3	1.1		20.9	0.5	
Delay (s)		28.1		28.9	55.7		20.4	25.7		49.9	19.0	
Level of Service		C		C	E		C	C		D	B	
Approach Delay (s)		28.1			54.2			25.6			30.3	
Approach LOS		C			D			C			C	

Intersection Summary					
HCM 2000 Control Delay	35.4	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)	13.0		
Intersection Capacity Utilization	111.0%	ICU Level of Service	H		
Analysis Period (min)	15				
c Critical Lane Group					

Queues
8: Cooke Boulevard & Masonry Court

Future Total (With South Parking Lot) - Improvements
PM Peak Hour

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	488	764	250	75
v/c Ratio	0.94	0.78	0.47	0.12
Control Delay	43.7	19.3	28.2	18.6
Queue Delay	0.1	0.0	0.0	0.0
Total Delay	43.7	19.3	28.2	18.6
Queue Length 50th (m)	63.3	85.3	28.0	5.0
Queue Length 95th (m)	115.7	119.2	78.5	21.0
Internal Link Dist (m)	120.3	111.1	314.3	67.0
Turn Bay Length (m)				
Base Capacity (vph)	836	1597	528	636
Starvation Cap Reductn	14	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.48	0.47	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: Cooke Boulevard & Masonry Court

Future Total (With South Parking Lot) - Improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	210	50	55	625	0	105	80	40	5	40	25
Future Volume (vph)	180	210	50	55	625	0	105	80	40	5	40	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.5	3.6	3.6	3.6
Total Lost time (s)		3.5			3.5			3.5			3.5	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.98			0.95	
Flt Protected		0.98			1.00			0.98			1.00	
Satd. Flow (prot)		1757			1892			1733			1766	
Flt Permitted		0.52			0.93			0.83			0.98	
Satd. Flow (perm)		925			1769			1466			1742	
Peak-hour factor, PHF	0.92	0.89	0.89	0.89	0.89	0.92	0.89	0.92	0.89	0.92	0.92	0.92
Adj. Flow (vph)	196	236	56	62	702	0	118	87	45	5	43	27
RTOR Reduction (vph)	0	6	0	0	0	0	0	6	0	0	16	0
Lane Group Flow (vph)	0	482	0	0	764	0	0	244	0	0	59	0
Confl. Peds. (#/hr)									15			
Heavy Vehicles (%)	2%	0%	31%	0%	0%	2%	6%	2%	0%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		43.6			43.6			27.7			27.7	
Effective Green, g (s)		44.6			44.6			28.7			28.7	
Actuated g/C Ratio		0.56			0.56			0.36			0.36	
Clearance Time (s)		4.5			4.5			4.5			4.5	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		513			982			523			622	
v/s Ratio Prot												
v/s Ratio Perm		c0.52			0.43			c0.17			0.03	
v/c Ratio		0.94			0.78			0.47			0.09	
Uniform Delay, d1		16.6			14.0			19.9			17.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		25.1			3.9			3.0			0.3	
Delay (s)		41.7			17.9			22.9			17.5	
Level of Service		D			B			C			B	
Approach Delay (s)		41.7			17.9			22.9			17.5	
Approach LOS		D			B			C			B	

Intersection Summary					
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.75				
Actuated Cycle Length (s)	80.3	Sum of lost time (s)	7.0		
Intersection Capacity Utilization	89.4%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

Queues — Future Total (With South Parking Lot) - Improvements

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	216	613	72	1361	113	309	366	222	330
v/c Ratio	0.96	0.39	0.18	0.97	0.31	0.97	0.94	0.43	0.53
Control Delay	76.6	21.7	6.9	38.3	24.0	89.2	54.3	27.6	16.8
Queue Delay	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0
Total Delay	76.6	21.7	6.9	42.8	24.0	89.2	54.3	27.6	16.8
Queue Length 50th (m)	32.9	48.2	1.7	152.5	15.9	67.9	71.1	43.9	45.8
Queue Length 95th (m)	#82.6	65.7	m5.0	#198.0	28.4	#125.1	#125.3	67.3	61.2
Internal Link Dist (m)		134.8		136.1		101.9		324.2	
Turn Bay Length (m)	60.0		50.0		50.0				50.0
Base Capacity (vph)	226	1553	501	1405	369	317	388	522	619
Starvation Cap Reductn	0	0	0	37	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.39	0.14	0.99	0.31	0.97	0.94	0.43	0.53

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.

HCM Signalized Intersection Capacity Analysis — Future Total (With South Parking Lot) - Improvements

10: Lasalle Park Road/Waterdown Road & Plains Road — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	530	65	70	970	350	110	235	65	355	215	320
Future Volume (vph)	210	530	65	70	970	350	110	235	65	355	215	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.5
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	6.0		2.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1616	3468		1641	3356		1694	1789		1710	1900	1491
Flt Permitted	0.09	1.00		0.37	1.00		0.62	1.00		0.19	1.00	1.00
Satd. Flow (perm)	145	3468		643	3356		1105	1789		343	1900	1491
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)	216	546	67	72	1000	361	113	242	67	366	222	330
RTOR Reduction (vph)	0	7	0	0	33	0	0	9	0	0	0	209
Lane Group Flow (vph)	216	606	0	72	1328	0	113	300	0	366	222	121
Confl. Peds. (#/hr)	5		10	10		5			5	5		
Confl. Bikes (#/hr)			10			15						5
Heavy Vehicles (%)	8%	2%	0%	6%	2%	4%	3%	3%	0%	2%	0%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	1
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	57.0	47.4		50.6	44.0		25.8	18.0		40.0	29.2	29.2
Effective Green, g (s)	58.0	48.4		52.6	45.0		27.8	19.0		41.0	30.2	30.2
Actuated g/C Ratio	0.53	0.44		0.48	0.41		0.25	0.17		0.37	0.27	0.27
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	223	1525		376	1372		326	309		376	521	409
v/s Ratio Prot	c0.10	0.17		0.01	c0.40		0.03	c0.17		c0.18	0.12	
v/s Ratio Perm	0.41			0.08			0.06			0.19		0.08
v/c Ratio	0.97	0.40		0.19	0.97		0.35	0.97		0.97	0.43	0.30
Uniform Delay, d1	31.9	20.9		15.8	31.8		32.9	45.2		30.1	32.8	31.5
Progression Factor	1.00	1.00		0.54	0.74		1.00	1.00		0.73	0.76	2.20
Incremental Delay, d2	50.8	0.8		0.2	14.6		0.6	43.0		37.9	0.5	0.4
Delay (s)	82.6	21.7		8.6	38.2		33.6	88.3		59.7	25.3	69.7
Level of Service	F	C		A	D		C	F		E	C	E
Approach Delay (s)		37.6			36.8			73.6			55.0	
Approach LOS		D			D			E			D	

Intersection Summary					
HCM 2000 Control Delay	45.9	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.96				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		15.0	
Intersection Capacity Utilization	102.6%	ICU Level of Service		G	
Analysis Period (min)	15				

c Critical Lane Group

Appendix K:
Intersection Spacing Review



Highway Corridor Management Manual, pg 4-62
Figure 4.6.1 1: Functional Interchange Area - Access Connection Offset Spacing Criteria

Four Lanes or Greater - Offset Spacing Criteria		
	W or X	Y or Z
Intersecting Access	800 m - Desirable 400 m - Minimum	125 - 185 m

W or X =

Public Road, Service Road or signalized Commercial / Public Road Access Connections

Desirable / minimum offset spacing distance to first Public Road, Service Road or signalized Commercial / Private Road access. Variances below the desirable offset spacing criteria, down to and including the minimum offset spacing criteria, will only be considered where a valid case can be supported by MTO (e.g. traffic impact study).

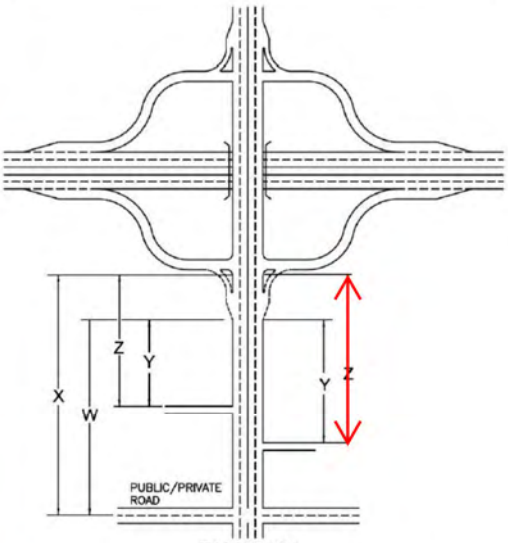
Y or Z =

Non-signalized Commercial / Private Road Access Connections

Desirable offset spacing criteria to first non-signalized Commercial / Private Road access; right-in / right-out only. Right-in / right-out Commercial / Private Road access requires appropriate design in order to prevent left turns into / out of the access connection (e.g. median island on intersecting road, right-in / right-out island, right-in only, one-way access). Should appropriate design not be provided for, the right-in / right-out access connection(s) may not be placed between ramp terminal and the first downstream Public Road, Service Road or signalized Commercial / Private Road access.

Private Access Connections

Desirable offset spacing criteria to first private access connection (i.e. Residential entrance, Farmstead entrance, Field entrance); all turning movements permitted.



DIAMOND
FOUR LANE CROSSING ROAD

GENERAL NOTES

1. SURVEY PREPARED BY R. AVIS SURVEYING INC. DATED MARCH 2021
2. ARCHITECTURAL PLANS PREPARED BY CORE ARCHITECTS AND RECEIVED ON MAY 21, 2021
3. AERIAL DATED 2019

DRAFT
FOR DISCUSSION PURPOSES ONLY
NOT APPROVED FOR CONSTRUCTION

00 MM-DD-YR INT REVISION NOTE

BA Group

101 MASONRY COURT

INTERSECTION SPACING REVIEW

Date: OCTOBER 2022
Project No.: 8057-01
Scale: 1:500 (0 5 10 15 20m)

FD-01A

Appendix L:
Functional Road Plan



GENERAL NOTES

1. SURVEY PREPARED BY R. AVIS SURVEYING INC. DATED MARCH 2021
2. ARCHITECTURAL PLANS PREPARED BY CORE ARCHITECTS AND RECEIVED ON MAY 21, 2021
3. AERIAL DATED 2019

DRAFT

FOR DISCUSSION
PURPOSES ONLY
NOT APPROVED FOR
CONSTRUCTION

00	MM-DD-YR	INT	REVISION NOTE

BA Group

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EMAIL bagroup@bagroup.com

MOVEMENT IN URBAN ENVIRONMENTS
BAGROUP.COM

101 MASONRY COURT

DRAFT FUNCTIONAL DESIGN
WATERDOWN RD / MASONRY CT
OPT A - 135m (STORAGE) + 45m (TAPER)

Date: JUNE 2021

Project No.: 8057-01

Scale: 1:500 (0 5 10 15 20m)

FD-01A

Appendix M:
MTO Comments

Douglas, Thomas

From: Akhtar, Usman (MTO) <Usman.Akhtar@ontario.ca>
Sent: April 19, 2023 1:06 PM
To: Douglas, Thomas
Cc: Cui, Yong (MTO); Bevers, Cameron (MTO); Venneri, Rita (MTO); Routledge, Graham (MTO); Pilla, Angelo (MTO); Asif, Shahbaz (MTO)
Subject: RE: Request for Comments - 1120 Cooke REVISED submission

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Blue Category

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.

RE: 1120 Cooke Blvd, Burlington(Formerly 101 Masonry Court)
Highway 403/Waterdown Road
City File No. 505-01/22, 520-01/22
3 Condominiums, 5 levels of underground parking(1,139 residential units, 231 m2 ground level retail)

Hi Doug,

We have completed our review of the revised submission and have the following comments:

- Do not copy and paste entire emails into the comment matrix. You may contact the MTO for assistance with creating bullet points.
- The site is within the MTO's permit control area. A MTO Building and Land Use permit is required prior construction.
- These comments were previously provided in 2021. We are not in receipt of a revised traffic impact study to-date.
- Further comments will be provided upon receipt of the revised traffic impact study. It is anticipated that the existing interchange cannot accommodate this development along with background traffic plus any other planned developments in the area without interchange improvements.
- There are no planned improvements at 403/Waterdown in the MTO 5-year plan. The City of Burlington and/or the developer would be responsible for funding any highway improvements triggered by any land use changes and development in the area.
- The report selected TTS Survey Zones of 4050, 4051, 4052, 4054 and 4055. The study area is within Zone 4051. Include zone 4053 which is adjacent to Zone 4051.
- Please provide a copy of TTS reports, and the detailed analyzing sheets, to show and explain the summary of Travel Mode Distribution (Table 6), Mode Split(Table 9), and Site Traffic Distribution(Table 14).
- TMCs data:

- Attach a copy of TMC report collected on Sep/26/2018 at Waterdown Rd & Hwy 403 EB Off-ramp (south ramp terminal) by City of Burlington, which was used in the report.
- The report did not use MTO TMCs data collected in 2016 by MTO Waterdown Rd Interchange area intersections but used the data 2018 collected by City of Burlington. Compare the 2018 data with the 2016 data. As of November 2022, the current traffic volume Highway 403 mainline shows that the total and peak hour volumes are still lower than in 2018. The TIS correctly uses Pre-Covid data.

- The figure 14 to Figure 24 are showing traffic volumes within the study area, applied 2% per annum growth:
  - Figure 14 – Existing 2021 Volumes: comparing the data with 2016, and 2018 TMCs data do not match or have errors. E.g. Some numbers showing growths, some are not, and rates are different, please fix.
  - Figure 15- Corridor Growth Volumes: stated this figure had applied corridor growth of 2% per year, but the volumes are not showing all movements, missing some movements. Please update.
  - The Table 12 listed Area Background Developments, but the report has not provided any more detailed traffic volumes information generated by these developments such as how to distribute the study area intersections. Provide this information.
  - Figure 16 - 2026 Volumes: the volumes should combine Figure 14 and Figure 15, but the volumes are not matched. Please fix.
  - Figure 17- 2031 Volumes: compared with Figure 16, some numbers are showing growth, some of them are kept the same. Please fix.
  - Figure 18- 2036 Volumes: compared with Figure 17, some numbers are showing growth, some of them are kept the same. Please fix.
  - Figure 19 - Phase 1 Volumes: please provide a copy of the original report figure.
  - Figure 22 to 24: please double check the volume update. Ensure the numbers add up.
- Figures 25, 26 and 27, please provide clearer images, the legends and chart color are hard to see and match, and please provide detailed supporting information of the outcome.
- The summary and analysing years are the future conditions of 2026, 2031 and 2036, missing the existing year-2021. The existing year should be included.
- Please provide all relevant supporting reports or documents which are used as a reference at this report.
- Synchro and SimTraffic:
  - Please explain how derived the PHFs used at Synchro analysis. The report has not attached 15 min TMCs report or have not provided information of the PHFs used.
  - Recommending developing all scenarios within one single Synchro 11 file under the same geometric configuration, such as AM, PM, existing, and future etc. it may be easier to analyze and compare.
  - Sim Traffic calibration setting, recommending duration of 15min seeding with 60min recording, and final queue lengths determined(update) from SimTraffic.
- Capacity analysis shall be performed at all proposed site access points and intersections in the study network in accordance with the methodology described in the latest edition of the Highway Capacity Manual (HCM). At signalized intersections, movements with v/c ratio greater than 0.85 are deemed to be “critical” in terms of operations. Movements that experience a v/c ratio of 0.85 or greater should be evaluated for possible operational improvements. For ramps, a v/c ratio for terminal ramp approaches with a value greater than 0.75 would be deemed critical and should be evaluated for

possible operational improvements. The 95th queue lengths should be determined from SimTraffic Simulation of recommended settings.

- The site plan, and the proposed street network showing a new access point (Parking entrance) from the development direct to Waterdown Rd between south ramp terminal and Masonry Ct. Considering the existing geometric and operational conditions within the interchange area, we are not recommending the proposed new access. Refer to our previous comments. A section may be included in the traffic impact study in lieu of a I-HAMP study discussing the access and associated access design for our review/comment. The TIS already includes other elements of a I-HAMP such as a discussion of municipal land use planning and transportation initiatives.
- Drainage - Detail and type of underground tank is not provided in drawings. Provide detailed engineering drawings/cross sections of the tank. Please note that unconventional underground storage such as chambers and infiltration systems are not permitted by MTO. Underground storages provided in manholes, storm sewer, super pipe or storage tank are permitted as such storages are accessible through a manhole and can be easily inspected for their continued functionality. If unconventional storages are provided, then calculations and comparison of post- to pre-development flows without underground and/or roof top storages and ponding limit for 100-year storm event should be provided to confirm that the proposed development will not impact the MTO's drainage system under such condition.

Thanks,

Usman

From: Douglas, Thomas <Thomas.Douglas@burlington.ca>
Sent: March 14, 2023 12:46 PM
To: Douglas, Thomas <Thomas.Douglas@burlington.ca>
Subject: Request for Comments - 1120 Cooke REVISED submission

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

Good afternoon,
The City of Burlington has received a revised submission of the applications for Official Plan Amendment and Zoning By-law Amendment for 1120 Cooke Blvd. The original application was circulated for comment in May 2022. The City requests your review and comments on the current revised submission. **Comments are requested by April 17, 2023** – please advise if you anticipate difficulty meeting this deadline. Comments can be sent to me by email.

Attached please find the following:

1. Request for Comments on REVISED proposal – March 14, 2023
2. For reference only: Request for Comments memo for original proposal (May 18, 2022)

Revised application materials will be published on the City's project webpage, www.burlington.ca/1120cooke, by Friday March 17, 2023. In the meantime, I will also send a download link using 2big4email to those who commented on the previous submission. Please watch for a separate email from 2big4email with a download link. Alternatively you can wait and download the materials from the City's webpage by the end of this week.

Please let me know if you have any questions or would like to discuss.
Thank you,

Thomas Douglas, MCIP RPP
Senior Planner
Community Planning Department

City of Burlington | www.burlington.ca
426 Brant Street P.O. Box 5013, Burlington, Ontario, L7R 3Z6
P. **905 335 7600 ext. 7811** | F. **905 335 7880** | E. **thomas.douglas@burlington.ca**

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Appendix N:
List of Documents Referenced in the Initial TIS Report

Documents Referenced in the November 2021 BA Group TIS Report

- **City of Burlington –Draft Aldershot GO Precincts (2018)**
  https://burlingtonpublishing.escribemeetings.com/filestream.ashx?DocumentId=26070
  Note: This Draft document has been updated and the updated MTSA document for Aldershot GO is attached in Appendix A.

- **MTO - QEW and Highway 403 Freeman Interchange Preliminary Design Study and Class Environmental Assessment – Public Information Centre #2 (September 10, 2019)**
  Note: This document is no longer publicly published on the webpage.

- **City of Burlington, 2013/2014 Investment Profile**
  https://investburlington.ca/wp-content/uploads/2015/07/BEDC_InvestProfile_2013_2014_.pdf

- **City of Burlington, 2020 Operating and Capital Budgets**
  https://www.burlington.ca/en/council-and-city-administration/resources/Budget-and-Finances/Approved-Budget-Book/2020/2020-Approved-Capital-and-Operating-Budget-Book.pdf

- **101 Masonry Court – Phase 1: Traffic Impact Study, Parking Study and TDM Options, City of Burlington, Paradigm Transportation Solutions (April, 2016)**
  Note: This document is no longer publicly published on the City of Burlington's webpage.

- **Traffic Impact Study Scope for OPA/ZBA – 1120 Cooke Boulevard, Terms of Reference, BA Consulting Group, (October 14, 2020)**
  Attached in Appendix B of this July 2023 TIS Report.

- **City of Burlington - Plains Road Corridor Urban Design Guidelines (June, 2006)**
  https://www.burlington.ca/en/building-and-renovating/resources/Urban-Design-Guidelines/Plains%20Road%20Urban%20Design%20Guidelines.pdf

- **Waterdown / Aldershot Transportation Master Plan, Phase 2 – Final Report, City of Hamilton, City of Burlington and Region of Halton (February, 2008)**
  https://www.hamilton.ca/sites/default/files/2023-03/Waterdown-Aldershot-TMP-Phase2-Report.pdf

- **City of Burlington – 2017 Approved Budget, 2017 Operating and Capital Budgets (2018-2026)**
  https://www.burlington.ca/en/council-and-city-administration/resources/Budget-and-Finances/Approved-Budget-Book/2017/2017-Approved-Capital-and-Operating-Budget-Book.pdf

- **City of Burlington – 2018 Approved Budget, 2018 Operating and Capital Budgets (2019-2027)**
- https://www.burlington.ca/en/council-and-city-administration/resources/Budget-and-Finances/Approved-Budget-Book/2018/2018-Approved-Capital-and-Operating-Budget-Book.pdf

- **City of Burlington - Zoning By-law (2020)**
  New By-law:https://www.burlington.ca/en/planning-and-development/resources/Zoning/Zoning-By-law-Documents/Part-5-Mixed-Use-Corridor-Zones.pdf
  Note: For the former by-law, a link can not be provided for the former by-law as it's been amended by the new by-law linked above. This PDF document can be sent via e-mail if needed.

- **City of Burlington and Halton Region – Downtown Burlington, Urban Growth Centre and MTSA Supplemental Discussion Paper (October, 2020)**
  https://www.halton.ca/Repository/Downtown-Burlington-Urban-Growth-Centre-and-MTSA-S

- **Metrolinx, GO Rail Station Access Plan (December 12, 2016)**
  https://assets.metrolinx.com/image/upload/v1663240170/Documents/Metrolinx/GO_Rail_Station_Access_Plan_EN.pdf

- **Halton Region, Development Design Guidelines for Source Separation of Solid Waste**
  https://www.halton.ca/Repository/Development-Design-Guidelines-for-Source-Separatio

- **Burlington, City-Wide Parking Standards Review, IBI Group, 2017.**
  https://www.burlington.ca/en/planning-and-development/resources/City-wide-Parking-Standards-Review/Burlington_Parking_Standards_Final_Consolidated_Report_2017-07-21_Clean_FINAL-s_574647.pdf

- **Halton Region Transportation Master Plan**
  https://www.halton.ca/For-Residents/Roads-Construction/Infrastructure-Master-Plans/Transportation-Master-Plan-to-2031-The-Road-to-C/Final-Transportation-Master-Plan-Transportation

- **City of Burlington Official Plan (2020)**
  https://www.burlington.ca/en/planning-and-development/resources/Official-Plan/Burlington-Official-Plan-2020-Full.pdf

- **City of Burlington Cycling Plan (2020)**
  https://www.burlington.ca/en/parks-facilities-and-rentals/resources/Trails-and-Bikeways/Burlington-Cycling-Plan-Final.pdf

- **Halton Region - Integrated Growth Management Strategy Regional Urban Structure Discussion Paper (June, 2020)**
  https://www.halton.ca/Repository/Regional-Urban-Structure-Discussion-Paper

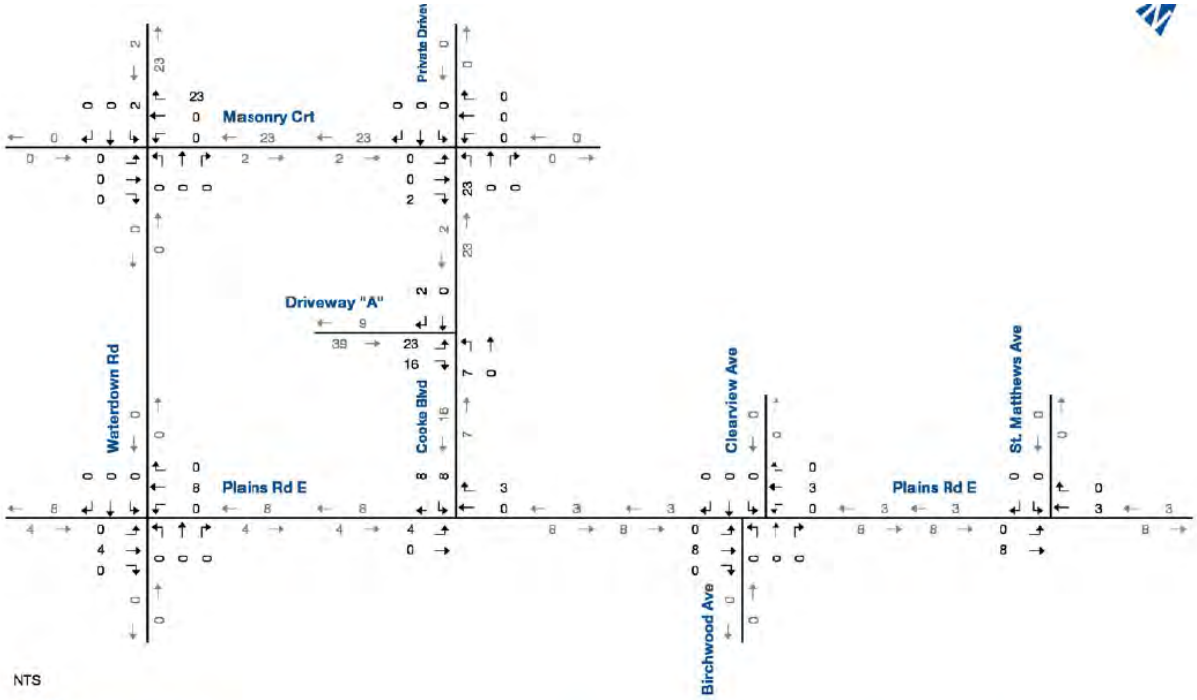
- **City of Burlington, Development Charges, 2014**
  Note: This document is no longer publicly published on the City of Burlington's webpage.

- **City of Burlington, Development Charges Background Study, 2019**
  https://www.burlington.ca/en/planning-and-development/resources/Development-Charges/Development-Charges-Background-Study-2019.pdf
  Note: Refer to the widening project (RD-RA-1304) of the Waterdown Road Bridge at Highway 403 in this document, which has been carried from the 2014 Development Charges document

- **AECOM, Aldershot GO Station – Parking Lot Expansion & Station Improvements (August 28, 2017)**
  Note: This document is no longer publicly published on the Metrolinx's webpage.

Appendix O:
Background Development Information

Appendix O – Background Development Site Traffic Sheets
35 Plains Road



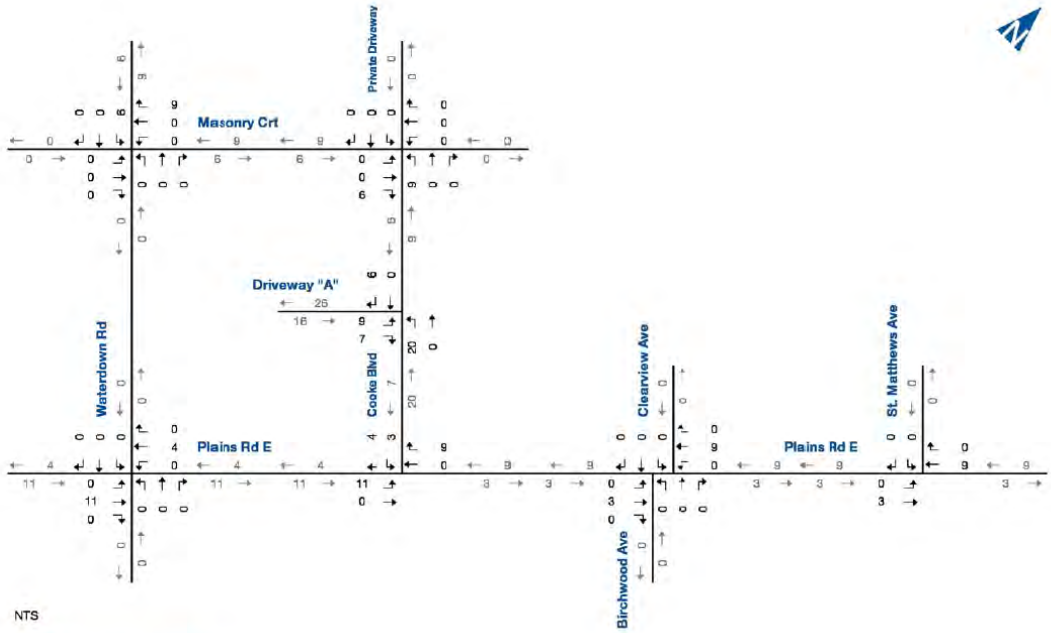
NTS

paradigm TRANSPORTATION SOLUTIONS LIMITED

Estimated Site Generated Traffic – AM Peak Hour

35 Plains Road East TRIS, Parking Study & TDM
152410S

Figure 3.2A



NTS

paradigm TRANSPORTATION SOLUTIONS LIMITED

Estimated Site Generated Traffic – PM Peak Hour

35 Plains Road East TRIS, Parking Study & TDM
152410S

Figure 3.2B

100%

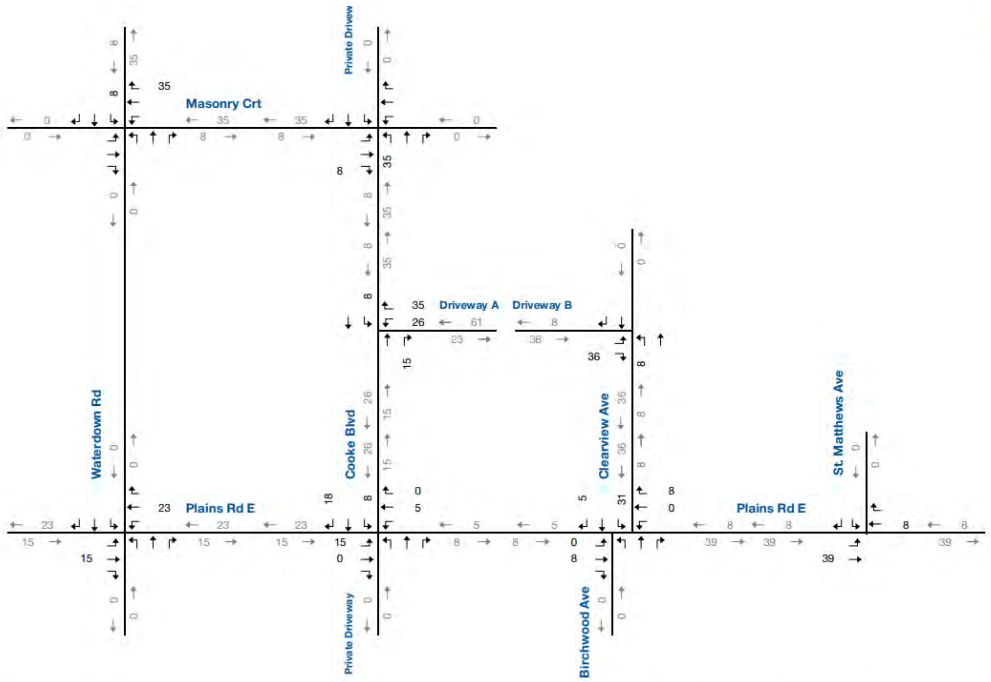
92 Plains Road

Exhibit 2 Development Trip Generation

Land Use	Size	ITE Land Use Code	AM Peak Hour			PM Peak Hour		
			Total	In	Out	Total	In	Out
Residential Condominium	50 units	230	22	4	18	26	17	9
General Office	157 m²	710	3	2	1	3	1	2
Total Trip Generation			*25*	*6*	*19*	*29*	*18*	*11*

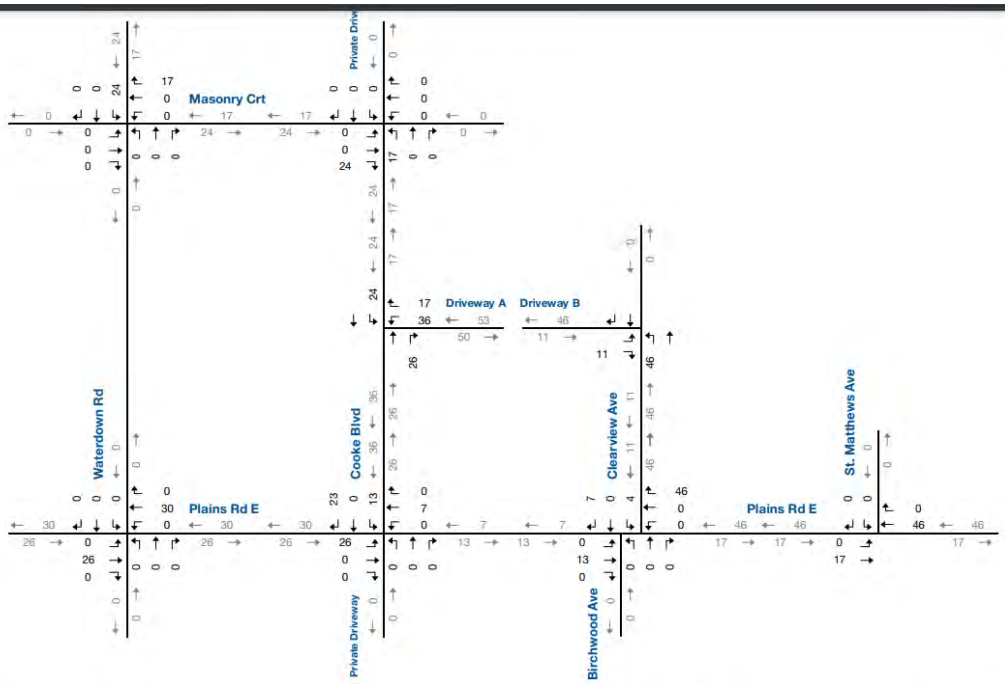
The estimated site traffic generation reflects an average of less than 1 trip every 3 minutes entering or leaving the site during the weekday morning and afternoon peak hours. There are a number of existing stop-controlled intersections and

53 Plains Rd East



NTS

Estimated Site Generated Traffic – AM Peak Hour



NTS

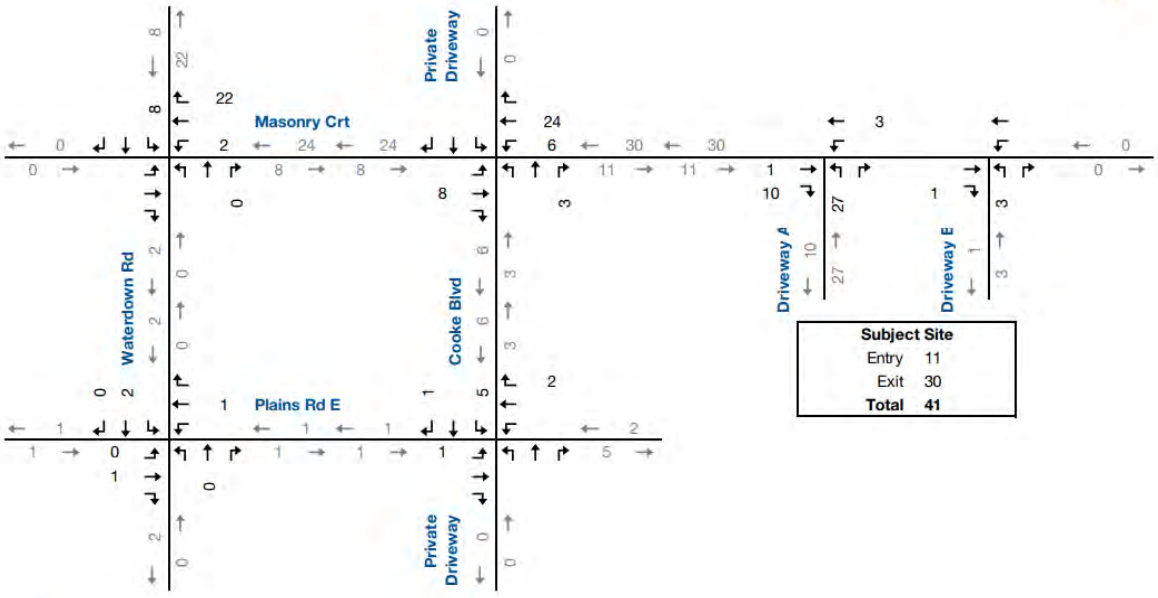
paradigm TRANSPORTATION SOLUTIONS LIMITED

Estimated Site Generated Traffic – PM Peak Hour

53 & 71 Plains Road East TRIS, Parking Study & TDM
170113

Figure 3.3B

1085 Clearview



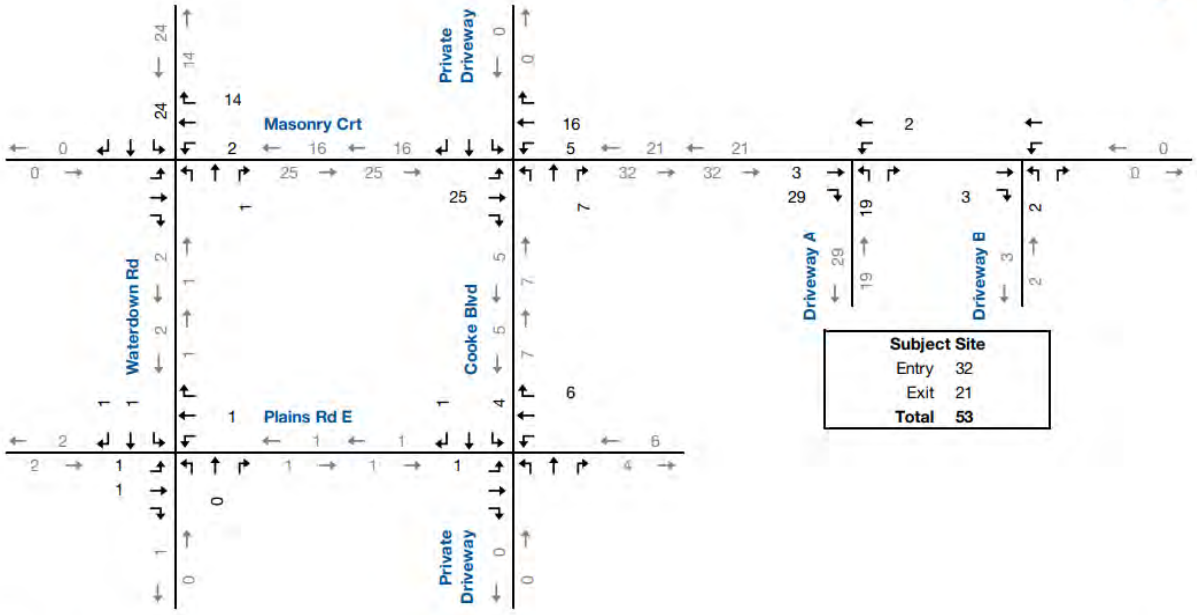
NTS

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Estimated Site Generated Traffic – AM Peak Hour

1085 Clearview Avenue & 1082, 1086 & 1090 St. Matthews Avenue TIS TDM
108222

Figure 3.2A

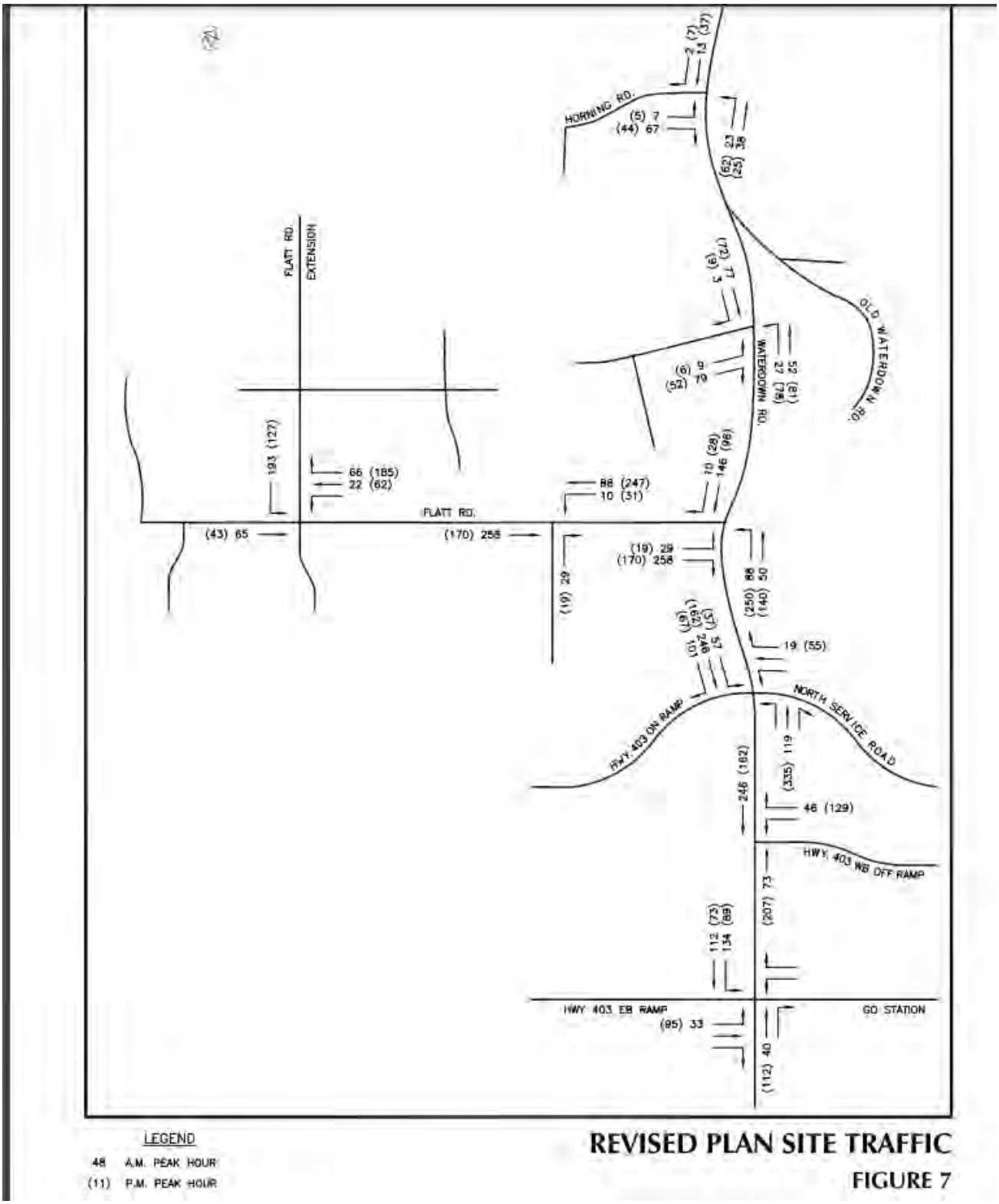


NTS

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Estimated Site Generated Traffic – PM Peak Hour

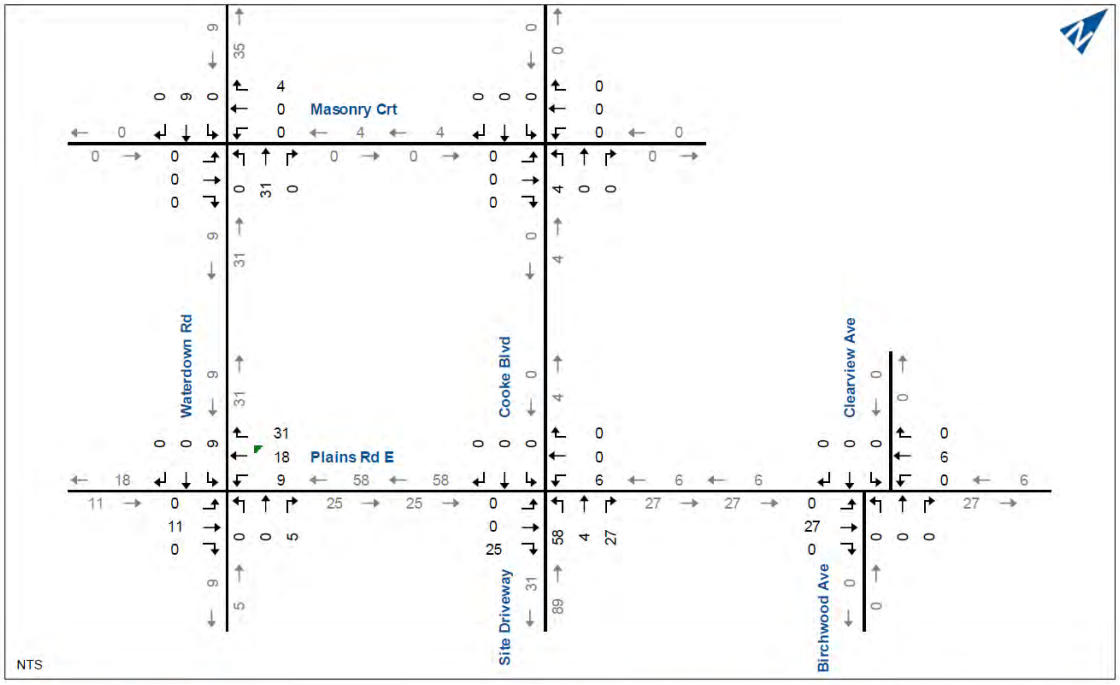
Eagle Heights



REVISED PLAN SITE TRAFFIC

FIGURE 7

40-70 Plains Rd

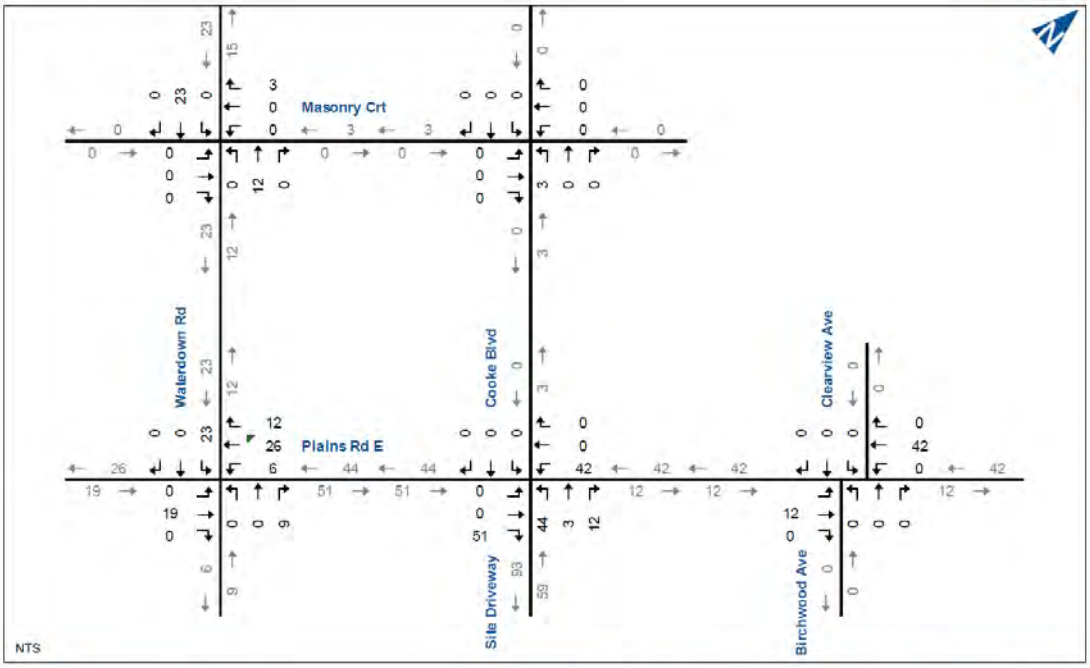


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Site Generated Traffic (Full Build-Out) – AM Peak Hour

40-70 Plains Road East TIA
190488

Figure 3.3A



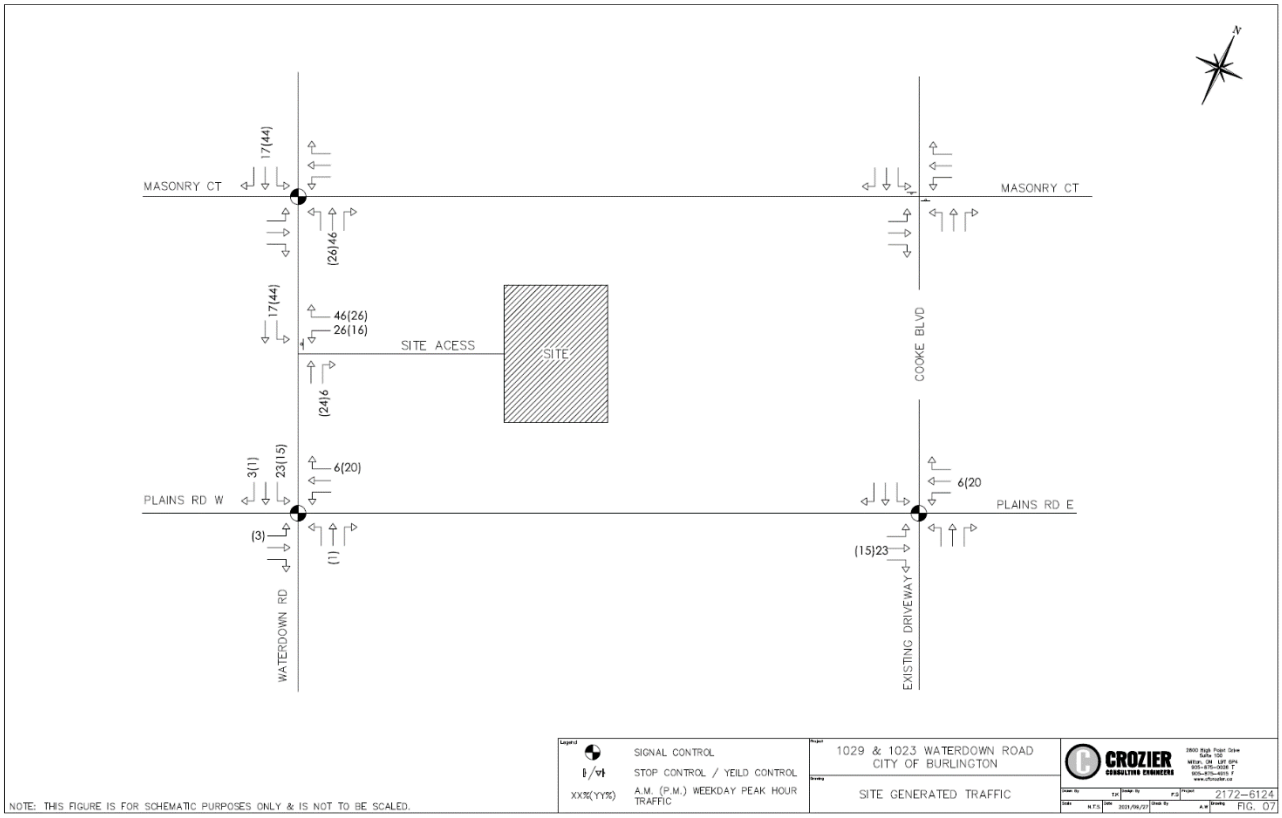
paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Generated Traffic (Full Build-Out) – PM Peak Hour

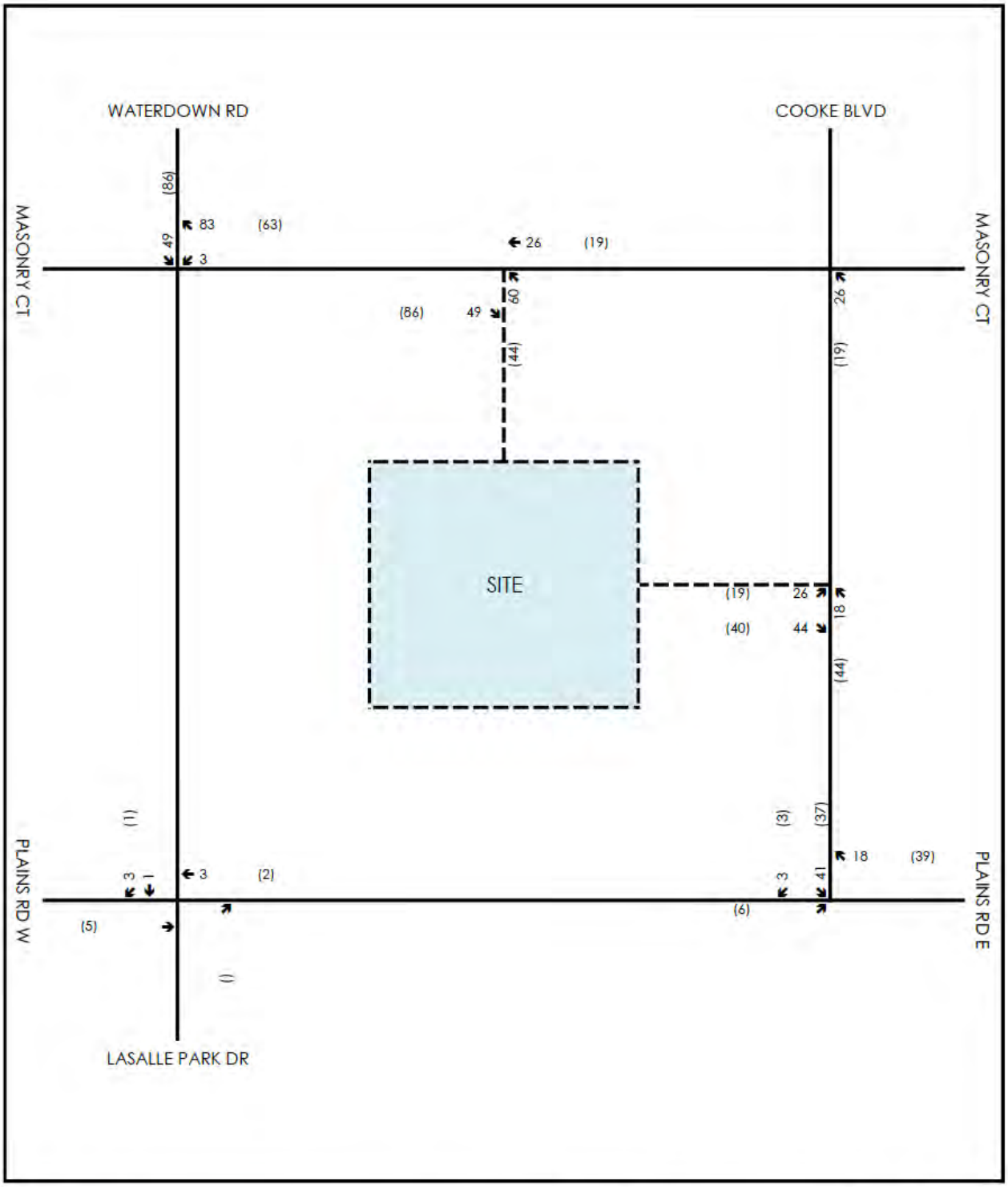
40-70 Plains Road East TIA
190488

Figure 3.3B

1029 Waterdown Rd



1062 Cooke



Legend	1062-1074 Cooke Blvd	CROZIER CONSULTING ENGINEERS	Figure 10
xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes {xx} Weekend Peak Hour Traffic Volumes	Site Generated Trips		Project No. 2321-6441 Date. Analyst. FC