2030 Caroline Street Burlington ON Transportation Impact Study, Parking Study and TDM Options Report

Paradigm Transportation Solutions Limited

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Project Summary

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2030 Caroline Street, Burlington ON Transportation Impact Study, Parking Study and TDM Options Report - Update



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Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation, Parking Justification and Transportation Demand Management Study for the proposed re-development of the lands known municipally as 2030 Caroline Street in the City of Burlington.

The subject site is located within the northern portion of the city block bounded by Maria Street, John Street, Elizabeth Street and Caroline Street (the “subject site”) and has a total site are of 0.278 square metres. In 2010, a comprehensive redevelopment plan for the entire city-block was approved by the City of Burlington. The first phase of development within this block is known as "The Berkeley", a 17-storey mixed-use building that has been constructed and is located in the southern portion of the block adjacent to Maria Street. This mixed-use building includes an underground resident parking facility that extends below-grade and underneath a southerly portion of the subject site.

The Applicant is proposing to redevelop the subject site (the Phase 2 lands”) with a 28-storey mixed-use building (including mechanical penthouse) with commercial and potential community uses at-grade fronting onto John Street.

This study evaluates traffic and parking characteristics within the downtown and the surrounding road network. This includes recommendations regarding traffic management and parking related matters.

Development Concept

The development proposes a 28-storey mixed-use high-rise building with 382 square meters of commercial space and 302 residential units. Two driveways are proposed to provide vehicular access: Driveway A to John Street and Driveway B to Elizabeth Street.

The proposed plan includes 267 on-site parking spaces for residents plus ten (10) publicly accessible visitor parking spaces provided as follows: 62 within parking facility provided beneath the podium of the proposed development; and 215 spaces withing the new above-grade parking facility.

Driveway A provides access to the underground parking facility with 62 parking spaces, while Driveway B provides access to an above-ground parking facility with 215 parking spaces.

No reserved on-site parking is proposed to be provided for the commercial component. These trips are expected to utilize the existing on-street and off-street public parking facilities that are available within the immediate proximity of the site.

Conclusions

Site Design and Layout

Vehicular access is proposed from John Street and Elizabeth Street. The connections are appropriately located and designed to provide sufficient stopping distance and are appropriately spaced away from upstream and downstream intersections.

Moreover, with the redevelopment of the property, on-street parking on the east side of John Street and the west side of Elizabeth Street flanking, the proposed driveway connections will likely need to be removed. To prevent egress or ingress issues, the City's Zoning Bylaw identifies the restrictions for on-street parking within 1 metre of any entrance to a driveway or laneway. The provision of on-street parking near a driveway may also hinder sight lines for the proposed driveway connections.

To provide adequate sight lines, the removal of three (3) spaces along John Street and two (2) spaces on Elizabeth Street is likely to be required.

The proposed geometry for the loading zone can accommodate an MSU entering and exiting the loading area with no conflicts. and private waste collection can be adequately provided.

Study Area Parking Utilization

With the redevelopment of the site up to five (5) on-street parking spaces along John Street and Elizabeth Street maybe potentially eliminated to provide adequate sight lines at the driveway connections to the development.

Weekday and weekend parking utilization surveys were conducted in April 2024 to examine and determine the current utilization of the public parking supply in the study area. Utilization refers to the percentage of parking spaces occupied by parked vehicles at any time. For planning purposes, the practical capacity is generally considered to be 85% utilization, beyond which drivers may perceive a lack of public parking space availability.

With the redevelopment of the site, the study area will provide a total of 190 parking spaces that are available for public use. Based on the utilization surveys, demand is noted to be 92 vehicles (48%) during the weekday and 110 vehicles (58%) during the weekend.

As the parking utilization will not exceed the typical target threshold of 85%, a considerable surplus of public parking spaces is available within the study area.

Transportation Impact Assessment

Full-build out of the development will generate approximately 84 new trips during the weekday AM peak hour and 99 net new trips during the weekday PM peak hour.

Based on the operational analysis conducted, the proposed development does not create operational issues at any intersections as they are all projected to operate with acceptable levels of service and minimal delays. The intersection of Brant Street and Maria Street, where the stop-controlled westbound approach is projected to operate at LOS E under the Background Horizon (without the proposed development). Under the Total Horizon (including the proposed development) there are no additional impacts as a LOS E is maintained. As the volume to capacity ratio for the westbound approach is not expected to exceed 0.72 and the queues are manageable, no improvements to the intersection are warranted.

Redevelopment of the subject site is anticipated to have a negligible effect on traffic operations within the study area. Individual movement delays are expected to increase by less than five seconds during the AM and PM peak hours as a result of the site traffic.

The site driveways to John Street and Elizabeth Street are forecast to operate with delays in the LOS A range and is not forecasted to exceed 9 seconds during the AM and PM peak hours.

The analysis indicates and concludes that the existing transportation infrastructure is adequate to accommodate additional traffic associated with the proposed re-development. No roadway improvements are required to facilitate the proposed development.

Parking Justification

Parking requirements for the development under the City's Zoning By-Law is 385 parking spaces, equating to a parking rate of 1.27 parking spaces per unit. The proposed parking supply of 277 spaces is a reduction of 108 spaces compared to the zoning requirements.

The study area falls under a zoning designation of "Downtown Parking Exemption Area," which recognizes the high-density, mixed-use development of the area. Parking requirements within this area have been updated to reflect the general oversupply of parking required in the zoning by-laws. While these updates are in the right direction, there is still room for improvement regarding parking rates, particularly for this site, given it has a walk score of 98 and is considered a "Walker's Paradise" location, meaning daily errands do not require a car[1]. The John Street Bus Terminal provides a connection with Hamilton Street Railway (HSR) providing connectivity between Burlington and Hamilton.

Minimum parking requirements have long been a staple of planning regulations based on various formulations. These regulations, unfortunately, have been driven by auto-centric engineering models. Over the past seven decades, the built form in Burlington has evolved significantly. Recent changes in transportation technology and services, characterized by ride-hailing (i.e. Uber), automobile sharing, and the emerging technologies dominated by autonomous vehicles (AVs) suggest that automobile ownership is expected to experience declines in the future.

Parking utilization surveys over the last several years at a number of different multi-family developments have consistently found that occupant parking demand varies considerably between 0.65 to 1.25 occupant spaces per unit. However, parking generation studies at older developments tend not to account for factors that may influence reduced dependency on parking demand (i.e. TDM measures) while at the same time promote vehicle dependency given older developments

[1] https://www.walkscore.com/score/2030-caroline-st-burlington-on-canada

provide a significant amount of on-site parking. They also serve as an antiquated and ineffective model to be used to guide parking provision without consideration of a balanced transportation network.

Additional utilization surveys have been undertaken at a relatively new and occupied condominium development in Downtown Burlington in January 2024 to address the project needs with updated occupant parking data.

This site is located at 2025 Maria Street (The Berkeley) and was constructed in 2018, representing Phase 1 of the redevelopment lands within the city block. The primary goal of obtaining these additional parking surveys is to confirm the current parking trends of new condominiums in Downtown Burlington. It is noted that the on-site parking at The Berkely is provided solely for occupants with no accommodation for visitor parking. Based on the survey data, The Berkley registered a peak demand of 0.81 occupant spaces during the survey hours.

The collection of occupant parking utilization data over several years at multi-family developments in Burlington enabled a unique statistical analysis (i.e., regression analysis). As multiple survey days were collected at each site, only the highest observed parking demand was used in the statistical analysis, given this was the peak parking demand observed at the site.

The coefficient of determination (R2) for occupant parking is 0.88. In terms of statistical analysis, as an R2 value approaches 1.0, the better the fit; as the R2 value approaches zero, the worse the fit. The final equation for the model is: **Y=0.7637x + 19.652**

Based on the regression equation using 302 units, the forecast occupant parking demand for the site is estimated to be 250 occupant spaces (0.83 spaces per unit).

As noted above, the Berkely condominium does not provide for any on-site visitor parking. Therefore, additional parking surveys concerning visitor parking demand were not undertaken. Based on the 2021 data set compiled by City staff and provided to us for visitor parking at multi-family developments, an average visitor parking demand of 0.03 spaces per unit is calculated. As city staff have previously supported this visitor supply rate and no new supplemental visitor parking surveys could be completed at The Berkely as there is no visitor parking, it is recommended that a parking supply rate of 0.03 spaces per unit be considered for the purpose of determining the publicly accessible visitor parking rate to be provided to serve the proposed redevelopment.

The City's strategic vision is to create an attractive and safe City that evokes pride, passion, and a sense of belonging - a city where people of all ages and abilities can enjoy a good quality of life.

The Official Plan, 1997 (OP) emphasizes the importance of basic planning goals and objectives, including embracing sustainability and creating a vision for compact, complete communities served by streets made for walking and cycling and an attractive transit system. This vision is supported by policies aimed at reducing auto dependence and limiting the amount of land occupied by automobile parking and related facilities. The transportation policies are deliberately interspersed with the land use policies to emphasize the importance of considering both areas to achieve the overall vision of compact, complete communities.

The intent is to reprioritize mobility to balance the transportation system. A more sustainable city requires an integrated transportation system that supports a compact urban form. Bringing jobs, housing services, and amenities closer together encourages non-automobile modes of travel, providing more choice to Burlington residents.

Burlington's Council has further identified Burlington as "feeling the effects of climate change over the past several years," and climate change is ranked as the third highest risk on the City's Enterprise Risk Register. Specifically, the city's Climate Action Plan stipulates Burlington will work toward being a net carbon-neutral community by the year 2050. Significant change is required to achieve the reductions needed as soon as possible.

If the City wishes to encourage active transportation and transit-friendly neighbourhoods as outlined in the OP and strategic vision, the City needs to recognize that minimum parking requirements present a significant barrier to these goals. It needs to be recognized that parking carries significant costs, heavily subsidizes the choice to drive, and hampers the ability to promote sustainable development. Parking should not be viewed as only an amenity required to support our cities and our ability to drive; instead, it must be viewed as a significant economic investment that carries outcomes that shape our cities and regions.

The site will exist well beyond 2050 when autonomous vehicles are anticipated to play a significant role in our mode choice. Auto ownership is expected to be significantly reduced when we can request a vehicle on demand for our travel needs. Recent societal changes have made it easier to live without owning a car. Vehicles-for-hire and bicycles have both increased in popularity. Online shopping has reduced the need for a personal vehicle to bring large purchases home and, in some areas, has made it convenient for everyday errands to be

delivered (i.e., groceries and household items). The future arrival of automated vehicles will further reduce personal automobile ownership, and these societal changes will decrease the need for vehicle parking. Lastly, as documented in the City-Wide Parking Standards Review[2]:

> *"It is also important to clarify the role of residential parking requirements. In general, there is little risk in reducing minimum residential parking requirements as availability of parking is a key decision in an individual's residential choice. Developers are well attuned to their potential customers' parking needs and will not reduce parking provision so much as to compromise the marketability of their development."*

Based on empirical survey data that both Paradigm and City staff have collected at multi-family residential buildings and a review of industry parking data and the Growth Plan policy framework, the Provincial Policy Statement and Burlington's OP, a reduced parking supply for the proposed development is beneficial and supportable.

Overall, a parking supply rate of 0.86 spaces per residential dwelling unit, including publicly accessible visitor parking, is appropriate and supportable for the proposed development based on parking data collected by Paradigm, city staff and effectively implements the policies and direction included in the Official Plan.

The development will also implement a suite of Transportation Demand Management (TDM) measures to reduce the dependency on vehicular travel further. These measures include:

- Active uses at grade along street frontages
- Welcome Packets including information regarding alternative mode use in the area

The TDM plan and the study area's transportation context will provide residents with a range of mobility choices other than a privately-owned vehicle and support an appropriate parking supply in the building.

[2] Burlington City-Wide Parking Standards Review, IBI Group, July 21, 2017

Recommendations

Based on the findings of this study, it is recommended that:

- The City of Burlington recognizes the conclusions provided above;
- The City continues to monitor traffic operations at study area signalized intersections and adjusts signal timings as needed;
- The City of Burlington support the proposed Zoning By-law parking rate to allow the provision of 0.86 parking spaces per unit); and
- The developer implements a TDM plan with the additional TDM measures listed above.

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1 Introduction

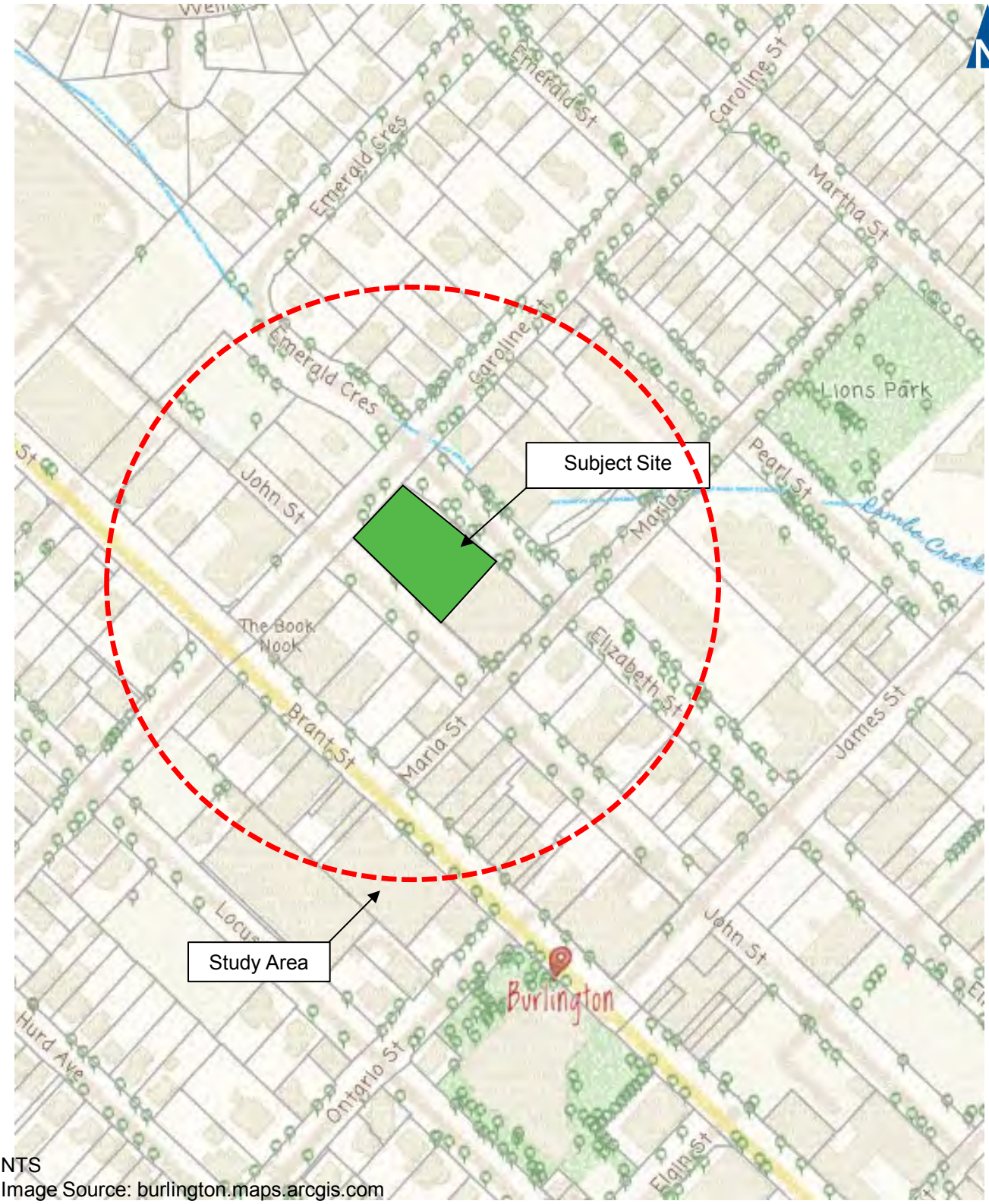
1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) has been retained to conduct this Transportation, Parking Justification and Transportation Demand Management Study for the proposed development of the lands municipally known as 2030 Caroline Street in the City of Burlington.

The subject site is located within the northern portion of the city-block bounded by Maria Street, John Street, Elizabeth Street and Caroline Street. The first development phase in this block is known as "The Berkeley." A redevelopment planning framework for the block was established in 2010. New ownership (Inaria Burlington Inc.) is proposing to redevelop the northern portion of the block, with a 28-storey building with commercial uses at grade on John Street and a 6 storey above-grade parking facility.

The scope of this study was developed in consultation with City of Burlington staff and as provided via e-mail dated November 2023. **Appendix A** contains the pre-submission consultation meeting minutes that identify the city's submission expectations.

Figure 1.1 details the subject development location.



NTS
Image Source: burlington.maps.arcgis.com

Location of Subject Site and Study Area

1.2 Purpose and Scope

This study is provided to determine the impacts of the development traffic on the surrounding road network and identify any improvements necessary to accommodate the traffic generated by this development. This study:

- Assesses the current traffic and site conditions within the study area;
- Estimates background traffic growth for five years from the date of study (2029);
- Estimates additional traffic generated by the re-development of the proposed development located on the subject site;
- Analyzes the impact of future traffic on the surrounding road network;
- Identifies any operational or safety concerns and any mitigation measures that may be required to improve operations;
- Reviews the City of Burlington's Zoning By-Law requirements;
- Provides a technical analysis using secondary sources and local parking survey information to estimate the potential parking demand;
- Reviews the sufficiency of the proposed parking supply; and
- Reviews and identifies potential Transportation Demand Management (TDM) measures that could be implemented for the proposed development.

This study has been prepared in accordance with the requirements detailed by the Halton Region Transportation Impact Study Guidelines[3].

[3] Transportation Impact Study Guidelines, Halton Region, January 2015.

1.3 Study Area

Based on the minutes of the pre-submission consultation meeting of August 23, 2023, the following intersections have been identified and investigated in this study:

- Brant Street & Caroline Street (signalized);
- Brant Street & Maria Street (unsignalized);
- John Street & Caroline Street (unsignalized);
- John Street & Maria Street (unsignalized);
- Elizabeth Street & Caroline Street (unsignalized); and
- Elizabeth Street & Maria Street (unsignalized);

2 Existing Conditions

2.1 Existing Roadways

The main roadways near the subject site that have been assessed include Brant Street, Caroline Street, John Street, Maria Street and Elizabeth Street. The characteristics of these roadways are as follows:

- **Brant Street** is a north-south two-lane minor arterial[4] roadway that operates under the jurisdiction of the City of Burlington. Within the study area, Brant Street has an urban cross-section, on-street parking, and sidewalks on both sides. The statutory speed limit of 50 km/h is assumed. The deemed right-of-way for Brant Street from Lakeshore Road to Caroline Street is 18 metres.

- **Caroline Street** is an east-west two-lane collector roadway that operates under the jurisdiction of the City of Burlington. Within the study area Caroline Street has an urban cross-section, sidewalks on both sides and on-street parking is available on the north side. The posted speed limit is 40 kilometres per hour. The right-of-way for Caroline Street is measured as 20 metres.

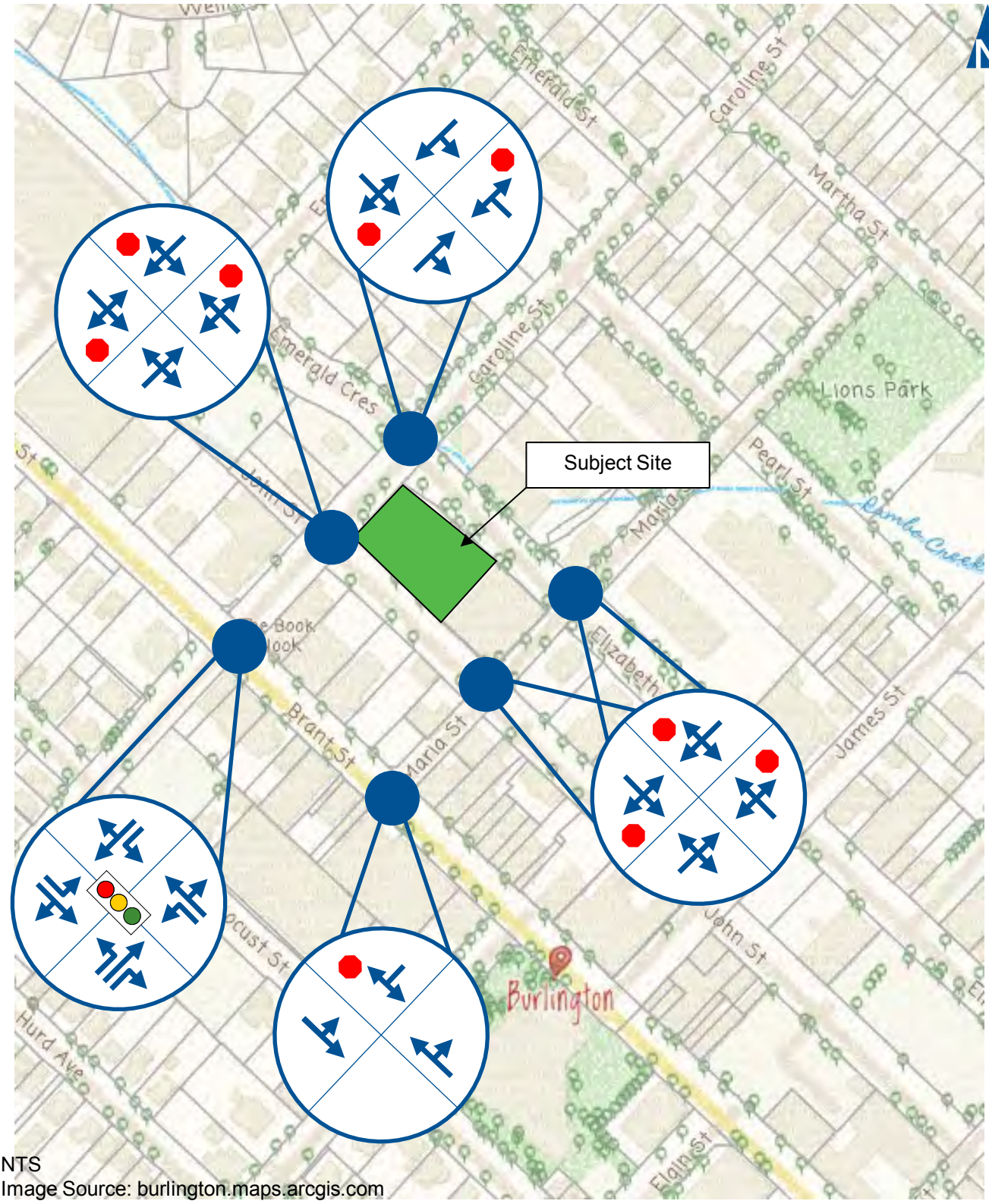
- **John Street**, south of Caroline Street, is a north-south two-lane collector roadway that operates under the jurisdiction of the City of Burlington. Within the study area John Street has an urban cross-section, sidewalks, and on-street parking on both sides. The statutory speed limit of 50 km/h is assumed. It is noted that John Street, north of Caroline Street, has been recently established by the City as a municipal road with a deemed right-of-way of 20 metres.

- **Maria Street** is an east-west two-lane local roadway that operates under the jurisdiction of the City of Burlington. Within the study area, Maria Street has an urban cross-section with sidewalks on both sides of the road. The posted speed limit is 40 kilometres per hour. The deemed right-of-way for Maria Street from Brant Street to Martha Street is 15 metres.

[4] The City of Burlington Official Plan, Schedule K: Classification of Transportation Facilities Downtown Area, October 2006,

- **Elizabeth Street** is a north-south two-lane local roadway that operates under the jurisdiction of the City of Burlington. Within the study area Elizabeth Street has an urban cross-section, sidewalks on both sides, and on-street parking provided through a layby on the west side. The statutory speed limit of 50 km/h is assumed. The right-of-way for Caroline Street is measured as 20 metres.

Figure 2.1 displays the traffic control and lane configuration of the rights-of-way within the study area and the corresponding intersections.



NTS
Image Source: burlington.maps.arcgis.com

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Existing Lane Configuration and Traffic Control

2.2 Transit Service

2.2.1 City of Burlington Transit Service

Burlington Transit (BT) is the public transit operator for the City of Burlington and operates several routes within the study area. The main bus terminal in Downtown Burlington is located on John Street, a walk of approximately 350 metres south from the subject site.

Currently, BT operates two routes within the study area:

- **Route 2 (Brant North)** runs between the Burlington GO Station and the Highway 407 Carpool Lot via Downtown Burlington. The route runs with approximately 15-minute headways during weekday peak hours and 30-minute headways during other service hours.
- **Route 52 (Burlington Northwest)** provides late-night service around the northwest portion of the City, emanating and terminating at the Burlington GO Station. Buses operate with one-hour headways and stop in Downtown Burlington. The service runs between 10:55 PM and 1:22 AM, Monday to Saturday.

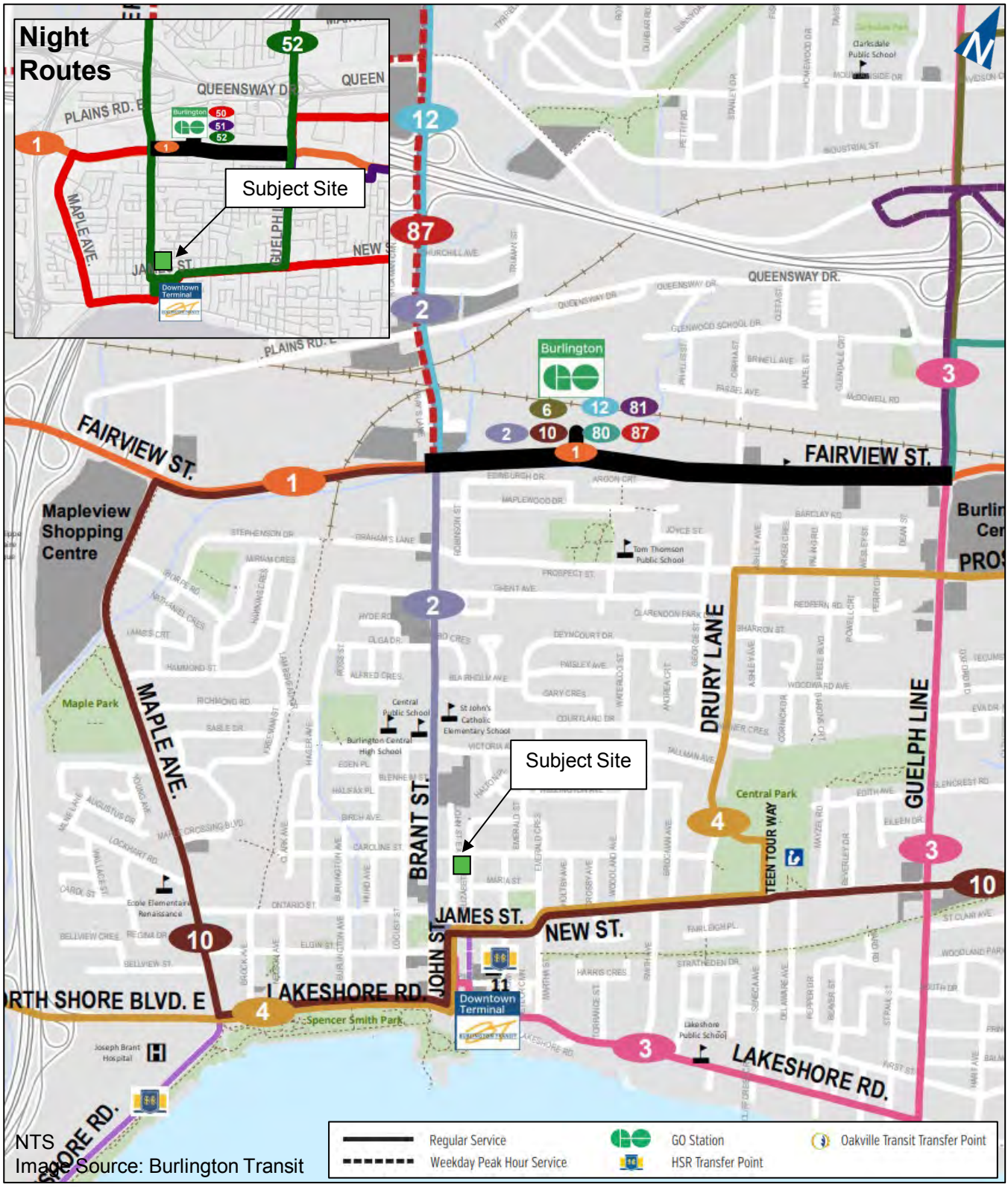
The nearest stop for both routes is located on the east side of Brant Street, less than 90 metres (2-minute walk) west of the subject site.

Bus routes 3,4,10,11, and 50 are also served at the John Street Bus Terminal along with the routes 2 and 52 which operate near the subject area. In addition, the John Street Bus Terminal provides a connection with Hamilton Street Railway (HSR) providing connectivity between Burlington and Hamilton. The terminal provides connection to a vast array of other neighbourhoods and destinations throughout Burlington, facilitating a more efficient public transportation system for the residents and people in the community.

Figure 2.2 illustrates the existing transit network.

2.2.2 GO Transit Service

The Burlington GO station is located about 1.8 kilometres north of the subject site and approximately a 20-minute walk or 4-minute transit ride on Routes 2 and 52. Since this GO line provides train service to Hamilton, Mississauga and Downtown Toronto, the subject site is expected to attract residents using City and inter-regional transit for commuting purposes.



NTS
Image Source: Burlington Transit

Existing Transit Network

2.3 Active Transportation

2.3.1 Walkability

Pedestrian sidewalks are provided along both sides of the roadways throughout most of the study area. Crosswalks, pedestrian pushbuttons, and indicators are provided for all approaches at the signalized intersections within the study area.

The subject site is within walking distance (less than 1 kilometre) of numerous significant employment, retail, cultural and recreational opportunities, providing a range of destinations for prospective residents of the proposed building that can be readily accessed without a car. The site's proximity to a range of amenities and destinations within walking distance reduces the need for building residents to travel regularly using a vehicle.

Walk Score is an online tool that assigns a numerical walkability score between 0 and 100 for addresses in Australia, Canada, the United States, and New Zealand. Walk Score ranks communities nationwide based on how many businesses, parks, theatres, schools and other common destinations are within walking distance of any given address. The subject site has a Walk Score of 98 and is considered a “Walker’s Paradise” location, meaning daily errands do not require a car[5].

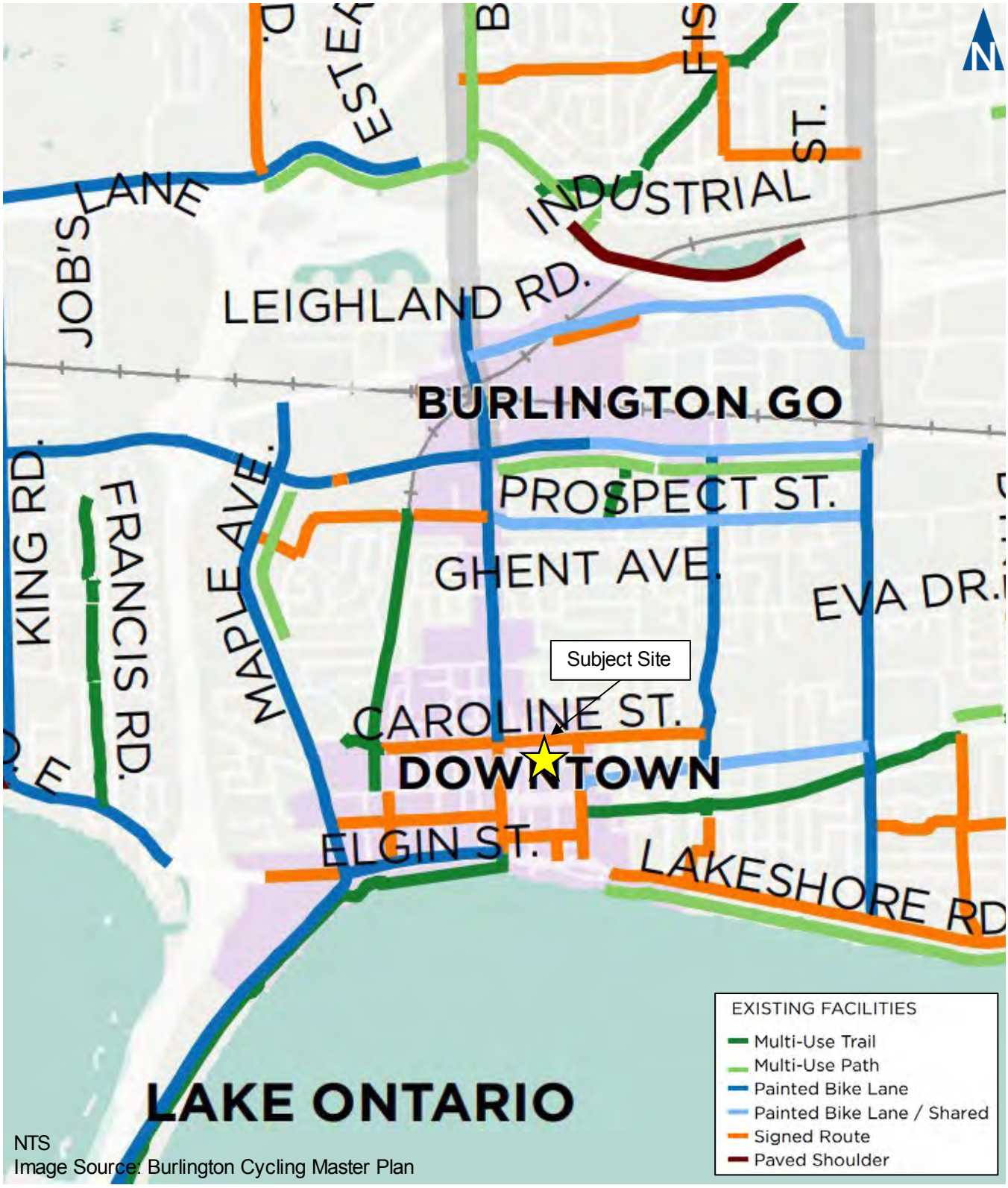
2.3.2 Cycling

The City’s cycling infrastructure consists of on-street and off-street facilities. On-street routes comprise bicycle lanes, signed bicycle routes, and paved shoulders. Off-street facilities are in the form of multi-use paths.

The City’s Interactive Map identifies several cycling facilities on the study area roadways. Brant Street, south of Caroline Street and Caroline Street, operates with shared-use shoulders (sharrows). Brant Street currently operates with bike lanes north of Caroline Street.

Although the City of Burlington’s Integrated Mobility Plan is not a policy document, it has been reviewed and considered. Brant Street from Baldwin Street to Fairview Street and Fairview Street from Brant Street to Cumberland Street are identified as protected bikeways. The addition of these bikeways will provide for improved cycling infrastructure for the proposed development to/from the Burlington GO Station. **Figure 2.3** illustrates the existing cycling network within the study area.

[5] https://www.walkscore.com/score/2030-caroline-st-burlington-on-canada



NTS
Image Source: Burlington Cycling Master Plan

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Existing Cycling Network

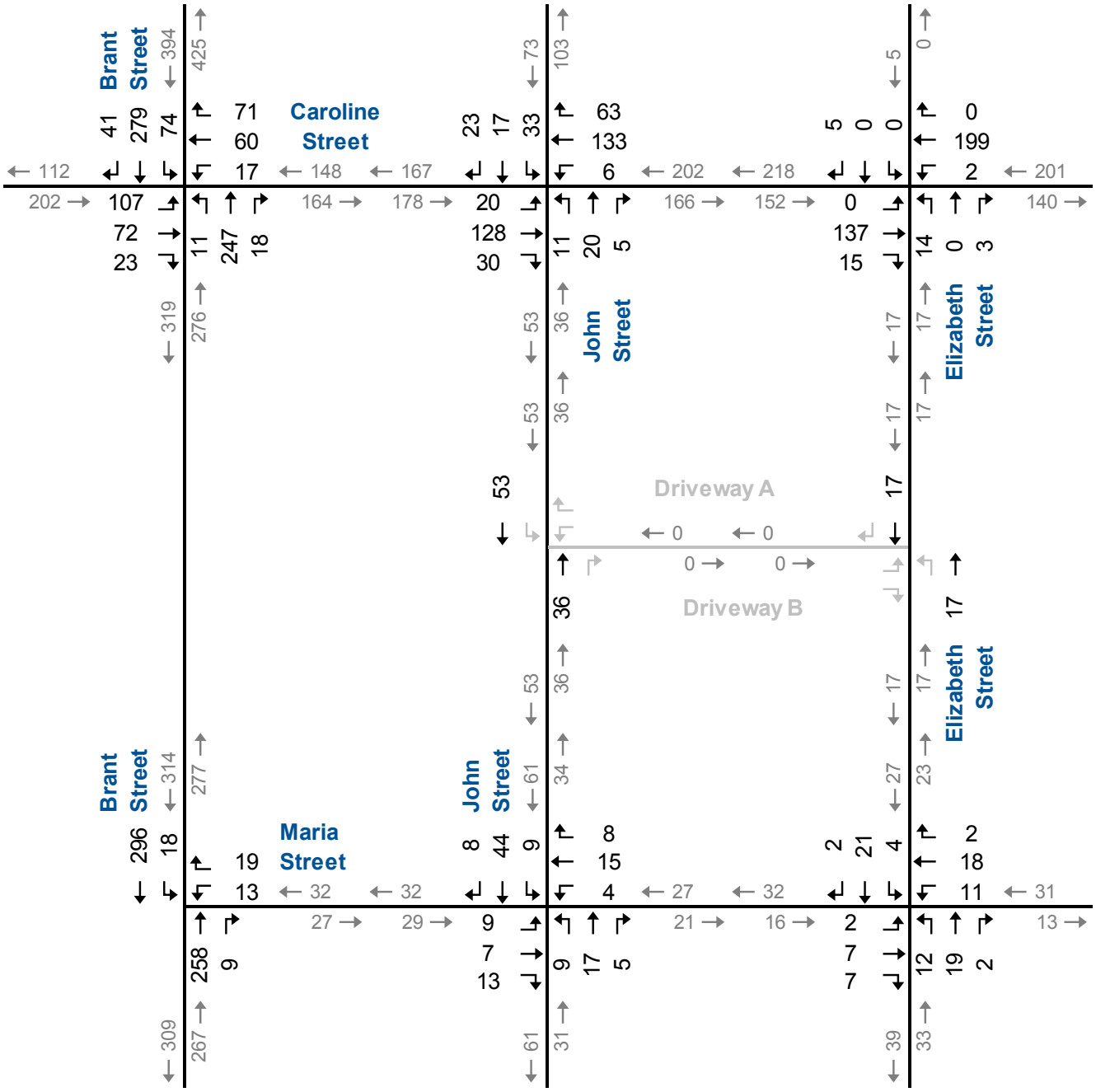
2.4 Existing Traffic Volumes

Turning movement counts are used to quantify the movement of vehicles through the area to assess intersection operations. Existing traffic data at an intersection or on a road section forms the foundation for the analysis. The counts are commonly taken during peak periods at an intersection to complete a level of service analysis under its worst-case operating conditions.

Turning movement counts for the study area intersections were collected by Paradigm in November 2023.

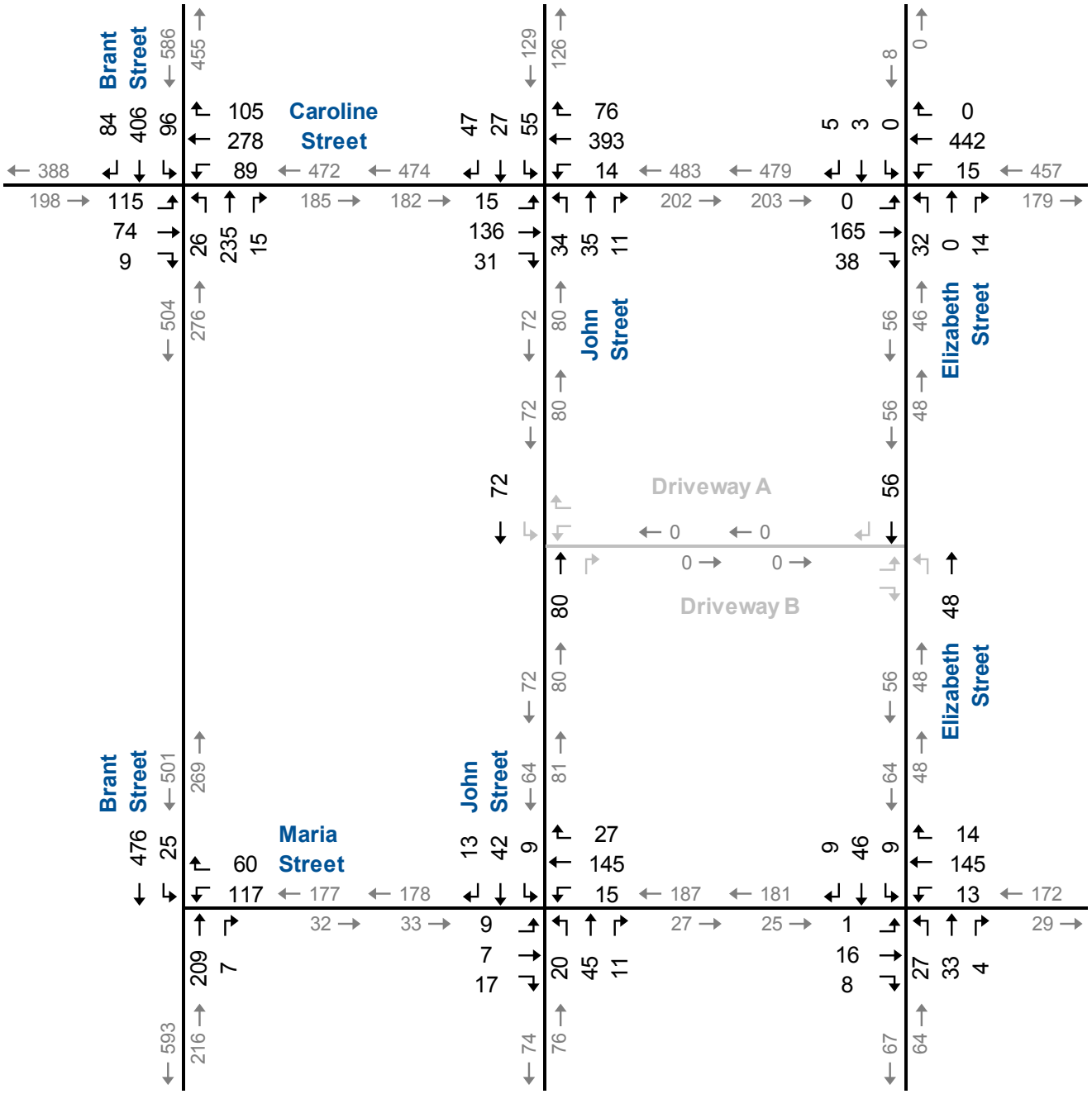
Appendix B contains the detailed traffic counts for study area intersections.

Figure 2.4a and **Figure 2.4b** display the existing AM and PM weekday peak hour turning movement traffic volumes, respectively.



NTS

Base Year Traffic Volumes
AM Peak Hour



NTS

Base Year Traffic Volumes
PM Peak Hour

2.5 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying any delays that may be experienced by drivers at intersections. It is based on the delay experienced by individual vehicles executing the various movements at an intersection. A delay is related to the number of vehicles desiring to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on several criteria, including, but not limited to, vehicle headways, intersection geometry, vehicle composition, opposing traffic flows, and signal timing for signalized intersections.

Table 2.1 summarizes the level of service criteria for signalized and stop-controlled intersections. The highest possible rating is LOS A, where the average total delay is equal to or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections or 50 seconds for unsignalized intersections, or when the volume-to-capacity (v/c) ratio is greater than 1.00, the movement is classified as LOS F, and improvements are usually implemented, if feasible. LOS D is typically considered acceptable peak-hour performance in an urban setting, and lower LOS values are tolerable for short-term periods during peak hours when heavier traffic volumes are expected.

TABLE 2.1: VEHICLE LEVEL OF SERVICE DEFINITIONS

Level of Service	Signalized Intersections Average Total Delay (sec/veh)	Unsignalized Intersections Average Total Delay (sec/veh)
A	< = 10	< = 10
B	> 10 & < = 20	> 10 & < = 15
C	> 20 & < = 35	> 15 & < = 25
D	> 35 & < = 55	> 25 & < = 35
E	> 55 & < = 80	> 35 & < = 50
F	> 80	> 50

The operations of the intersections in the study area were evaluated with the base year traffic volumes using Synchro 11. The intersection analysis considered the following measures of performance:

- The volume-to-capacity ratio for each intersection;
- The LOS, based on the average control delay for each vehicle, for each turning movement; and
- The estimated 95th percentile queue length.

Movements are considered critical under the following conditions for signalized intersections:

- Volume/capacity (V/C) ratios for overall intersection operations, through movements or shared through/turning movements increased to 0.85 or above;
- V/C ratios for exclusive turning movements increased to 0.95 or above; or
- Queues for an individual movement are projected to exceed available turning lane storage.

Movements are considered critical under the following conditions for unsignalized intersections:

- Level of Service (LOS), based on the average delay per vehicle on individual movements, exceeds LOS “D”; or
- An individual movement's estimated 95th percentile queue length exceeds the available queue storage.

Table 2.2 summarizes the analysis results for the existing weekday AM and PM peak-hour intersection operations and indicates all intersections operate with acceptable service levels.

Appendix C contains the detailed Synchro Reports.

TABLE 2.2: BASE YEAR TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Brant Street at Caroline Street	TCS	LOS	B	B	B	**B**	B	C	C	**C**	B	C	C	**C**	B	B	B	**B**	**B**
			Delay	15	13	13	**14**	19	20	20	**20**	17	23	23	**23**	15	17	17	**16**	**18**
			V/C	0.24	0.09	0.02		0.05	0.18	0.18		0.04	0.47	0.47		0.22	0.45	0.45		**0.37**
			Q	19	14	0		7	21	21		5	56	56		14	54	54		
	2 - Caroline Street at John Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	10	10	10	**10**	8	8	8	**8**	7	7	7	**0**	9	9	9	**9**	
			DU	0.27	0.27	0.27		0.22	0.22	0.22		0.08	0.08	0.08		0.06	0.06	0.06		
	3 - Caroline Street at Elizabeth Street	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	B	B	B	**B**	A	A	A	**A**	
			Delay	0	0	0	**0**	0	0	0	**0**	12	12	12	**12**	10	10	10	**10**	
			V/C	0.10	0.10	0.10		0.00	0.00	0.00		0.03	0.03	0.03		0.01	0.01	0.01		
			Q	0	0	0		0	0	0		1	1	1		0	0	0		
	4 - Brant Street at Maria Street	TWSC	LOS					B		B	**B**		A	A	**A**	A	A		**A**	
			Delay					13		13	**13**		0	0	**0**	1	1		**1**	
			V/C					0.07		0.07			0.17	0.17		0.02	0.02			
			Q					2		2			0	0		0	0			
	5 - Maria Street at John Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	7	7	7	**7**	7	7	7	**7**	7	7	7	**7**	7	7	7	**7**	
			DU	0.04	0.04	0.04		0.03	0.03	0.03		0.04	0.04	0.04		0.08	0.08	0.08		
	6 - Maria Street at Elizabeth Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	7	7	7	**7**	7	7	7	**7**	8	8	8	**8**	7	7	7	**7**	
			DU	0.02	0.02	0.02		0.04	0.04	0.04		0.04	0.04	0.04		0.03	0.03	0.03		
AM Peak Hour	1 - Brant Street at Caroline Street	TCS	LOS	B	B	B	**B**	C	C	C	**C**	B	C	C	**C**	B	C	C	**B**	**C**
			Delay	17	13	12	**16**	22	31	31	**30**	19	22	22	**22**	15	21	21	**20**	**23**
			V/C	0.44	0.09	0.01		0.26	0.71	0.71		0.12	0.43	0.43		0.27	0.64	0.64		**0.67**
			Q	21	15	0		24	99	99		9	52	52		17	89	89		
	2 - Caroline Street at John Street	AWSC	LOS	B	B	B	**B**	C	C	C	**C**	A	A	A	**A**	B	B	B	**B**	
			Delay	12	12	12	**12**	18	18	18	**17**	7	7	7	**0**	11	11	11	**11**	
			DU	0.32	0.32	0.32		0.68	0.68	0.68		0.11	0.11	0.11		0.16	0.16	0.16		
	3 - Caroline Street at Elizabeth Street	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	C	C	C	**C**	B	B	B	**B**	
			Delay	0	0	0	**0**	0	0	0	**0**	16	16	16	**16**	13	13	13	**13**	
			V/C	0.13	0.13	0.13		0.01	0.01	0.01		0.13	0.13	0.13		0.02	0.02	0.02		
			Q	0	0	0		0	0	0		3	3	3		0	0	0		
	4 - Brant Street at Maria Street	TWSC	LOS					D		D	**D**		A	A	**A**	A	A		**A**	
			Delay					29		29	**29**		0	0	**0**	1	1		**1**	
			V/C					0.57		0.57			0.14	0.14		0.02	0.02			
			Q					26		26			0	0		1	1			
	5 - Maria Street at John Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	7	7	7	**7**	9	9	9	**9**	8	8	8	**8**	8	8	8	**8**	
			DU	0.04	0.04	0.04		0.24	0.24	0.24		0.10	0.10	0.10		0.09	0.09	0.09		
	6 - Maria Street at Elizabeth Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	7	7	7	**7**	8	8	8	**8**	8	8	8	**8**	8	8	8	**8**	
			DU	0.03	0.03	0.03		0.22	0.22	0.22		0.09	0.09	0.09		0.09	0.09	0.09		

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

3 Development Concept

3.1 Development Description

The subject site is located within the northern portion of the city block bounded by Maria Street, John Street, Elizabeth Street and Caroline Street. "The Berkeley", a 17 storey mixed-use building has been constructed within the southerly portion of the block adjacent to Maria Street. This building is now occupied.

In accordance with the existing planning framework, a portion of the underground parking facility serving the Berkeley is constructed beneath the lands proposed to be occupied above-grade by a new parking facility. A portion of the subject site is currently occupied by a city-operated temporary public parking facility that accommodates 28 public parking spaces. We are advised by the property owner that there is an existing agreement with the city which provides temporary public parking permissions we may be extended at the owner's discretion until such time as the redevelopment of the site is to occur.

The proposed re-development consists of a high-rise mixed-use 28-storey building with 382 m^2 (4,120 sq.ft.) of ground floor commercial space and 302 residential units. The existing parking facility for The Berkeley is located within an underground stratum that does not comprise part of the subject site. This existing parking facility is not connected to, nor is it proposed to be connected to, the proposed development.

As shown on **Figure 3.1**, vehicular access is proposed via a full-moves driveway (Driveway A) to John Street, located 30 metres (curb radii to curb radii) south of the Caroline Street and John Street intersection. A second full-movement driveway (Driveway B) is proposed to Elizabeth Street, located 65 metres (curb radii to curb radii) south of the Caroline Street and John Street intersection.

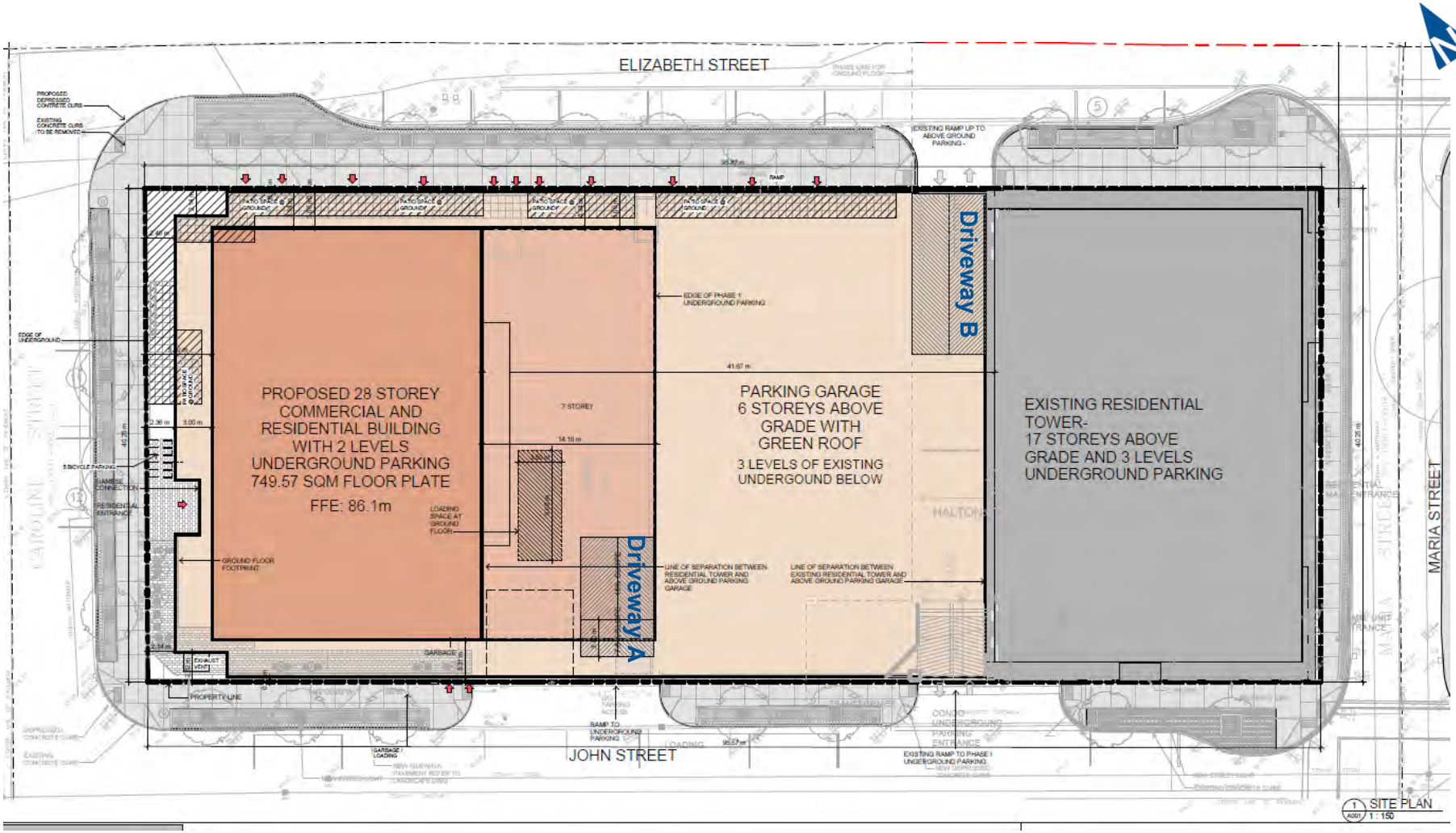
The proposed development includes 267 on-site parking spaces for residents plus ten (10) publicly accessible visitor parking spaces. The allocation of parking is noted as follows:

- 267 Resident spaces; and
- 10 Publicly accessible visitor spaces

Driveway A will provide access to the underground parking facility serving the new residents, providing access to 62 resident parking spaces. Driveway B will provide access to the above-grade parking facility with access to 215 parking spaces which includes the residential and previously noted ten (10) publicly accessible visitor parking spaces.

In accordance with the city's parking standards, no on-site parking is proposed to be provided for the commercial component. These trips are expected to utilize existing on-street and off-street parking facilities available in the immediate vicinity.

Figure 3.1 shows the site development concept.



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Site Concept Plan

2030 Caroline Street, Burlington TIS, PS & TDM Options Report
230499

Figure 3.1

3.2 Access Location

To assist in determining the appropriateness of the access locations, the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR)[6] was reviewed.

3.2.1 Sight Distance

The proposed driveway connections to John Street and Elizabeth Street have been reviewed to determine sight distance, sight line availability, and provisions. The assessment has been carried out based on the methodology in TAC-GDGCR.

Sight distance requirements are considered for vehicles approaching the driveway (approach sight distance) along the major roadway. The sight distance requirements for a 60 km/h design speed have been utilized.

Stopping sight distance is required for a vehicle approaching an intersection from either direction to perceive, react to, and come to a complete stop to avoid colliding with an object in the road. In this respect, stopping sight distance can be considered the minimum visibility criterion for the safe operation of an unsignalized intersection/driveway. **Table 3.1** summarizes the sight distance requirements for a 60 km/h design speed.

TABLE 3.1: REQUIRED SIGHT DISTANCE CRITERIA

Sight Distance Criteria	Sight Distance Requirement Design Speed (60 km/h)
Minimum Stopping Sight Distance[1]	85
Notes: *1 TAC Guide. June 2017. Table 2.5.2: Stopping Sight Distance on Level Roadways for Automobiles*	

Stopping sight distance is the sum of a motorist's distance during the perception, reaction time, and braking distance. Stopping sight distance is measured from the standard driver eye height of 1.05 metres to a fixed object 0.60 metres off the roadway's surface. The main measurements for approaching traffic were taken from within the center of either travel lane of John Street and Elizabeth Street, assuming a vehicle position perpendicular to the theoretical access location.

[6] Geometric Design Guide for Canadian Roads, Transportation Association of Canada, 2017

Table 3.2 summarizes the available and TAC-recommended sight distances for an approaching vehicle with a 60 km/h design speed.

TABLE 3.2: APPROACHING SIGHT DISTANCE SUMMARY

Driveway	Approaching Movement	Available Sight Distance Measured (m)	TAC Sight Distance Requirement (m)	Sight Distance Summary
Driveway A	Southbound Vehicle	100+	85	Adequate
	Northbound Vehicle	100+	85	Adequate
Driveway B	Southbound Vehicle	100+	85	Adequate
	Northbound Vehicle	100+	85	Adequate

The following summarizes the review:

- Approaching from the north (southbound drivers), the proposed driveways meet the approaching sight distance requirement.
- Approaching from the south (northbound drivers), the proposed driveways meet the approaching sight distance requirement.

3.2.2 Corner Clearance

TAC-GDGCR offers suggested spacing guidelines for access management applications, including corner clearance requirements at Major Intersections. TAC Chapter 8.8 (Corner Clearances at Major Intersection), Section 8.8.1 (General) states,

> *"Corner clearance is the distance from an intersection to the nearest access upstream or downstream of it. Corner clearance is measured from the near curb of the cross roadway to the near edge of the access throat. It consists of three components: the curb return radius at the intersection, a length of tangent, and the curb return radius or flare dimension at the driveway. Inadequate corner clearance between accesses and intersections along a major road, such as a major arterial, can create operational issues."*

The suggested corner clearance guidelines for a local roadway are 15 metres (curb radii to curb radii) downstream and upstream of a stop-controlled intersection.

- Driveway A will be located 30 metres south (curb radii to curb radii) south of the Caroline Street and John Street intersection and about 75 metres north of the John Street and Maria Street intersection and meets the corner clearance requirements.

- Driveway B will be located 65 metres south (curb radii to curb radii) south of the Caroline Street and John Street intersection and about 40 metres north of the John Street and Maria Street intersection and meets the corner clearance requirements.

3.2.3 On-Street Parking

John Street and Elizabeth Street currently provide on-street parking. However, with the development of the subject site, on-street parking on the east side of John Street and the west side of Elizabeth Street flanking, the proposed driveway connections are noted to be situated within closing proximity, which may hinder sightlines for traffic to enter/exit the proposed development.

The City's Zoning Bylaw[7] identifies restrictions for on-street parking within 1 metre of any driveway or laneway entrance to prevent unacceptable egress or ingress encroachments. The provision of on-street parking near a driveway is to be evaluated to confirm that it does not adversely impact sight lines for proposed driveway connections.

To provide adequate sight lines, the removal of three (3) spaces along John Street and two (2) spaces on Elizabeth Street is likely to be required.

3.2.4 Study Area Parking Utilization

To determine the impacts on the overall parking supply for the area with the removal of the five (5) on-street parking spaces, a parking utilization of the publicly available parking within 200 metres of the subject site has been undertaken.

Utilization refers to the proportionate number of parking spaces occupied by parked vehicles at any given time, expressed as a percentage of spaces occupied (i.e. demand divided by capacity). Utilization rates greater than 100% suggest that the number of vehicles within the parking area exceeds the actual number of spaces, which would infer illegal or inappropriate parking behaviour.

For planning purposes, the practical capacity is generally considered to be 85% utilization, above which drivers may perceive a lack of available parking spaces. When utilization reaches this level, options to manage the parking demand should be considered, including varying rates, times, and durations to redistribute parking to underutilized areas, increasing enforcement to promote compliance

[7] By-law 62-2021, City of Burlington

and/or finding opportunities for more commercial parking spaces to increase parking supply.

The parking utilization surveys were conducted on a weekday and weekend in April 2024. Data was collected in 15-minute intervals throughout the survey day. **Appendix M** contains the parking survey utilization data.

The study area's future public parking supply would likely equate to 190 parking spaces. Assuming the demand levels remain consistent in the future, this would equate to a peak demand of 48% during the weekday and 58% during the weekend based on 190 publicly available parking spaces. As the parking utilization will not exceed the typical target threshold of 85%, this suggests a considerable surplus of parking is available for the study area.

3.3 Development Trip Generation

Trip generation information is used to forecast the anticipated level of traffic activity as a result of the development. Trip generation for each land use type was summed to establish total site trip generation for the respective weekday AM and PM peak hours. The following sub-sections provide the methodology of this analysis.

3.3.1 Institute of Transportation Engineers (ITE)

The Institute of Transportation Engineers (ITE) Trip Generation Manual[8] provides rates and equations used to estimate the peak hour traffic volumes generated by the Land Use Codes (LUC) of this development:

- LUC 222 – Multifamily Housing (High Rise);
- LUC 220 - Multifamily Housing (Low-Rise); and
- LUC 822 – Retail Plaza.

Data for the peak hour of adjacent street traffic was used to estimate trip generation. Fitted curve equations were used for LUC 222 and LUC 822.

3.3.2 Internal Trips

The ITE Trip Generation Handbook[9] describes a multi-use development as a single project that consists of two or more ITE land use classifications in which trips can be made between land uses without using the off-site roadway system. This sharing of trips between compatible land uses, without traveling off-site, is an internal capture.

Based on this information, the proposed development is considered multi-use, with compatible commercial land and uses that are likely to share – or capture – trips that do not require vehicular travel outside the site.

For example, some traffic destined to and from the commercial uses located within the site will likely originate from the on-site residential units, requiring only a walking trip. The ITE Trip Generation Handbook

[8] Institute of Transportation Engineers, *Trip Generation Manual,* 11th ed., (Washington, DC: ITE, 2021).
[9] Institute of Transportation Engineers, Trip Generation Handbook, 3rd ed., (Washington, DC: ITE, 2017).

has been utilized to account for internal trips within the development. **Appendix D** contains the detailed calculations for internal trips.

3.3.3 Modal Split

Due to the proposed re-developments proximity to transit services and pedestrian facilities, some percentage of the trips generated by the site will be made by other modes (transit, walking, etc.).

Data on primary modes of travel were extracted from the 2016 Transportation Tomorrow Survey[10] (TTS) for the study area (GTA Zones 4059-4069). It is estimated that 27% are using travel modes other than by personal vehicle (e.g. transit, cycling, walking, carpooling, etc.).

A conservative reduction of 20% has been applied to account for travel by transit and active modes for the residential component.

Appendix D contains the TTS Data.

3.3.4 Pass-By Trips

Pass-by trips are a subset of a trip generation that only applies to commercial developments. These trips are made by vehicles already present on the roadway, which businesses attract them to their site as they pass by. The estimates of pass-by trips were derived using the ITE Trip Generation Handbook.

An example of a pass-by trip is a vehicle driving from home to work and stopping for coffee on the way. It is noted that pass-by trips are already included in the background traffic stream and do not load additional traffic onto the road network. The ITE Trip Generation Handbook provides a 40% pass-by trip rate for LUC 821 Shopping Plaza during the weekday PM peak hour. No information is available for a pass-by rate during the weekday AM peak hour.

3.3.5 Net Trip Generation Estimates

Table 3.3 summarizes the forecast number of net new trips generated by the proposed re-development. These estimates are based on standardized ITE rates with internal, pass-by, and modal split credits made, as noted earlier.

Accordingly, no on-site parking is proposed for the commercial component. These trips are expected to utilize existing on-street and

[10] Transportation Tomorrow Survey (TTS), 2016, Data Management Group, University of Toronto.

off-street parking facilities near the site. Therefore, the trip assignment has assumed the commercial trips would originate from the John Street North Parking Lot immediately north of the subject site.

As shown, with the build-out of the re-development, approximately 84 new trips during the weekday AM peak hour and 99 new trips during the weekday PM peak hour are forecast to be added to the area roadways.

TABLE 3.3: TRIP GENERATION

ITE Land Use Code / Number of Units	Trips	AM Peak Hour				PM Peak Hour			
		Rate	In	Out	Sum	Rate	In	Out	Sum
222 - Multifamily Housing (High-Rise) - 292 Units	Total	Eqn.	22	61	**83**	Eqn.	61	38	**99**
	Internal	1%	0	1	**1**	7%	5	2	**7**
	Mode Share	20%	4	12	**16**	20%	11	7	**18**
	New		**18**	**48**	**66**		**45**	**29**	**74**
220 - Multifamily Housing (Low-Rise) - 10 Units	Total	0.40	1	3	**4**	0.51	3	2	**5**
	Internal	0%	0	0	**0**	0%	0	0	**0**
	Mode Share	20%	0	1	**1**	20%	1	0	**1**
	New		**1**	**2**	**3**		**2**	**2**	**4**
822 - Retail Plaza (<40k GFA) - 4,120 sq.ft	Total	Eqn.	10	6	**16**	Eqn.	21	21	**42**
	Internal	6%	1	0	**1**	17%	2	5	**7**
	Pass-by	--	0	0	**0**	40%	7	7	**14**
	New	**--**	**9**	**6**	**15**	**--**	**12**	**9**	**21**
Total	**Total**	--	**33**	**70**	**103**	--	**85**	**61**	**146**
	Internal	2%	**1**	**1**	**2**	10%	**7**	**7**	**14**
	Mode Share	16%	**4**	**13**	**16**	12%	**12**	**7**	**18**
	Pass-by	0%	**0**	**0**	**0**	10%	**7**	**7**	**14**
	New	**82%**	**28**	**56**	**84**	**68%**	**59**	**40**	**99**

Equations

LUC 222 Eqn. per Unit AM: T = 0.22(X) + 18.85 | PM: T = 0.26(X) + 23.12

LUC 822 Eqn. per 1,000 sq.ft. GFA AM: Ln(T) = 0.66 Ln(X) + 1.84 | PM: Ln(T) = 0.71 Ln(X) + 2.72



3.4 Development Trip Distribution and Assignment

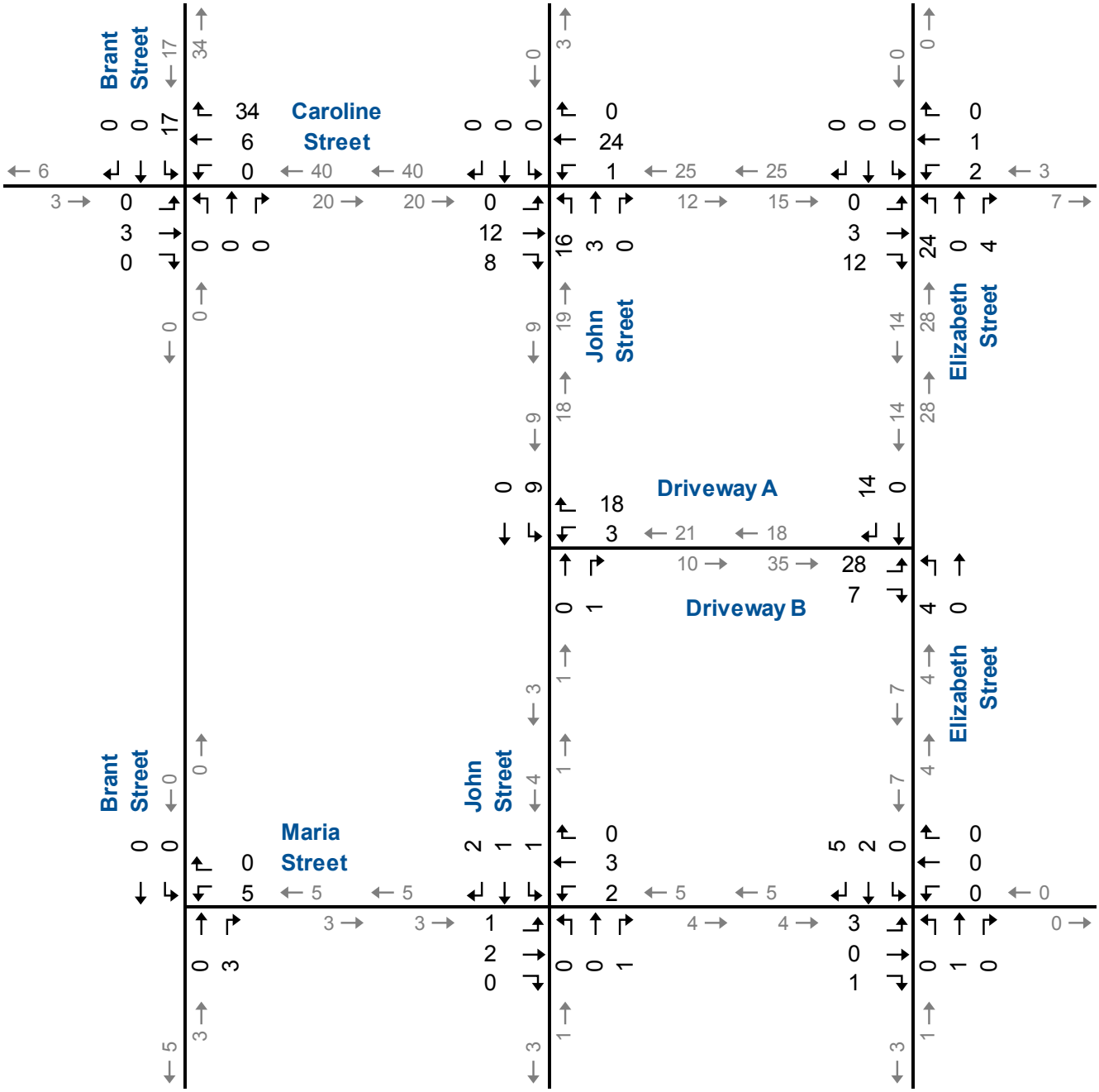
Table 3.3 summarizes the estimated trip distribution for the subject site. The trip distribution is based on traffic count data and Transportation Tomorrow Survey[11] (TTS) data for the subject site zone. TTS data can be found in **Appendix D**.

TABLE 3.3: TRIP DISTRIBUTION

Origin/Destination	%
North via Brant Street	60%
South via Brant Street	9%
South via John Street	4%
South via Elizabeth Street	4%
East via Caroline Street	13%
West via Caroline Street	10%
Total	**100%**

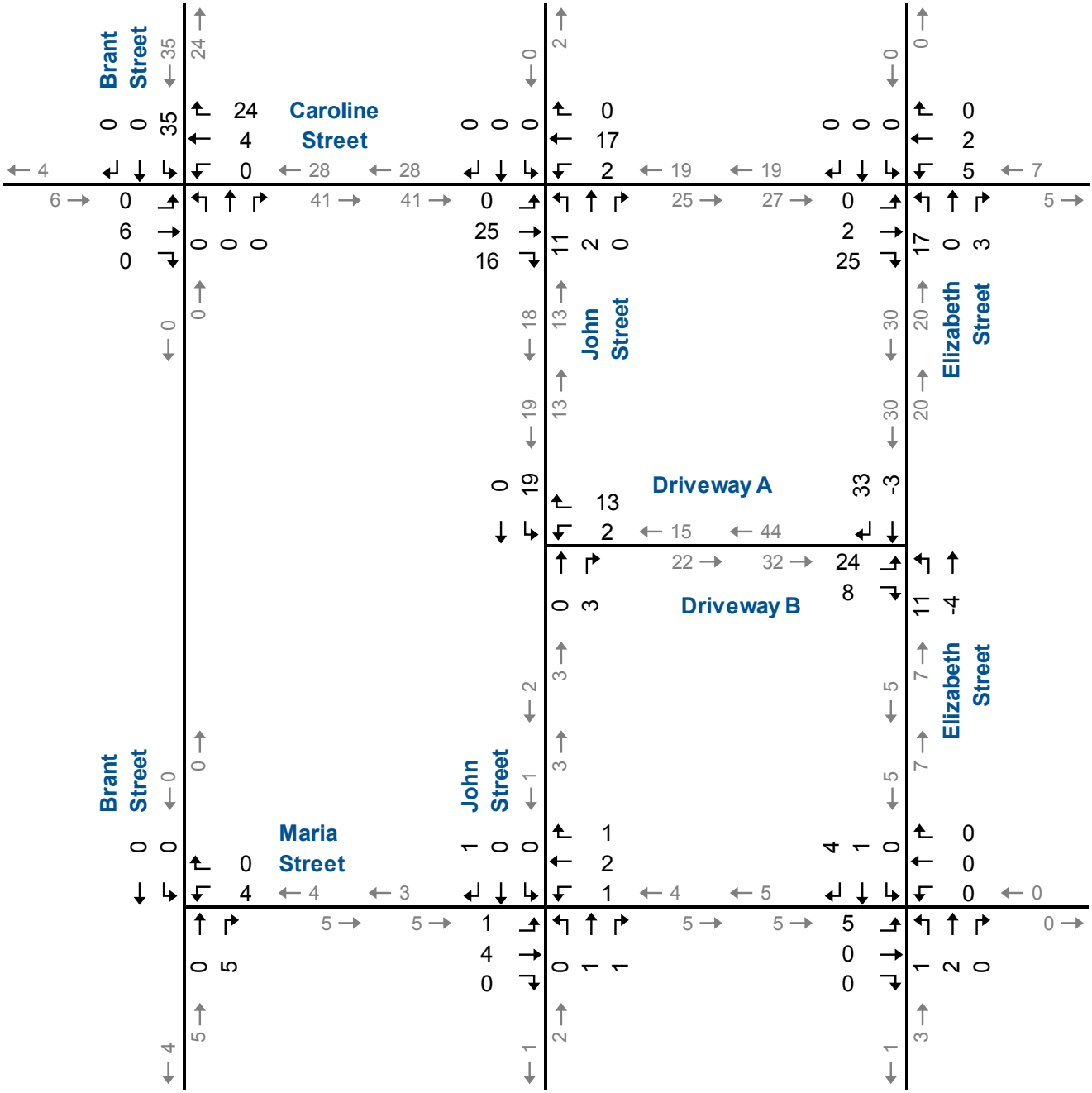
Figure 3.2a illustrates the site-generated traffic volumes for the AM peak hour. **Figure 3.2b** illustrates the net site-generated traffic volumes for the PM peak hour.

[11] Data Management Group, Transportation Tomorrow Survey 2016, University of Toronto, 2016



NTS

Net Site Generated Traffic Volumes – AM Peak Hour



NTS

Net Site Generated Traffic Volumes – PM Peak Hour

4 Future Traffic Conditions

To be consistent with the terms of reference established with the City of Burlington and with the Region of Halton's Transportation Impact Study Guidelines, the horizon year of 2029, five (5) years beyond the date of TIS, has been used for traffic forecasting and analysis purposes.

4.1 Background Growth

Traffic growth on area roadways is a function of expected land development, economic activity, and demographic changes. A frequently used procedure is to estimate an annual percentage increase and apply that increase to the study area traffic volumes. An alternative procedure is to identify estimated traffic generated by specific planned major developments that would be expected to affect the project study area roadways. For this assessment, both methods were used.

4.1.1 General Background Growth

Generalized traffic growth was determined by applying a growth rate of 1.0% per annum to the base year volumes. This growth rate was confirmed with City staff as noted the minutes of the pre-submission consultation meeting conducted on August 23, 2023.

4.1.2 Background Developments

By 2029, other new developments may also increase the traffic volumes on the study area roadways.

The City's Planning Department advised that there are several mixed-use, residential and commercial developments within and within proximity of the study area.

Figure 4.1 illustrates the general locations of these area developments. **Table 4.1** outlines the expected number of units.



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Background Developments

Figure 4.1

TABLE 4.1: BACKGROUND DEVELOPMENTS

Development	Development Plans
421 - 431 Brant Street	183 residential units; 1,390 SM (14,961 SF) office land uses; and 967 SM (10,407 SF) commercial land uses
409 Brant Street	227 residential units; 597 SM (6,425 SF) commercial land uses
535 Brant Street	259 residential units; 1,191 SM (12,819 SF) commercial land uses
2082, 2086 and 2090 James Street	153 residential units

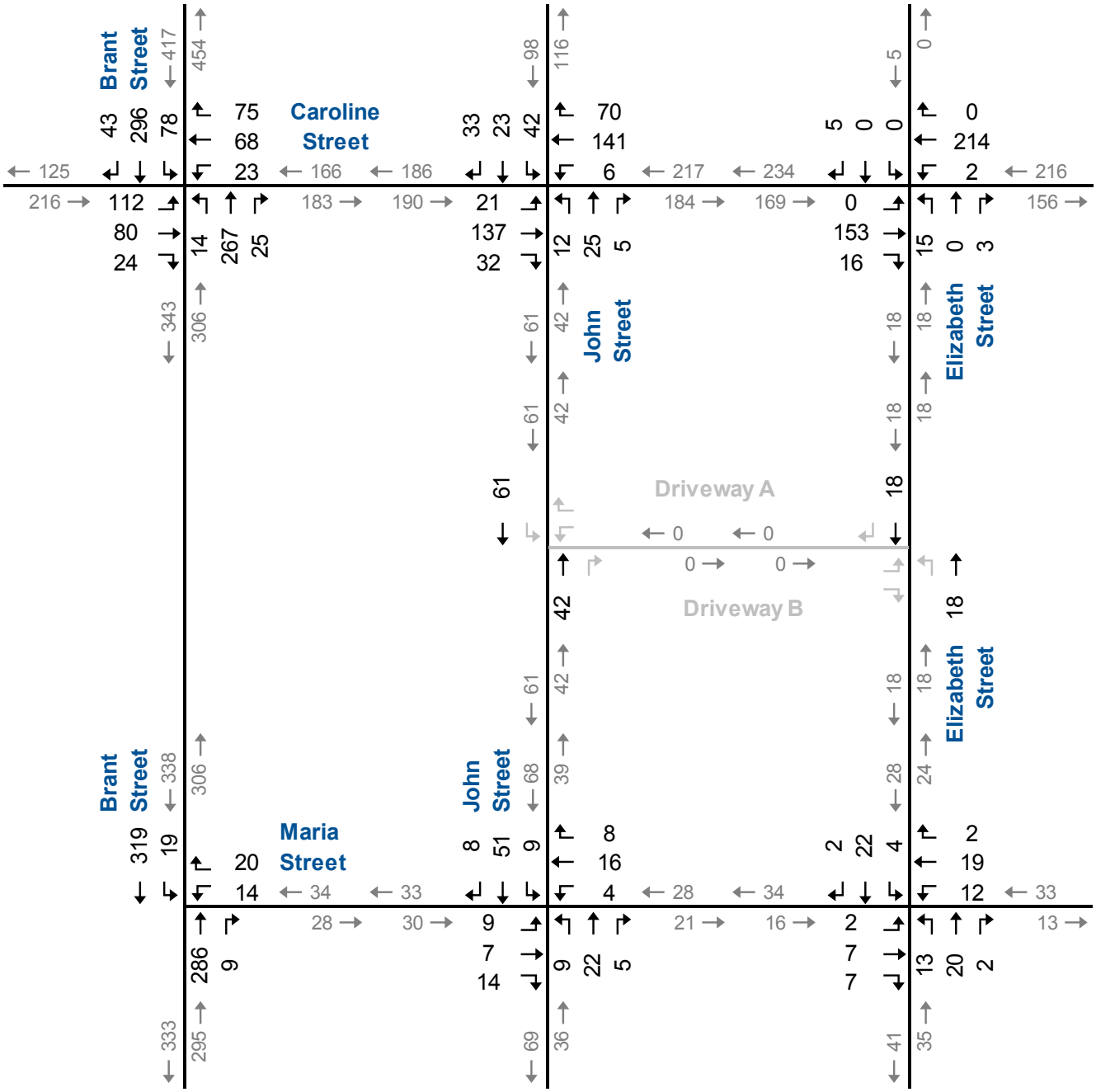
Appendix E contains the background development forecast traffic volumes.

4.1.3 Background Traffic Volumes

The background traffic volumes within the study area are estimated to consist of generalized background traffic growth of 1.0 percent per annum, along with traffic related to the background developments. **Figure 4.2a** and **Figure 4.2b** illustrate the 2029 background traffic forecasts for the AM and PM peak hours, respectively.

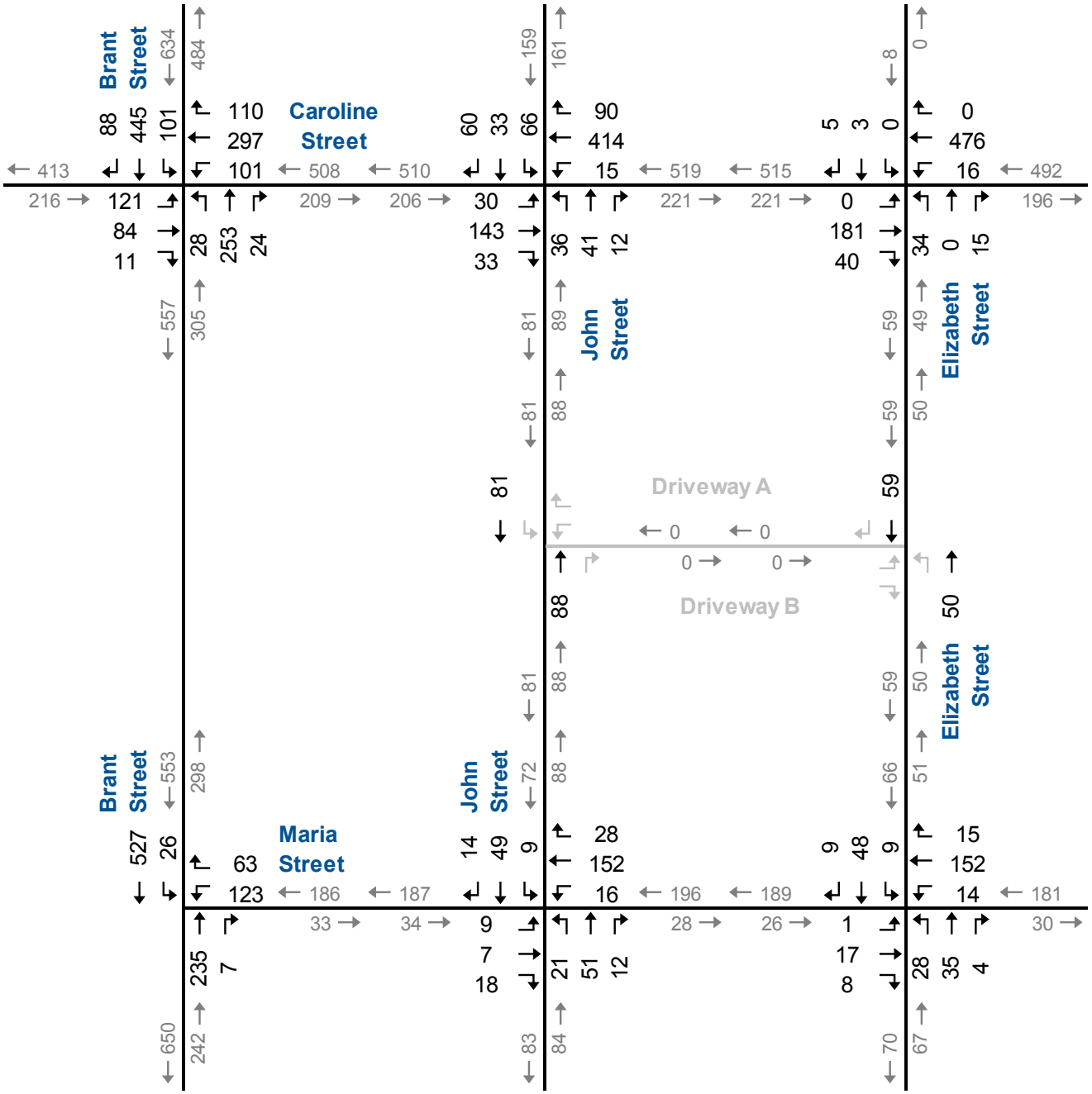
4.1.4 Total Traffic Volumes

The total traffic volumes within the study area are estimated to consist of generalized background traffic growth of 1.0 percent per annum, traffic related to the background developments and development site-generated traffic. **Figure 4.3a** and **Figure 4.3b** illustrate the 2029 total traffic forecasts for the AM and PM peak hours, respectively.



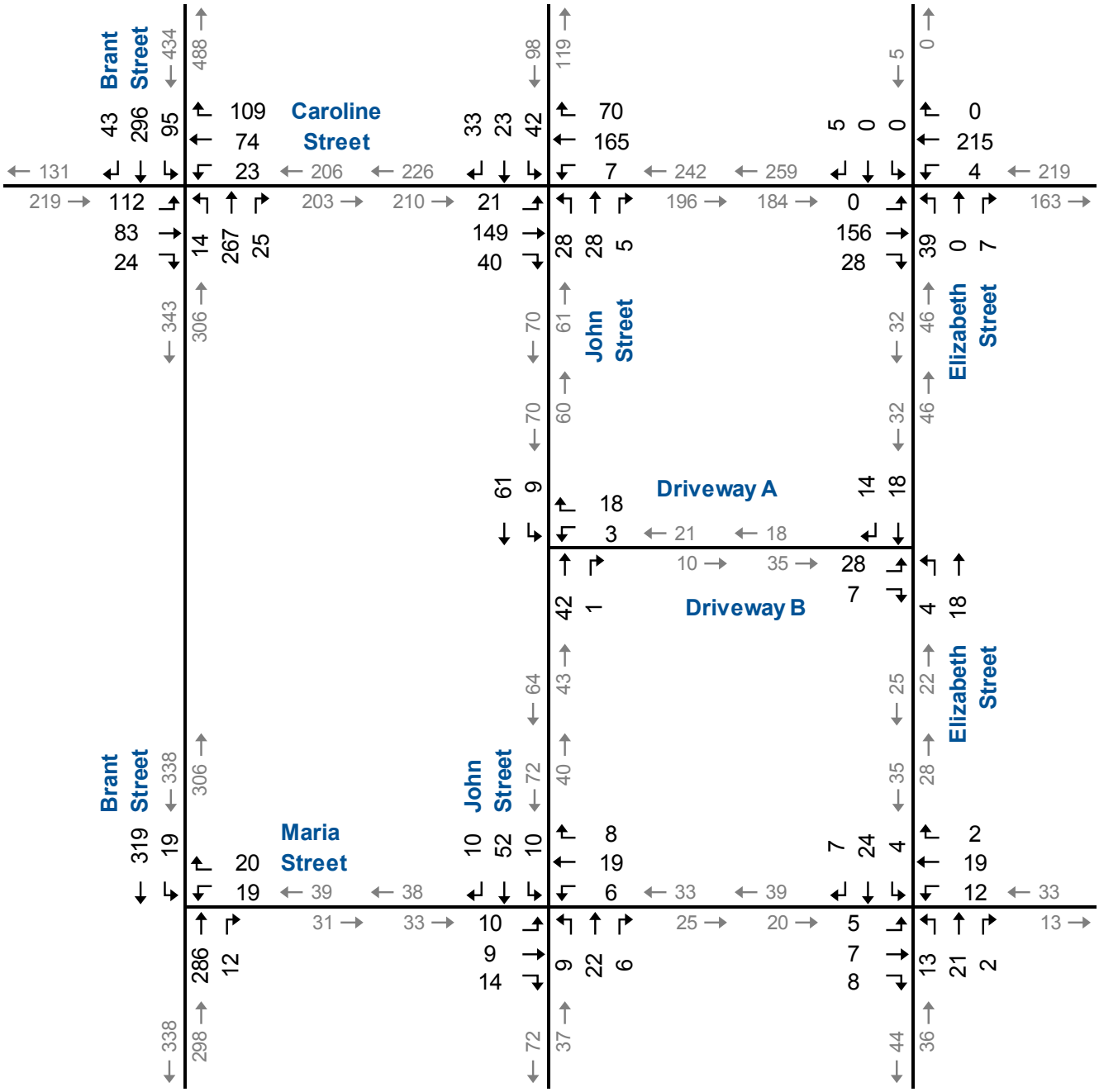
NTS

Background Traffic Volumes – AM Peak Hour



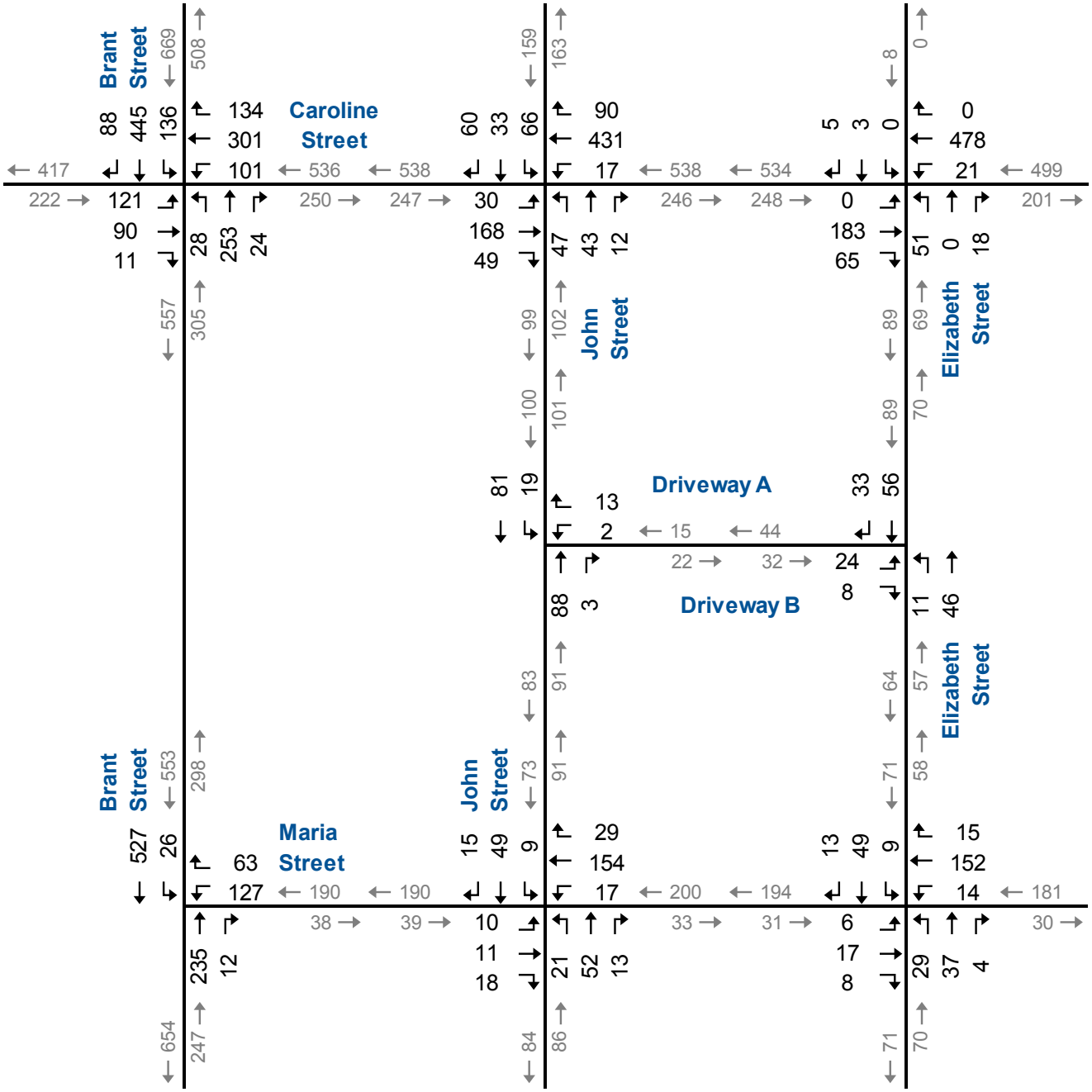
NTS

Background Traffic Volumes – PM Peak Hour



NTS

Total Traffic Volumes – AM Peak Hour



NTS

Total Traffic Volumes – PM Peak Hour

4.2 Background Traffic Operations

Level of service analyses have been conducted using Synchro 11 for the weekday AM and PM peak hour conditions at the study area intersections utilizing background traffic forecasts. The intersections within the study area were assessed based on the same parameters as in the analysis of existing conditions. Signal timings were not optimized.

Table 4.2 summarizes the results of the background traffic operations. The study area intersections are forecast to operate with acceptable levels of service, except for the following movements:

- At the intersection of Brant Street and Maria Street, the stop-controlled westbound approach operates at LOS E during the weekday PM peak hour. It is noted that a v/c ratio for the westbound movement is not projected to exceed 0.69, indicating spare capacity is still projected.

Appendix F contains the detailed Synchro reports.

TABLE 4.2: BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Brant Street at Caroline Street	TCS	LOS	B	B	B	**B**	B	C	C	**C**	B	C	C	**C**	B	B	B	**B**	**B**
			Delay	15	13	13	**14**	19	21	21	**20**	18	24	24	**24**	15	17	17	**17**	**19**
			V/C	0.26	0.10	0.02		0.07	0.21	0.21		0.05	0.52	0.52		0.24	0.47	0.47		**0.39**
			Q	20	16	0		8	24	24		6	62	62		14	58	58		
	2 - Caroline Street at John Street	AWSC	LOS	B	B	B	**B**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	10	10	10	**10**	9	9	9	**8**	7	7	7	**0**	9	9	9	**9**	
			DU	0.30	0.30	0.30		0.23	0.23	0.23		0.09	0.09	0.09		0.07	0.07	0.07		
	3 - Caroline Street at Elizabeth Street	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	B	B	B	**B**	A	A	A	**A**	
			Delay	0	0	0	**0**	0	0	0	**0**	12	12	12	**12**	10	10	10	**10**	
			V/C	0.11	0.11	0.11		0.00	0.00	0.00		0.04	0.04	0.04		0.01	0.01	0.01		
			Q	0	0	0		0	0	0		1	1	1		0	0	0		
	4 - Brant Street at Maria Street	TWSC	LOS					B		B	**B**		A	A	**A**	A	A		**A**	
			Delay					14		14	**14**		0	0	**0**	1	1		**1**	
			V/C					0.08		0.08			0.19	0.19		0.02	0.02			
			Q					2		2			0	0		0	0			
	5 - Maria Street at John Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	7	7	7	**7**	7	7	7	**7**	7	7	7	**7**	8	8	8	**8**	
			DU	0.04	0.04	0.04		0.04	0.04	0.04		0.04	0.04	0.04		0.08	0.08	0.08		
	6 - Maria Street at Elizabeth Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	7	7	7	**7**	7	7	7	**7**	8	8	8	**8**	7	7	7	**7**	
			DU	0.02	0.02	0.02		0.04	0.04	0.04		0.05	0.05	0.05		0.03	0.03	0.03		
AM Peak Hour	1 - Brant Street at Caroline Street	TCS	LOS	B	B	B	**B**	C	C	C	**C**	B	C	C	**C**	B	C	C	**C**	**C**
			Delay	18	13	12	**16**	23	34	34	**32**	20	23	23	**23**	15	22	22	**21**	**24**
			V/C	0.50	0.11	0.01		0.30	0.76	0.76		0.15	0.48	0.48		0.30	0.69	0.69		**0.73**
			Q	22	16	0		27	110	110		9	58	58		18	100	100		
	2 - Caroline Street at John Street	AWSC	LOS	B	B	B	**B**	C	C	C	**C**	A	A	A	**A**	B	B	B	**B**	
			Delay	13	13	13	**13**	23	23	23	**20**	8	8	8	**0**	12	12	12	**12**	
			DU	0.38	0.38	0.38		0.75	0.75	0.75		0.14	0.14	0.14		0.19	0.19	0.19		
	3 - Caroline Street at Elizabeth Street	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	C	C	C	**C**	B	B	B	**B**	
			Delay	0	0	0	**0**	0	0	0	**0**	17	17	17	**17**	14	14	14	**14**	
			V/C	0.14	0.14	0.14		0.01	0.01	0.01		0.15	0.15	0.15		0.02	0.02	0.02		
			Q	0	0	0		0	0	0		4	4	4		0	0	0		
	4 - Brant Street at Maria Street	TWSC	LOS					E		E	**E**		A	A	**A**	A	A		**A**	
			Delay					41		41	**41**		0	0	**0**	1	1		**1**	
			V/C					0.69		0.69			0.15	0.15		0.02	0.02			
			Q					36		36			0	0		1	1			
	5 - Maria Street at John Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	8	8	8	**8**	9	9	9	**9**	8	8	8	**8**	8	8	8	**8**	
			DU	0.05	0.05	0.05		0.25	0.25	0.25		0.11	0.11	0.11		0.10	0.10	0.10		
	6 - Maria Street at Elizabeth Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	7	7	7	**7**	9	9	9	**9**	8	8	8	**8**	8	8	8	**8**	
			DU	0.03	0.03	0.03		0.23	0.23	0.23		0.09	0.09	0.09		0.09	0.09	0.09		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

RBT - Roundabout

4.3 Total Traffic Operations

Level of service analyses have been conducted using Synchro 11 for the weekday AM and PM peak hour conditions at the study area intersections utilizing total traffic forecasts. The intersections within the study area were assessed based on the same parameters as in the analysis of background conditions. Signal timings were not optimized.

Table 4.3 summarizes the results of the total traffic operations. The study area intersections are forecast to operate with acceptable levels of service, except for the following movements:

- At the intersection of Brant Street and Maria Street, the stop-controlled westbound approach operates at LOS E during the weekday PM peak hour. It is noted that a v/c ratio for the westbound movement is not projected to exceed 0.72, indicating spare capacity is still projected and the proposed development does not adversely impact the operation of this intersection.

Appendix G contains the detailed Synchro reports.

The re-development of the subject site is anticipated to have a negligible effect on traffic operations within the study area. Individual movement delays are expected to increase by less than five seconds during the AM and PM peak hours as a result of the site traffic.

The site driveway will operate with delays in the LOS A range and is not expected to exceed 9 seconds of delay during the AM and PM peak hours.

TABLE 4.3: TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																Overall
				Eastbound				Westbound				Northbound				Southbound				
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Brant Street at Caroline Street	TCS	LOS	B	B	B	**B**	B	C	C	**C**	B	C	C	**C**	B	B	B	**B**	**B**
			Delay	15	13	13	**14**	19	21	21	**21**	18	24	24	**24**	15	17	17	**17**	**19**
			V/C	0.28	0.11	0.02		0.07	0.26	0.26		0.05	0.52	0.52		0.29	0.47	0.47		**0.4**
			Q	20	16	0		8	29	29		6	62	62		17	58	58		
	2 - Caroline Street at John Street	AWSC	LOS	B	B	B	**B**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	11	11	11	**11**	9	9	9	**9**	7	7	7	**0**	10	10	10	**10**	
			DU	0.34	0.34	0.34		0.28	0.28	0.28		0.10	0.10	0.10		0.11	0.11	0.11		
	3 - Caroline Street at Elizabeth Street	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	B	B	B	**B**	A	A	A	**A**	
			Delay	0	0	0	**0**	0	0	0	**0**	13	13	13	**13**	10	10	10	**10**	
			V/C	0.12	0.12	0.12		0.00	0.00	0.00		0.10	0.10	0.10		0.01	0.01	0.01		
			Q	0	0	0		0	0	0		2	2	2		0	0	0		
	4 - Brant Street at Maria Street	TWSC	LOS					B		B	**B**		A	A	**A**	A	A		**A**	
			Delay					15		15	**15**		0	0	**0**	1	1		**1**	
			V/C					0.10		0.10			0.19	0.19		0.02	0.02			
			Q					3		3			0	0		0	0			
	5 - Maria Street at John Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	7	7	7	**7**	8	8	8	**8**	7	7	7	**7**	8	8	8	**8**	
			DU	0.04	0.04	0.04		0.04	0.04	0.04		0.05	0.05	0.05		0.09	0.09	0.09		
	6 - Maria Street at Elizabeth Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	7	7	7	**7**	7	7	7	**7**	8	8	8	**8**	7	7	7	**7**	
			DU	0.02	0.02	0.02		0.04	0.04	0.04		0.05	0.05	0.05		0.04	0.04	0.04		
	7 - John Street at Driveway A	TWSC	LOS					A		A	**A**		A	A	**A**	A	A		**A**	
			Delay					9		9	**9**		0	0	**0**	1	1		**1**	
			V/C					0.02		0.02			0.03	0.03		0.01	0.01			
			Q					1		1			0	0		0	0			
	8 - Elizabeth Street at Driveway B	TWSC	LOS	A		A	**A**					A	A		**A**	A	A		**A**	
			Delay	9		9	**9**					1	1		**1**	0	0		**0**	
			V/C	0.04		0.04						0.00	0.00			0.02	0.02			
			Q	1		1						0	0			0	0			
AM Peak Hour	1 - Brant Street at Caroline Street	TCS	LOS	B	B	B	**B**	C	D	D	**C**	C	C	C	**C**	B	C	C	**C**	**C**
			Delay	19	13	12	**17**	23	38	38	**35**	21	25	25	**24**	16	22	22	**21**	**25**
			V/C	0.54	0.12	0.01		0.30	0.82	0.82		0.15	0.50	0.50		0.39	0.69	0.69		**0.76**
			Q	22	17	0		27	120	120		9	58	58		23	100	100		
	2 - Caroline Street at John Street	AWSC	LOS	B	B	B	**B**	D	D	D	**C**	A	A	A	**A**	B	B	B	**B**	
			Delay	15	15	15	**15**	28	28	28	**25**	8	8	8	**0**	12	12	12	**12**	
			DU	0.47	0.47	0.47		0.81	0.81	0.81		0.14	0.14	0.14		0.22	0.22	0.22		
	3 - Caroline Street at Elizabeth Street	TWSC	LOS	A	A	A	**A**	A	A	A	**A**	C	C	C	**C**	B	B	B	**B**	
			Delay	0	0	0	**0**	1	1	1	**1**	19	19	19	**19**	14	14	14	**14**	
			V/C	0.16	0.16	0.16		0.02	0.02	0.02		0.23	0.23	0.23		0.02	0.02	0.02		
			Q	0	0	0		0	0	0		7	7	7		1	1	1		
	4 - Brant Street at Maria Street	TWSC	LOS					E		E	**E**		A	A	**A**	A	A		**A**	
			Delay					44		44	**44**		0	0	**0**	1	1		**1**	
			V/C					0.72		0.72			0.16	0.16		0.02	0.02			
			Q					38		38			0	0		1	1			
	5 - Maria Street at John Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	8	8	8	**8**	9	9	9	**9**	8	8	8	**8**	8	8	8	**8**	
			DU	0.05	0.05	0.05		0.26	0.26	0.26		0.12	0.12	0.12		0.10	0.10	0.10		
	6 - Maria Street at Elizabeth Street	AWSC	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	
			Delay	8	8	8	**8**	9	9	9	**9**	8	8	8	**8**	8	8	8	**8**	
			DU	0.04	0.04	0.04		0.23	0.23	0.23		0.10	0.10	0.10		0.10	0.10	0.10		
	7 - John Street at Driveway A	TWSC	LOS					A		A	**A**		A	A	**A**	A	A		**A**	
			Delay					9		9	**9**		0	0	**0**	2	2		**2**	
			V/C					0.02		0.02			0.06	0.06		0.01	0.01			
			Q					0		0			0	0		0	0			
	8 - Elizabeth Street at Driveway B	TWSC	LOS	A		A	**A**					A	A		**A**	A	A		**A**	
			Delay	9		9	**9**					2	2		**2**	0	0		**0**	
			V/C	0.04		0.04						0.01	0.01			0.06	0.06			
			Q	1		1						0	0			0	0			

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

RBT - Roundabout

5 Remedial Measures

5.1 Left-Turn Lanes

The need for auxiliary turning lanes at the site driveway on John Street and Elizabeth Street follows the requirements and procedures detailed in the Ministry of Transportation Geometric Design Manual[12].

Warrants have been calculated for a southbound left turn at John Street and Driveway A and a northbound left turn at Elizabeth Street and Driveway B. The warrant was calculated using the nomographs for left-turn lanes on a two-lane undivided highway at an unsignalized intersection with a 60 km/h design speed. Based on this criterion, left-turn lanes are not warranted on John Street or Elizabeth Street under total AM and PM peak hour volumes.

Appendix H contains the warrant nomographs.

[12] Geometric Design Manual for Ontario Highways, Ministry of Transportation of Ontario, Queen's Printer for Ontario, 1986

6 Parking Methodology

6.1 Zoning By-Law Requirements

6.1.1 Vehicle Parking

Zoning By-law 2020 is the current in-force By-law for the City of Burlington. Based on the City Zoning By-law, the subject site is within the "Downtown Parking Exemption Area," which exempts all non-residential properties from providing on-site parking.

The minimum parking rates for the proposed development are as follows:

- Apartment Dwelling Units: 1.25 spaces per unit;
- Townhouse Units: 2.00 spaces per unit;
- Retail: Parking Exempt.

Table 6.1 summarizes the development's Zoning By-Law 2020 minimum parking standard calculations.

TABLE 6.1: ZONING REQUIREMENTS

Land Use	Units	Rate*	Spaces Required
Apartment	292 Units	1.25 spaces/unit	365
Townhouse	10 units	2.00 spaces/unit	20
Retail Store	196 m^2	0.00 space/100m^2 GFA	0
Total			**385**
Total Parking Required			**385**

*Zoning By-Law 2020 - Downtown Parking Exemption Area

As indicated in **Table 6.1**, the proposed development requires 385 parking spaces under the City's Zoning By-Law 2020. The proposed parking supply of 277 spaces is 108 less than the Zoning By-Law requirement.

6.1.2 Burlington City-Wide Parking Standards Review

In 2017, the city retained IBI Group to undertake a Burlington City-Wide Parking Standards Review (CWPSR). The primary goal of this study is to review the "Parking Requirements" contained within By-law 2020 and to provide detailed recommendations on how they should be modified to reflect better the transportation and land use realities and objectives across Burlington.

A comprehensive approach to determining the recommended parking rates involved assessing existing standards in Burlington and other jurisdictions, conducting parking surveys, estimating parking demand directly from first principles, and considering policy objectives. **Table 6.2** summarises the recommended parking ratios for apartment units in an Intensification Area as contained in the CWPSR.

TABLE 6.2: CWPSR INTENSIFICATION PARKING – APARTMENT

Assignment	Parking Ratio (spaces/unit)	
	Min.	Max.
Resident	1.00	1.50
Visitor	0.25	0.25

The Planning and Development Committee of Burlington Council approved revising the parking rates at a statutory public meeting on September 17, 2019, and the rates outlined in **Table 6.2** were approved by Council on September 23, 2019, as contained within the Zoning By-law Amendment (2020-414).

An appeal to the Local Planning Appeal Tribunal (LPAT) regarding the passing of By-law 2020.414, which amends Zoning By-law 2020 to update the parking rates for residential land use, was made on October 16, 2019. The residential parking rates contained in the Zoning By-law 2020 Amendment are based on the parking rates recommended in the CWPSR.

The LPAT decision regarding the City of Burlington's Zoning By-law Amendment accepted the following:

"For those lands within a 'Primary Growth Area' as identified in the City's new Official Plan approved November 30, 2020, a minimum parking rate of 1.25 spaces per unit for apartment dwellings inclusive of visitors regardless of the number of bedrooms. This rate is to be identified as interim and subject to further study. Further, any application to reduce the parking rate below a rate of 1.25 spaces per unit for apartment dwellings inclusive of visitors will be required to be supported by a parking justification study that is acceptable to the city."

Per the Zoning By-law Amendment, a requirement confirmed in the LPAT decision, a critique of the CWPSR methodology is noted below. As the CWPSR formed the basis for the rates contained in the Zoning By-Law Amendment 2020.414, the critique establishes flaws in the method to establish the updated parking rates:

- As part of undertaking the CWPSR, spot surveys were completed. The survey data observed a maximum parking demand of 1.10 per unit, with a maximum visitor demand of 0.10 per unit at Burlington apartment sites. There is no rationale, methodology or justification for why a visitor parking requirement of 0.25 spaces per unit, which is more than double the observed maximum rate, is recommended for intensification areas.

- The CWPSR is largely dismissive of the negative impacts that parking requirements have. While the CWPSR recognizes the negative effects of parking minimums and the Ontario Climate Change Plan prescribes the removal of parking minimums from all municipal by-laws, the recommendations view parking minimums as necessary for the foreseeable future. This dismissal contradicts the literature reviewed as part of the CWPSR, which found that parking minimums have significant negative impacts and that several policy alternatives are available.

- The CWPSR suggests that there is little risk in reducing minimum residential parking requirements as availability of parking is a key decision in an individual's residential choice. Developers are well attuned to their potential customers' parking needs and will not reduce parking provision so much as to compromise the marketability of their development. It stands to reason that the economic demand for parking would create self-enforced minimums and that the report could have also suggested eliminating minimums.

- The CWPSR identified shared parking as a viable tool that encourages more efficient use of the parking supply. However, the CWPSR fails to further expand on the "macro" scale, recognizing that shared parking can extend beyond a specific site and include several developments. Specifically, parking can be shared among buildings and facilities in an area to take advantage of public parking facilities during peak periods. This type of arrangement is not new, particularly for the City of Burlington, which has employed a shared parking strategy. City Hall does not provide on-site parking for employees, so the city has been using a shared parking arrangement because of the

municipal parking lots near City Hall. These municipal parking spaces are efficiently shared since peak parking demands of City Hall employees occur during weekdays, while restaurants and visitors to the Downtown peak parking demands occur during evenings and weekends.

- The CWPSR did not deviate from the status quo of parking policy within intensification areas despite recognizing the negative impacts associated with the parking provisions. Given this report created the scope for future parking requirement studies, adhering to the status quo of still requiring 1.25 spaces per unit in Intensification Areas limits opportunities for change and, more importantly, deviates from Provincial, Regional and Municipal planning policy, including Ontario's Climate Action Plan.
- A final critique of the CWPSR methodology is that it failed to study auto ownership trends to determine how parking demand has changed and will continue to change. As the literature review suggested, auto ownership is decreasing within the general population, and the decrease is even more pronounced with younger generations. By basing parking requirements on existing auto-ownership rates, this exercise fails to create the space for reduced parking requirements that reflect changing mobility trends and policy goals. The proposed minimum parking requirements are based on providing at least enough parking to meet existing auto-ownership rates; they do not reflect changing mobility trends or policies that encourage a shift away from automobile-based travel.



6.2 Residential Parking Supply

6.2.1 Institute of Transportation Engineers (ITE)

The ITE Parking Generation 6th Edition is regarded as a reliable source for parking generation. The requirements specified by ITE's Parking Generation for Multi-Family High-Rise dwellings indicate parking demands of 0.68 spaces per 1-bedroom units and 1.02 spaces for 2+-bedroom units.

As the site proposes 189 one-bedroom/studio units and 113 two-bedroom and three-bedroom units, the calculated supply based on the ITE rates is 244 parking spaces (resident and visitor supply). This equates to an overall parking rate of 0.81 spaces per unit. Based on the following, a reduced parking supply is supportable based on the ITE rates.

6.2.2 Vehicle Ownership Rates

A review of vehicle ownership data from the Transportation Tomorrow Survey (TTS) found that 18% of residents living in apartment units in and around zones within the study area do not own a vehicle (GTA 2006 Zones 4059-4069). From the study, it is also calculated that the vehicle ownership rate for the surrounding area is approximately 1.01 vehicles/dwelling unit. **Table 6.3** summarizes the TTS data.

Appendix I includes the TTS data.

TABLE 6.3: VEHICLE OWNERSHIP – APARTMENT DWELLINGS

Year	Vehicles Per Household					Households	Vehicles	Ownership
	0	1	2	3	4			
2016	1,107	3,943	992	46	35	6,123	6,205	1.01
	14%	69%	16%	1%	0%			

6.2.3 Occupant Parking Utilization Surveys

Parking utilization Surveys over the last several years have been completed by the City of Burlington, Paradigm and others at a number of different multi-family developments. These surveys have consistently found that occupant parking demand varies considerably. A summary of the observed parking rates, as compiled by Paradigm, city staff and others, is outlined in **Table 6.4**. Peak occupant parking demand varies widely across the survey data, ranging from 0.65 to 1.25 occupant spaces per unit.

Today, the interim parking rate included in By-law 2020 as amended by By-law 2020-414 requires a parking rate of 1.25 space per unit for multi-family residential buildings subject to the criteria noted above in section 6.1.2. As noted through the historic utilization surveys, a parking rate of 1.25 is rarely achieved and would likely contribute to an oversupply parking.

TABLE 6.4: HISTORIC OCCUPANT PARKING SURVEYS

Source	Date	Address	Year Built	User Group	Units	Peak Parking Demand	Rate
Paradigm	04/14/2016	1284 Guelph Line	2015	Occupant	78	51	0.65
Paradigm	04/13/2016	1284 Guelph Line	2015	Occupant	78	52	0.67
Paradigm	08/17/2016	1284 Guelph Line	2015	Occupant	78	61	0.78
Paradigm	08/23/2016	1284 Guelph Line	2015	Occupant	78	65	0.83
City	05/01/2021	1477 Lakeshore Road	2005	Occupant	60	63	1.05
City	05/06/2021	1477 Lakeshore Road	2005	Occupant	60	64	1.07
City	05/04/2021	1477 Lakeshore Road	2005	Occupant	60	66	1.10
Paradigm	11/16/2013	1980 Imperial Way	2009	Occupant	101	94	0.93
Paradigm	10/16/2013	1980 Imperial Way	2009	Occupant	101	97	0.96
Paradigm	11/16/2013	1998 Ironstone Drive	2006	Occupant	135	112	0.83
Paradigm	11/25/2022	2025 Maria Street	2018	Occupant	154	120	0.78
Paradigm	11/24/2022	2025 Maria Street	2018	Occupant	154	121	0.79
Paradigm	11/27/2022	2025 Maria Street	2018	Occupant	154	122	0.79
Paradigm	11/23/2022	2025 Maria Street	2018	Occupant	154	123	0.80
Paradigm	11/26/2022	2025 Maria Street	2018	Occupant	154	123	0.80
City	05/01/2021	2121 Lakeshore Road	1989	Occupant	39	40	1.03
City	05/06/2021	2121 Lakeshore Road	1989	Occupant	39	41	1.05
City	05/04/2021	2121 Lakeshore Road	1989	Occupant	39	42	1.08
City	05/04/2021	2121 Lakeshore Road	1989	Occupant	39	45	1.15
Paradigm	11/09/2016	360 Pearl Street	2009	Occupant	75	56	0.75
Paradigm	11/08/2016	360 Pearl Street	2009	Occupant	75	57	0.76
Paradigm	11/01/2016	360 Pearl Street	2009	Occupant	75	58	0.77
Paradigm	11/02/2016	360 Pearl Street	2009	Occupant	75	58	0.77
City	05/08/2021	360 Pearl Street	2009	Occupant	75	78	1.04
City	04/29/2021	360 Pearl Street	2009	Occupant	75	84	1.12
City	04/27/2021	360 Pearl Street	2009	Occupant	75	94	1.25
Paradigm	02/22/2014	360 Pearl Street	2009	Occupant	75	64	0.85
Paradigm	02/22/2014	399 Elizabeth Street	2006	Occupant	122	115	0.94
City	04/17/2021	442 Maple Avenue	2001	Occupant	135	139	1.03
City	04/08/2021	442 Maple Avenue	2001	Occupant	135	146	1.08
City	04/06/2021	442 Maple Avenue	2001	Occupant	135	148	1.10
City	04/06/2021	505 Locust Street	1992*	Occupant	117	103	0.88
City	04/17/2021	505 Locust Street	1992*	Occupant	117	107	0.91
City	04/18/2021	505 Locust Street	1992*	Occupant	117	121	1.03
CF Crozier	03/29/2017	5340 Lakeshore Road	2006	Occupant	42	45	1.07
Paradigm	11/01/2016	551 Maple Avenue	2012	Occupant	186	146	0.78
Paradigm	11/09/2016	551 Maple Avenue	2012	Occupant	186	148	0.80
Paradigm	02/22/2014	551 Maple Avenue	2012	Occupant	186	151	0.81
Paradigm	11/08/2016	551 Maple Avenue	2012	Occupant	186	154	0.83
Paradigm	11/02/2016	551 Maple Avenue	2012	Occupant	186	155	0.83
Paradigm	11/26/2022	2025 Maria Street	2018	Occupant	154	123	0.80



In auto-dominated developments, parking decisions are relatively straightforward; planners or developers can apply findings from parking generation studies. However, parking generation studies at older developments tend not to account for factors that may influence reduced dependency on parking demand (i.e. TDM measures). They also serve as an antiquated model to guide parking provision without consideration for a balanced transportation network.

Additional utilization surveys have been undertaken at a contemporary condominium development in Downtown Burlington in January 2024 to address the project needs with updated occupant parking data.

The site surveyed is located at 2025 Maria Street (The “Berkeley”) and which was constructed in 2018. The Berkeley is a 17-storey multi-family building that contains 154 residential units. The primary goal of obtaining these additional parking surveys is to clarify and confirm the current parking trends of new condominiums. The on-site parking for The Berkely is provided solely for occupants and visitor parking is not provided.

Surveys were conducted in 2024 for four consecutive days (Wednesday to Saturday) and an overnight carryover into Sunday until 4:00 AM to capture any surge in overnight peak demand. Overall, 96+ hours of parking demand were observed at The Berkely to provide a fulsome data set of occupant parking observations.

Based on the survey data, The Berkley registered a peak demand of 0.81 occupant spaces for the survey hours. **Appendix J** contains the parking study data that Paradigm, the city and others collected.

6.2.4 Occupant Regression Equation Analysis

The collection of the occupant parking utilization data over several years enabled a unique statistical analysis and the development of a model for predicting parking utilization at multi-family residential developments. Based on the field data collected by Paradigm, city staff and others, a regression analysis was developed to create a statistical model that best describes the relationship between parking utilization and demand.

To construct the regression analysis, many approaches were tested to find the best method of including, removing, and assembling the best data points. Ultimately, the goal was to find the data set that provided the most robust theoretical framework while remaining relevant from a practical development and planning standpoint.



As multiple survey days were collected at each site, **only the highest observed parking demand was used in the statistical analysis**, given this was the peak parking demand observed at the site. The thought behind this is the objective of the analysis is to estimate the total quantity of parking that would be demanded at a given property to provide peak characteristics of each survey site. Therefore, it is not desirable for the model to consider situations where parking utilization was lower on other survey dates because we are only interested in capturing peak demand.

In the end, 29 surveys were removed based on this, resulting in a final sample size of 11 independent properties. A summary of the final sample size is outlined in **Table 6.5**. The coefficient of determination (R2) for occupant parking is 0.89. In terms of statistical analysis, as an R2 value approaches 1.0, the better the fit; as the R2 value approaches zero, the worse the fit. The final equation for the model is: **Y=0.7637x + 19.652**

Appendix K contains the occupant parking demand models.

Based on the regression equation with the use of 302 units, the forecast occupant parking demand for the site is estimated to be 250 spaces (0.83 spaces per unit).

TABLE 6.5:REGRESSION ANALYSIS SAMPLES

Source	Date	Address	Year Built	User Group	Units	Peak Parking Demand	Rate
CF Crozier	03/29/2017	5340 Lakeshore Road	2006	Occupant	42	45	1.07
City	04/06/2021	442 Maple Avenue	2001	Occupant	135	148	1.10
City	04/18/2021	505 Locust Street	1992*	Occupant	117	121	1.03
City	04/27/2021	360 Pearl Street	2009	Occupant	75	94	1.25
City	05/04/2021	1477 Lakeshore Road	2005	Occupant	60	66	1.10
City	05/04/2021	2121 Lakeshore Road	1989	Occupant	39	45	1.15
Paradigm	08/23/2016	1284 Guelph Line	2015	Occupant	78	65	0.83
Paradigm	10/16/2013	1980 Imperial Way	2009	Occupant	101	97	0.96
Paradigm	11/02/2016	551 Maple Avenue	2012	Occupant	186	155	0.83
Paradigm	11/16/2013	1998 Ironstone Drive	2006	Occupant	135	112	0.83
Paradigm	01/23/2024	2025 Maria Street	2018	Occupant	154	125	0.81



6.2.5 Visitor Demand

As The Berkely does not provide for any on-site visitor parking, an additional parking survey with respect to visitor demand could not be undertaken. Further, as existing residential developments within Burlington were previously not required to provide any on-site visitor parking, no additional surveys within Downtown Burlington were undertaken.

In that respect, in 2021, the City of Burlington undertook parking surveys in advance of the Major Transit Station Area (MTSA) Area Specific Planning, which is anticipated to be completed in 2022. The city collected visitor parking survey data in Downtown Burlington from April 2021 to May 2021. City staff surveyed the following two sites located outside of the Downtown Exemption Zone with respect to visitor parking demands:

- 442 Maple Avenue – 135 residential units
- 2121 Lakeshore Road – 39 residential units

A summary of the observed parking rates as compiled by city staff is outlined in **Table 6.6**. Peak visitor parking demand within Downtown Burlington was consistent at these two-site, varying from 0.00 to 0.07 spaces.

As only two sites have been observed regarding visitor parking demand within Downtown Burlington, there is insufficient data to provide a regression analysis. Instead, as previously noted by the city staff, an acceptable approach is using the average rate to determine an appropriate visitor supply.

Based on the data set compiled by the city staff, an average visitor parking demand of 0.03 spaces per unit is identified for Downtown Burlington. As city staff have previously supported this visitor supply rate and no new supplemental visitor parking surveys are available, it is recommended that a parking supply rate of 0.03 spaces per unit (10 spaces) be considered for the site's visitor requirement that will be publicly accessible through the above grade parking facility.

6.2.6 Combined Rate

Based on the calculated occupant and visitor demand rates, a total parking supply of 0.86 spaces per unit (0.83 residential and 0.03 visitors) is supportable.

As a general comparison, the calculated parking data outlines a combined rate of 0.86 spaces per unit, while the ITE rates outline a combined rate of 0.81 spaces per unit. The calculated rates are slightly higher than the ITE requirements; however, they are still relatively consistent in that a combined rate of 0.86 spaces per unit is supportable (combined residential and visitor).

TABLE 6.6: CITY-SUPPLIED VISITOR PARKING SURVEYS

Source	Date	Address	Year Built	User Group	Units	Peak Parking Demand	Rate
City	05/01/2021	2121 Lakeshore Rd	1989	Visitor	39	1	0.03
City	05/01/2021	2121 Lakeshore Rd	1989	Visitor	39	1	0.03
City	04/05/2021	2121 Lakeshore Rd	1989	Visitor	39	1	0.03
City	04/05/2021	2121 Lakeshore Rd	1989	Visitor	39	1	0.03
City	04/06/2021	2121 Lakeshore Rd	1989	Visitor	39	1	0.03
City	05/01/2021	2121 Lakeshore Rd	1989	Visitor	39	2	0.05
City	05/06/2021	2121 Lakeshore Rd	1989	Visitor	39	0	0.00
City	05/06/2021	2121 Lakeshore Rd	1989	Visitor	39	0	0.00
City	04/17/2021	442 Maple Ave	2001	Visitor	135	4	0.03
City	04/17/2021	442 Maple Ave	2001	Visitor	135	4	0.03
City	04/06/2021	442 Maple Ave	2001	Visitor	135	5	0.04
City	04/06/2021	442 Maple Ave	2001	Visitor	135	5	0.04
City	04/06/2021	442 Maple Ave	2001	Visitor	135	6	0.04
City	04/08/2021	442 Maple Ave	2001	Visitor	135	5	0.04
City	04/208/2021	442 Maple Ave	2001	Visitor	135	5	0.04
City	04/08/2021	442 Maple Ave	2001	Visitor	135	8	0.06
City	04/17/2021	442 Maple Ave	2001	Visitor	135	9	0.07
				Average	**90**	**3**	**0.03**

6.3 Policy Framework

6.3.1 Sustainability

Traditionally, transportation networks focused on increasing the road network's capacity to accommodate more vehicles. However, as outlined in the Region of Halton's Transportation Master Plan[13] (TMP), the transportation system needs to look at a “balanced needs” approach that encourages alternative modes of transportation.

The City of Burlington’s OP identifies an integrated and multi-modal transportation system that will be achieved by prioritizing decision-making to shift more trips away from the private car and to more sustainable transportation options, such as walking, biking, transit and car sharing.

The intent is to reprioritize mobility to balance the transportation system. A more sustainable city requires an integrated transportation system that supports a compact urban form. Bringing jobs, housing services, and amenities closer together encourages non-automobile modes of travel, providing more choices to Burlington residents.

6.3.2 Burlington Climate Emergency

Climate change and air pollution must be addressed to achieve a sustainable community and human and ecosystem health. Climate change and air pollution impacts are caused primarily by burning fossil fuels, resulting in greenhouse gases and air pollutants emissions. These impacts can be reduced through sustainable and efficient land use and transportation policies that reduce air and greenhouse gas emissions.

Burlington’s Council unanimously passed a motion to declare a climate emergency in 2019 and directed staff to complete a Climate Action Plan. Council has identified Burlington as “feeling the effects of climate change over the past several years,” Climate change is ranked as the third highest risk on the City’s Enterprise Risk Register, which measures overall risk to the city.

The city’s Climate Action Plan includes seven key program areas to help the community transition away from the use of fossil fuels, particularly for buildings and transportation:

- Low Carbon New Building Guideline

[13] The Road to Change, Halton Region Transportation Master Plan 2031, Dillion + GHD, 2011

- Deep Energy Retrofit Program
- Renewable Energy Cooperative
- Integrated Mobility Plan
- Electric Mobility & Equipment Program
- Waste Reduction Initiative
- Industrial Innovation Program

Of importance are the goals of the Climate Action Plan. Specifically, the city will work toward being a net carbon-neutral community by the year 2050, with an interim target of reducing emissions to 50% below 2016 levels by 2030. However, to meet the 2050 goal, the city will need to offset carbon dioxide emissions through purchasing carbon offsets or through further actions to reduce emissions.

Significant change is required as soon as possible to achieve the reductions needed to meet the city's emissions target. If Burlington's current emissions patterns do not decrease, the carbon budget will run out in 8.5 years, the same amount of time remaining in the global budget[14]. As the climate emergency declaration is a Council priority, the importance of supporting a low-carbon re-development project that focuses on integrated mobility is apparent.

6.3.3 Parking and Emissions

While single-occupant vehicle trips are commonly targeted in transport policies, they are only a consequence of the spatial layout and densities of the accompanying land uses. Therefore, there is merit in targeting the underlying cause of these carbon emissions rather than solely focussing on polices to reduce private vehicle use.

Parking management has an important role to play as an instrument in reducing carbon emissions[15]. In this respect, car parking is the "glue" between these facets of land use and the transport environment. In addition, car parking is a critical factor which can be targeted relatively easily by planners and their municipality plans.

The transportation sector is responsible for 23% of Canada's GHG emissions[16] and offers tremendous opportunities for significant emissions reduction. To reduce emissions, municipalities need to drive a transition towards zero and low-emissions transportation modes,

[14] Climate Action Plan, City of Burlington, April 2020
[15] Parking as a tool to reduce carbon emissions, McCormick Rankin Cagney Pty Ltd, 2009
[16] Reducing GHG Emissions in Canada's Transportation Sector, Clean Energy Canada, June 2016.

increase the use of cleaner fuels, improve public transit ridership, and encourage denser, mixed-use communities. Significant encouragement is needed to shift travel modes from single-occupant vehicles towards public transit, auto-share and active transportation to reduce greenhouse gas emissions related to the transportation sector.

6.3.4 Societal Changes

A sudden, dramatic shift in travel patterns occurred early in 2020 as society adjusted to the emergence of COVID-19, its declaration as a pandemic and subsequent public health measures to stop its spread.

As a result, recent societal changes have made living easier without owning a car. Online shopping has reduced the need for a vehicle to bring large purchases home and, in some areas, has made it convenient for everyday errands to be delivered (i.e., groceries and household items). Vehicles-for-hire and bicycles have both increased in popularity. The future arrival of automated vehicles may further support reducing personal automobile ownership and use. These societal changes will decrease the need for vehicle parking with a shift to curbside management.

As businesses have adapted and residents have embraced the convenience of the delivery of everyday items, these changes are expected to remain for the foreseeable future, providing further incentives to residents not requiring a vehicle.

Results from the 2016 TTS show that approximately 4% of households in Burlington do not own a vehicle. When looking at the downtown area (South of QEW and West of Guelph Line), where there is a greater proportion of apartments and high-density developments, this number increases to 14%. It is likely that these proportions have increased since 2016 and will continue to increase due to societal changes.

Given the expected changes in automobile ownership brought about by the changes in mobility-related technologies, it is likely that if change is parking policy framework is not revised, new residential developments will be left with an oversupply of parking, which, if provided below grade, will result in redundant space that will not be repurposed in the future.

6.3.5 Electric Vehicles

There are two general approaches to reducing transportation emissions: cleaner vehicle strategies that reduce travel emission rates and vehicle travel reduction strategies that reduce the total distance travelled.

Electric vehicles are much more efficient than vehicles powered by internal combustion engines (ICE), so the adoption of electric vehicles significantly contributes to greater efficiency and lower conversion losses in low-carbon developments. Electric vehicles, however, typically cost more than a typical combustion-powered vehicle. Even with tax credits and limited maintenance required, the capital cost to afford an electric vehicle is high and primarily benefits affluent households that purchase new vehicles rather than cater to a portion of the population seeking affordable housing[17]. Additionally, if each ICE-powered vehicle is transitioned to an electric vehicle, single-occupant use would still be present, creating automobile-dependent transportation systems and sprawled development patterns.

Table 6.7 outlines a basic framework for comparing the various strategies.

TABLE 6.7: COMPARING EMISSION REDUCTION STRATEGIES

Community Goal	Electric Vehicle	Reduced Travel
Congestion reduction	Worse	Better
Roadway cost savings	Worse	Better
Consumer savings and affordability	Mixed	Better
Traffic safety	Worse	Better
Mobility options for non-drivers	Worse	Better
Energy conservation	Better	Better
Pollution reduction	Better	Better
Physical fitness and health	Worse	Better
More compact development	Worse	Better

Although electric vehicles reduce greenhouse gas emissions, they increase total vehicle travel and encourage sprawl development, reducing net benefits and external costs.

However, through the lens of economic, social, and environmental goals, reduced travel is consistent with the Region's TMP and the City's OP, which calls for a "balanced" transportation system.

[17] Win-Win Transportation Emission Reduction Strategies, Victoria Transport Policy Institute, April 2021.

6.4 Summary of Parking Demand

Minimum parking requirements have long been a staple of planning regulations based on some formulation. These regulations, unfortunately, have been driven by auto-centric engineering models. Over the past seven decades, the built form in Burlington has evolved significantly. Recent changes in transportation technology and services, characterized by ride-hailing (i.e. Uber), automobile sharing, and the emerging technologies dominated by autonomous vehicles (AVs) suggest that automobile ownership is likely to experience declines in the future.

The City of Burlington's strategic vision is about creating an attractive and safe City that evokes pride, passion, and a sense of belonging - a city where people of all ages and abilities can enjoy a good quality of life. The Official Plan (OP) emphasizes the importance of fundamental rights, including embracing sustainability and creating a vision for complete compact communities served by streets made for walking, cycling and an attractive transit system. This vision is supported by policies aimed at reducing auto dependence and limiting the amount of land occupied by automobile parking. The transportation policies are deliberately interspersed with the land use policies to emphasize the importance of considering both areas to achieve the overall vision of complete compact communities.

The intent is to reprioritize mobility to balance the transportation system. A more sustainable city requires an integrated transportation system that supports a compact urban form. Bringing jobs, housing services, and amenities closer together encourages non-automobile modes of travel, providing more choices to Burlington residents.

Burlington's Council has further identified Burlington as "feeling the effects of climate change over the past several years," and climate change is ranked as the third highest risk on the City's Enterprise Risk Register. Specifically, the city's Climate Action Plan stipulates Burlington will work toward being a net carbon-neutral community by the year 2050. Significant change is required to achieve the reductions needed as soon as possible.

If the City wishes to encourage active transportation and transit-friendly neighbourhoods as outlined in the OP and strategic vision, the City needs to recognize that minimum parking requirements present a significant barrier to these goals. It needs to be recognized that parking carries substantial costs, heavily subsidizes the choice to drive, and hampers the ability to promote sustainable development. Parking should not be viewed as only an amenity required to support our cities and our ability to drive; instead, it must be viewed as a significant

economic investment that carries outcomes that shape our cities and regions.

The site will exist well beyond 2050 when autonomous vehicles are anticipated to play a more significant role in our mode choice. Auto ownership is expected to be significantly reduced when we can request a vehicle on demand for our travel needs. Recent societal changes have made it easier to live without owning a car. Vehicles-for-hire and bicycles have both increased in popularity. Online shopping has reduced the need for a vehicle to bring large purchases home and, in some areas, has made it convenient for everyday errands to be delivered (i.e., groceries and household items). The future arrival of automated vehicles will further reduce personal automobile ownership, and these societal changes will decrease the need for vehicle parking. Lastly, as documented in the City-Wide Parking Standards Review[18]:

"It is also important to clarify the role of residential parking requirements. In general, there is little risk in reducing minimum residential parking requirements as availability of parking is a key decision in an individual's residential choice. Developers are well attuned to their potential customers' parking needs and will not reduce parking provision so much as to compromise the marketability of their development."

Based on empirical survey data that both Paradigm and the City staff have collected at multi-family residential buildings in Burlington, as well as a review of industry parking data and policy framework of the Growth Plan, the Provincial Policy Statement and Burlington's OP, a reduced parking supply for the proposed development is supportable.

Overall, a parking supply rate of 0.86 spaces per residential dwelling unit, including publicly accessible visitor parking, is appropriate and supportable for the proposed development.

[18] Burlington City-Wide Parking Standards Review, IBI Group, July 21, 2017



6.5 Parking Space Dimensional Requirements

A cursory review of the City's parking space sizes as required under the City's existing By-law has also been reviewed. The City's By-law requirements are summarized in **Table 6.8** below, along with dimensional requirements from other municipalities for comparison and benchmarking.

TABLE 6.8: PARKING SPACE DIMENSIONAL REVIEW

City/Region	Parking Space Dimensions			Parking Area	Parking Module	Source
	Width	Length	Aisle Width	Width x Length	Length + Aisle Width + Length	
Town of Whitby	2.60	5.40	6.00	14.04	16.80	Zoning By-Law 2585
City of Hamilton	2.60	5.50	6.00	14.30	17.00	Zoning By-Law 05-200
Town of Fort Erie	2.70	5.50	6.00	14.85	17.00	Zoning By-Law 58-2015
City of Ottawa	2.60	5.20	6.70	13.52	17.10	Zoning By-Law 2008-250
City of Toronto	2.60	5.60	6.00	14.56	17.20	Zoning By-Law 569-2013
City of Thorold	2.75	5.80	5.80	15.95	17.40	Zoning By-Law 2140 (97)
City of Vaughan	2.70	5.70	6.00	15.39	17.40	Zoning By-Law 088-2013
Town of Oakville	2.60	5.20	7.00	13.52	17.40	Zoning By-Law 2009-189
City of Brampton	2.70	5.40	6.60	14.58	17.40	Zoning By-Law
City of Mississauga	2.60	5.20	7.00	13.52	17.40	Zoning By-Law 0225-2007
City of Markham	2.60	5.80	6.00	15.08	17.60	Comprehensive Zoning By-Law Review
Town of Caledon	2.60	5.80	6.00	15.08	17.60	Zoning By-Law 2006-50
Town of Halton Hills	2.60	5.50	6.70	14.30	17.70	Zoning By-Law 2010-0050
Town of Newmarket	2.60	5.50	6.70	14.30	17.70	Zoning By-Law 2010-40
Town of Pelham	2.60	5.80	6.20	15.08	17.80	Zoning By-Law 4481
City of Burlington	2.75	6.00	6.00	16.50	18.00	Zoning By-Law 2020

While the proposed parking space dimensions meet the requirements of the City of Burlington, it should be noted that the dimensions are noted to be the largest requirement of the municipalities reviewed and a reduced parking stall size could be supported.

7 Transportation Demand Management

A Transportation Demand Management (TDM) plan aims to reduce the development's overall traffic and parking impacts by implementing strategies that are aimed at affecting the demand side of the transportation equation rather than the supply side. By their very nature, TDM programs attempt to change people's behaviour and to be successful; they must rely on incentives or disincentives to makeshifts in behaviour attractive to the commuter.

TDM strategies include financial incentives, time incentives, the provision of new or enhanced commuter services, dissemination of information, and marketing alternative services. TDM strategies include all the incentives and disincentives that increase people's likelihood of changing travel behaviour.

The TDM plan has been formulated to extend reasonable and practical strategies that encourage residents and visitors to take alternative modes of transportation. The strategies identified are expected to improve transportation access and connectivity within the development and reset the study area. An explanation and a description of what the applicant is proposing to provide are provided for each strategy.

7.1 Through Design

Supporting land use/infrastructure that encourages people to choose travel modes other than driving alone influences peoples' travel mode choices. These strategies are accounted for through the development's overall design and include the following.

7.1.1 Housing Density

Designing the plan with increased densities reduces Greenhouse Gas (GHG) emissions associated with traffic in several ways. Density is usually measured in persons, jobs, or dwellings per unit area. Increased densities generally shorten the distance people travel and provide greater options for their travel mode. This strategy also provides a foundation for the implementation of many other strategies which would benefit from increased densities.

7.1.2 Land Use-Density Mix

Having different types of land uses in close proximity can decrease vehicle mode share since trips between land use types are shorter and may be accommodated by non-automotive transportation. The mix of high-density housing and commercial uses provides land use diversity

that should reduce the number of automobile trips that residents or employees make.

7.1.3 Pedestrian Facilities

Accessibility to and from a development is essential in helping to ensure that those that can walk, do. Proper pedestrian connections from the surrounding community to the development should be constructed to ensure safety and enhance the overall pedestrian experience.

Walking is encouraged by providing a pedestrian-friendly site layout with an extensive network of sidewalks and entrances at key points within the site and connecting to the existing pedestrian network. Most of the site has direct public access for pedestrians via multiple street-level entrances from Caroline Street and Elizabeth Street. This is intended to provide a comprehensive network of pedestrian connections for an enhanced pedestrian experience for all site users.

By taking advantage of the future public sidewalk network to attract and serve pedestrians, combined with multiple pedestrian connections within the site, the development offers walkability as one of the critical design features.

7.1.4 Bicycle Facilities

Increasing bicycling to, from and within Burlington is a crucial strategy for reducing vehicle trips. The number of people bicycling is directly related to the quality of the bicycling network and the presence of bicycle facilities. As outlined in **Section 2.3.2**, Brant Street south of Caroline Street and Caroline Street as proposed Bicycle Priority Streets.

7.1.5 Transit

The use of transit places less reliance on personal automobiles for trips that convenient and desirable transit options can complete. Convenient and desirable transit can be provided by providing well-lit transit stops with seating and weather-protective shelters. Additional amenities, including bicycle parking, schedule information, real-time bus status, and maps, can increase the convenience of the transit network.

The subject site is currently served by two (2) BT Routes that operate primarily on Brant Street, connecting Burlington GO Station, Aldershot GO Station, and the Appleby GO Station. Headways are on the order of 30 minutes during most service hours, with shorter headways provided during peak-hour services.

The closest bus stop is less than 90 metres (2-minute walk) away along Brant Street west of the site. In addition, the development is approximately a 350-metre walk to the Downtown Burlington bus terminal, which provides significant access to additional local routes.

At the development level, direct links connecting residents and visitors to both nearby bus stops and existing pedestrian networks will be provided as part of the overall design scheme, making the development area more navigable towards local bus stops.

7.2 Proposed Strategies

The development should consider the proposed strategies identified herein to reduce the number of auto-trips made to/from the development:

7.2.1 Transportation Information

The applicant will consider developing marketing/informational materials as part of their initial scope of work. Information on transportation options and/or links to the appropriate website should be conveyed to all prospective residents as a component of a resident welcome packet.

Available information should include schedules for local and regional transit services, bicycle and trail networks and the location of retail and recreational establishments.

7.2.2 Parking Supply

The role of parking management is also a key element in helping Burlington meet its trip reduction goals. Free and abundant parking encourages people to drive more frequently, drive alone rather than car or van pool, be dropped off or picked up, walk, cycle or take transit. If free and unregulated parking is provided, there is little incentive for many residents and visitors to use alternative modes of transportation. When too much parking is provided and is provided free of cost to the user, the use of alternative sustainable modes is put at a substantial disadvantage.

As the development promotes using other modes of transportation through limited on-site parking that will meet the projected demand, the development plays a significant role in setting an example for residents and visitors to consider non-automotive travel.

8 Vehicle Circulation

8.1 Vehicle Circulation

The site circulation has been assessed using the following design vehicles:

- Transportation Association of Canada[19] (TAC) Medium Single Unit (MSU)

Appendix L contains the reduced-scale vehicle turning movement diagrams for the site driveway and loading area. The diagrams were produced using the site plan, and AutoTURN swept path analysis software.

The MSU design vehicles will enter the site via John Street and reverse onto John Street to exit the site. For the proposed geometry of the loading zone, the MSU can enter/exit the loading without any conflicts.

[19] Transportation Association of Canada. Geometric Design Guide for Canadian Roads (2017).

9 Conclusions and Recommendations

9.1 Conclusions

Vehicular access is proposed from John Street and Elizabeth Street. The connections are appropriately located and designed to provide sufficient stopping distance and are appropriately spaced away from upstream and downstream intersections.

Moreover, with the redevelopment of the property, on-street parking on the east side of John Street and the west side of Elizabeth Street flanking, the proposed driveway connections will likely need to be removed. To prevent egress or ingress issues, the City's Zoning Bylaw identifies the restrictions for on-street parking within 1 metre of any entrance to a driveway or laneway. The provision of on-street parking near a driveway may also hinder sight lines for the proposed driveway connections.

To provide adequate sight lines, the removal of three (3) spaces along John Street and two (2) spaces on Elizabeth Street is likely to be required.

The proposed geometry for the loading zone can accommodate an MSU entering and exiting the loading area with no conflicts. and private waste collection can be adequately provided.

Study Area Parking Utilization

With the redevelopment of the site up to five (5) on-street parking spaces along John Street and Elizabeth Street maybe potentially eliminated to provide adequate sight lines at the driveway connections to the development.

Weekday and weekend parking utilization surveys were conducted in April 2024 to examine and determine the current utilization of the public parking supply in the study area. Utilization refers to the percentage of parking spaces occupied by parked vehicles at any time. For planning purposes, the practical capacity is generally considered to be 85% utilization, beyond which drivers may perceive a lack of public parking space availability.

With the redevelopment of the site, the study area will provide a total of 190 parking spaces that are available for public use. Based on the utilization surveys, demand is noted to be 92 vehicles (48%) during the weekday and 110 vehicles (58%) during the weekend.

As the parking utilization will not exceed the typical target threshold of 85%, a considerable surplus of public parking spaces is available within the study area.

Transportation Impact Assessment

Full-build out of the development will generate approximately 84 new trips during the weekday AM peak hour and 99 net new trips during the weekday PM peak hour.

Based on the operational analysis conducted, the proposed development does not create operational issues at any intersections as they are all projected to operate with acceptable levels of service and minimal delays. The intersection of Brant Street and Maria Street, where the stop-controlled westbound approach is projected to operate at LOS E under the Background Horizon (without the proposed development). Under the Total Horizon (including the proposed development) there are no additional impacts as a LOS E is maintained. As the volume to capacity ratio for the westbound approach is not expected to exceed 0.72 and the queues are manageable, no improvements to the intersection are warranted.

Redevelopment of the subject site is anticipated to have a negligible effect on traffic operations within the study area. Individual movement delays are expected to increase by less than five seconds during the AM and PM peak hours as a result of the site traffic.

The site driveways to John Street and Elizabeth Street are forecast to operate with delays in the LOS A range and is not forecasted to exceed 9 seconds during the AM and PM peak hours.

The analysis indicates and concludes that the existing transportation infrastructure is adequate to accommodate additional traffic associated with the proposed re-development. No roadway improvements are required to facilitate the proposed development.

Parking Justification

Parking requirements for the development under the City's Zoning By-Law is 385 parking spaces, equating to a parking rate of 1.27 parking spaces per unit. The proposed parking supply of 277 spaces is a reduction of 108 spaces compared to the zoning requirements.

The study area falls under a zoning designation of "Downtown Parking Exemption Area," which recognizes the high-density, mixed-use development of the area. Parking requirements within this area have been updated to reflect the general oversupply of parking required in the zoning by-laws. While these updates are in the right direction, there

is still room for improvement regarding parking rates, particularly for this site, given it has a walk score of 98 and is considered a "Walker's Paradise" location, meaning daily errands do not require a car[20]. The John Street Bus Terminal provides a connection with Hamilton Street Railway (HSR) providing connectivity between Burlington and Hamilton.

Minimum parking requirements have long been a staple of planning regulations based on various formulations. These regulations, unfortunately, have been driven by auto-centric engineering models. Over the past seven decades, the built form in Burlington has evolved significantly. Recent changes in transportation technology and services, characterized by ride-hailing (i.e. Uber), automobile sharing, and the emerging technologies dominated by autonomous vehicles (AVs) suggest that automobile ownership is expected to experience declines in the future.

Parking utilization surveys over the last several years at a number of different multi-family developments have consistently found that occupant parking demand varies considerably between 0.65 to 1.25 occupant spaces per unit. However, parking generation studies at older developments tend not to account for factors that may influence reduced dependency on parking demand (i.e. TDM measures) while at the same time promote vehicle dependency given older developments provide a significant amount of on-site parking. They also serve as an antiquated and ineffective model to be used to guide parking provision without consideration of a balanced transportation network.

Additional utilization surveys have been undertaken at a relatively new and occupied condominium development in Downtown Burlington in January 2024 to address the project needs with updated occupant parking data.

This site is located at 2025 Maria Street (The Berkeley) and was constructed in 2018, representing Phase 1 of the redevelopment lands within the city block. The primary goal of obtaining these additional parking surveys is to confirm the current parking trends of new condominiums in Downtown Burlington. It is noted that the on-site parking at The Berkely is provided solely for occupants with no accommodation for visitor parking. Based on the survey data, The Berkley registered a peak demand of 0.81 occupant spaces during the survey hours.

The collection of occupant parking utilization data over several years at multi-family developments in Burlington enabled a unique statistical

[20] https://www.walkscore.com/score/2030-caroline-st-burlington-on-canada

analysis (i.e., regression analysis). As multiple survey days were collected at each site, only the highest observed parking demand was used in the statistical analysis, given this was the peak parking demand observed at the site.

The coefficient of determination (R2) for occupant parking is 0.88. In terms of statistical analysis, as an R2 value approaches 1.0, the better the fit; as the R2 value approaches zero, the worse the fit. The final equation for the model is: **Y=0.7637x + 19.652**

Based on the regression equation using 302 units, the forecast occupant parking demand for the site is estimated to be 250 occupant spaces (0.83 spaces per unit).

As noted above, the Berkely condominium does not provide for any on-site visitor parking. Therefore, additional parking surveys concerning visitor parking demand were not undertaken. Based on the 2021 data set compiled by City staff and provided to us for visitor parking at multi-family developments, an average visitor parking demand of 0.03 spaces per unit is calculated. As city staff have previously supported this visitor supply rate and no new supplemental visitor parking surveys could be completed at The Berkely as there is no visitor parking, it is recommended that a parking supply rate of 0.03 spaces per unit be considered for the purpose of determining the publicly accessible visitor parking rate to be provided to serve the proposed redevelopment.

The City's strategic vision is to create an attractive and safe City that evokes pride, passion, and a sense of belonging - a city where people of all ages and abilities can enjoy a good quality of life.
The Official Plan, 1997 (OP) emphasizes the importance of basic planning goals and objectives, including embracing sustainability and creating a vision for compact, complete communities served by streets made for walking and cycling and an attractive transit system. This vision is supported by policies aimed at reducing auto dependence and limiting the amount of land occupied by automobile parking and related facilities. The transportation policies are deliberately interspersed with the land use policies to emphasize the importance of considering both areas to achieve the overall vision of compact, complete communities.

The intent is to reprioritize mobility to balance the transportation system. A more sustainable city requires an integrated transportation system that supports a compact urban form. Bringing jobs, housing services, and amenities closer together encourages non-automobile modes of travel, providing more choice to Burlington residents.

Burlington's Council has further identified Burlington as "feeling the effects of climate change over the past several years," and climate change is ranked as the third highest risk on the City's Enterprise Risk Register. Specifically, the city's Climate Action Plan stipulates Burlington will work toward being a net carbon-neutral community by the year 2050. Significant change is required to achieve the reductions needed as soon as possible.

If the City wishes to encourage active transportation and transit-friendly neighbourhoods as outlined in the OP and strategic vision, the City needs to recognize that minimum parking requirements present a significant barrier to these goals. It needs to be recognized that parking carries significant costs, heavily subsidizes the choice to drive, and hampers the ability to promote sustainable development. Parking should not be viewed as only an amenity required to support our cities and our ability to drive; instead, it must be viewed as a significant economic investment that carries outcomes that shape our cities and regions.

The site will exist well beyond 2050 when autonomous vehicles are anticipated to play a significant role in our mode choice. Auto ownership is expected to be significantly reduced when we can request a vehicle on demand for our travel needs. Recent societal changes have made it easier to live without owning a car. Vehicles-for-hire and bicycles have both increased in popularity. Online shopping has reduced the need for a personal vehicle to bring large purchases home and, in some areas, has made it convenient for everyday errands to be delivered (i.e., groceries and household items). The future arrival of automated vehicles will further reduce personal automobile ownership, and these societal changes will decrease the need for vehicle parking. Lastly, as documented in the City-Wide Parking Standards Review[21]:

> *"It is also important to clarify the role of residential parking requirements. In general, there is little risk in reducing minimum residential parking requirements as availability of parking is a key decision in an individual's residential choice. Developers are well attuned to their potential customers' parking needs and will not reduce parking provision so much as to compromise the marketability of their development."*

Based on empirical survey data that both Paradigm and City staff have collected at multi-family residential buildings and a review of industry parking data and the Growth Plan policy framework, the Provincial

[21] Burlington City-Wide Parking Standards Review, IBI Group, July 21, 2017

Policy Statement and Burlington's OP, a reduced parking supply for the proposed development is beneficial and supportable.

Overall, a parking supply rate of 0.86 spaces per residential dwelling unit, including publicly accessible visitor parking, is appropriate and supportable for the proposed development based on parking data collected by Paradigm, city staff and effectively implements the policies and direction included in the Official Plan.

The development will also implement a suite of Transportation Demand Management (TDM) measures to reduce the dependency on vehicular travel further. These measures include:

- Active uses at grade along street frontages
- Welcome Packets including information regarding alternative mode use in the area

The TDM plan and the study area's transportation context will provide residents with a range of mobility choices other than a privately-owned vehicle and support an appropriate parking supply in the building.

9.2 Recommendations

Based on the findings of this study, it is recommended that:

- The City of Burlington recognizes the conclusions provided above;
- The City continues to monitor traffic operations at study area signalized intersections and adjusts signal timings as needed;
- The City of Burlington support the proposed Zoning By-law parking rate to allow the provision of 0.86 parking spaces per unit); and
- The developer implements a TDM plan with the additional TDM measures listed above.

Appendix A

Minutes of Pre-Submission Consultation Meeting

Greg Lue

From: Adiga, Smeeta <Smeeta.Adiga@burlington.ca>
Sent: December 12, 2023 12:12 PM
To: Greg Lue
Cc: Adam Makarewicz
Subject: RE: 230499 - 2030 Caroline Street, Burlington - TIA and Parking Study - Terms of Reference

Hi Greg,

Thank you for your follow-up email. We agree not to consider Saturday counts since less area is to be allocated for retail/ commercial space, and it is anticipated that retail space will be utilized by the residential component of the development.

Thanks,

Smeeta Adiga (she/her)
Transportation Planning Technologist
Transportation Services Department

P. 905 335 7600, ext 7691 | E. smeeta.adiga@burlington.ca
Address: 426 Brant Street P.O. Box 5013, Burlington, Ontario, L7R 3Z6

City of Burlington | www.burlington.ca

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From: Greg Lue <glue@ptsl.com>
Sent: Monday, December 11, 2023 12:04 PM
To: Adiga, Smeeta <Smeeta.Adiga@burlington.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: RE: 230499 - 2030 Caroline Street, Burlington - TIA and Parking Study - Terms of Reference

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Hi Smeeta,
Thanks for the comments. With regards to the Saturday counts, we feel that the AM and PM peak hour analysis periods are sufficient for this development as the retail/commercial space is not a significant portion of the development and is not expected to generate a large amount of external vehicle trips.
While we understand that retail uses require Saturday analysis periods, the development is proposed as a mixed-use developed with less than 210m2 of ground floor retail/commercial space. Preliminary conservative estimates for retail trip generation are less than 25 trips during the AM and PM peak hours without accounting for reductions for internal trips between the residential and retail uses.

The by-law also does not require any parking within the downtown for retail developments. In reality, very few trips to/from the retail are expected through a vehicle as it is intended to be served by residents of the development or through walking/cycling/transit trips.

Paradigm has completed various other similar mixed-use studies in the downtown area, none of which required the Saturday analysis period:

- 2069 Lakeshore Road
- 688 Brant Street,
- 535 Brant Street
- 407 Marth Street
- 2085 Pine Street
- 374 Martha Street
- 421 Brant Street
- 409 Brant Street
- 2020 Lakeshore Rd
- 2107 Old Lakeshore Road

We will consider the pedestrian and cycling traffic in the area and to the site but we ask that only the AM and PM peak hour analysis periods be required for this study.

Please let us know if this is acceptable.

Thanks,

Greg Lue, M.A.Sc., P.Eng.
Project Manager
(he/him)

Paradigm Transportation Solutions Limited
p: 905.381.2229 x307
m: 905.981.7479

**** Paradigm is now operating on a 4-day workweek. Our offices are closed Fridays. ****

From: Adiga, Smeeta <Smeeta.Adiga@burlington.ca>
Sent: Friday, December 8, 2023 11:58 AM
To: Greg Lue <glue@ptsl.com>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: RE: 230499 - 2030 Caroline Street, Burlington - TIA and Parking Study - Terms of Reference

Good morning Greg,

Thank you for providing the Terms of Reference (TOR) for 2030 Caroline Street, Burlington. Please ensure that any comments from the Region are taken into consideration.

The submitted TOR is deemed acceptable. The comments are provided in "blue" in the submitted "Terms of Reference" mentioned below.

Please refer to Halton's Traffic Impact Study Guidelines.
https://www.halton.ca/Repository/Transportation-Impact-Study-Guidelines
Finally, ensure that the approved Terms-of-Reference are included as appendices within the Transportation Impact Study (TIS).

Thanks,

Smeeta Adiga
Transportation Planning Technologist
Transportation Services Department

P. 905 335 7600, ext 7691 | E. smeeta.adiga@burlington.ca
Address: 426 Brant Street P.O. Box 5013, Burlington, Ontario, L7R 3Z6

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From: Greg Lue <glue@ptsl.com>
Sent: Monday, December 4, 2023 2:13 PM
To: Ozimkovic , Danijel <Danijel.Ozimkovic@burlington.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: RE: 230499 - 2030 Caroline Street, Burlington - TIA and Parking Study - Terms of Reference

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Hi Dan,
Just following up on this to see if you had any comments or questions about the study. Let us know.

Thanks !

Greg Lue, M.A.Sc., P.Eng.
Project Manager
(he/him)

Paradigm Transportation Solutions Limited
p: 905.381.2229 x307
m: 905.981.7479

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From: Greg Lue <glue@ptsl.com>
Sent: Monday, November 20, 2023 3:40 PM
To: Ozimkovic , Danijel <danijel.ozimkovic@burlington.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: 230499 - 2030 Caroline Street, Burlington - TIA and Parking Study - Terms of Reference

Hi Dan,
Paradigm Transportations Solutions Limited has been retained to conduct a Transportation Impact Analysis and Parking Study for a proposed development of 2030 Caroline Street and the surrounding block bounded by Maria Street, John Street, Elizabeth Street and Caroline Street in the City of Burlington.

The first development phase in this block is known as "The Berkeley." Planning approvals for the entire city block were obtained in 2010, permitting the existing 17-storey condominium building with office space at grade and an 8-storey medical office building on the northern portion of the block. For various reasons, the medical office is not moving forward. New ownership is considering redeveloping the phase 2 lands with a 26-storey building with commercial uses at grade.

Based on the preliminary site stats, 263 residential units are proposed with ground floor retail and 278 parking spaces. Vehicle access is proposed via a driveway connection to John Street and a connection to Elizabeth Street. A preliminary site plan is attached.

Proposed Terms of Reference
Study Area Intersections

- Brant Street & Caroline Street (signalized);
- Brant Street & Maria Street (unsignalized);
- John Street & Caroline Street (unsignalized);
- John Street & Maria Street (unsignalized);
- Elizabeth Street & Caroline Street (unsignalized);
- Elizabeth Street & Maria Street (unsignalized); and
- Three site driveways.

Existing Data

- Does the City have any concerns with new traffic data being collected in the coming weeks?
  - The city doesn't have any concern with new traffic data being collected; however the data must be collected in a way that does not impact typical conditions or appear inconsistent due to weather, construction activity, seasonal variations, holidays or other factors. All traffic counts included in the TIS report must be referenced in a separate technical Appendix.

Horizon Years

- 2023 Base Year- consider 2024 as a base year
- Five years from date of study (2028)-

Analysis Periods

- Weekday AM peak hour
- Weekday PM peak hour

when a development has a retail use and in the downtown area, an analysis of the Saturday afternoon peak hour or other time period associated with the peak hour of the generator should be conducted. This area experiences high levels of pedestrian and cycling activity, so data collection and analysis must include these travel modes.

Analysis

- Synchro 11
- HCM 2000
- SimTraffic Queueing (five 60-min iterations)

Background Traffic

- Generalized growth rate 1% per annum
- Traffic generated by any in stream developments in the area. Can you comment on this and provide any relevant studies or inputs to estimate the traffic for the site(s)?
  - 409 Brant Street: southeast corner of Brant and James Street: mixed use

Site Traffic Estimates

- ITE Trip Generation Data 11th Edition
- No modal split reductions

Site Traffic Distribution

- Existing travel patterns/TTS data

TDM Plan

- Will outline existing and proposed TDM measures and assess their likely effectiveness for the proposed development

Parking Study

- Parking generation for the site will be calculated using parking rates obtained from ITE Parking Generation Manual and Zoning By-Law comparisons.
- A parking rate will be recommended that is deemed applicable to the subject site taking into account the development's location. The recommended rate will then be used to estimate the number of parking spaces needed to meet the projected parking demand. The estimated parking supply needed will be compared to the By-law required supply to assess the feasibility of providing less than the By-law supply requirements. In the event that the parking review determines that a parking reduction cannot be justified, the report will speak to this point.

Access and Circulation Review

- ACR will be conducted to ensure compliance of the proposed development plan with review agency requirements and applicable industry guidelines

Access location analysis: Adequacy with respect to design operation and LOS, including turning sight distance that conform with accepted guidelines and safety analysis

Site Parking, Loading, and Circulation: Vehicle queuing resulting from on-site vehicle circulation patterns must be evaluated to ensure that queuing vehicles do not interfere with on-street traffic operations; A loading vehicle maneuvering assessment should be undertaken to assess adequacy of access into and out from the loading area and its associated driveway. Additionally, any impacts on on-street parking that would be necessary for delivery vehicle/courier vehicles to access the site, should be identified.

Report

- We will document the study methodologies, findings, and conclusions in a report with appendices containing the detailed analysis results and any data collected.

Please let us know if you have any comments or questions about the proposed terms of reference.

Thanks !

Greg Lue, M.A.Sc., P.Eng.

Project Manager
(he/him)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge ON N1R 8J8
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Appendix B

Existing Traffic Counts & Signal Timings

Caroline St @ Brant St

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 9:00:00
To: 10:00:00

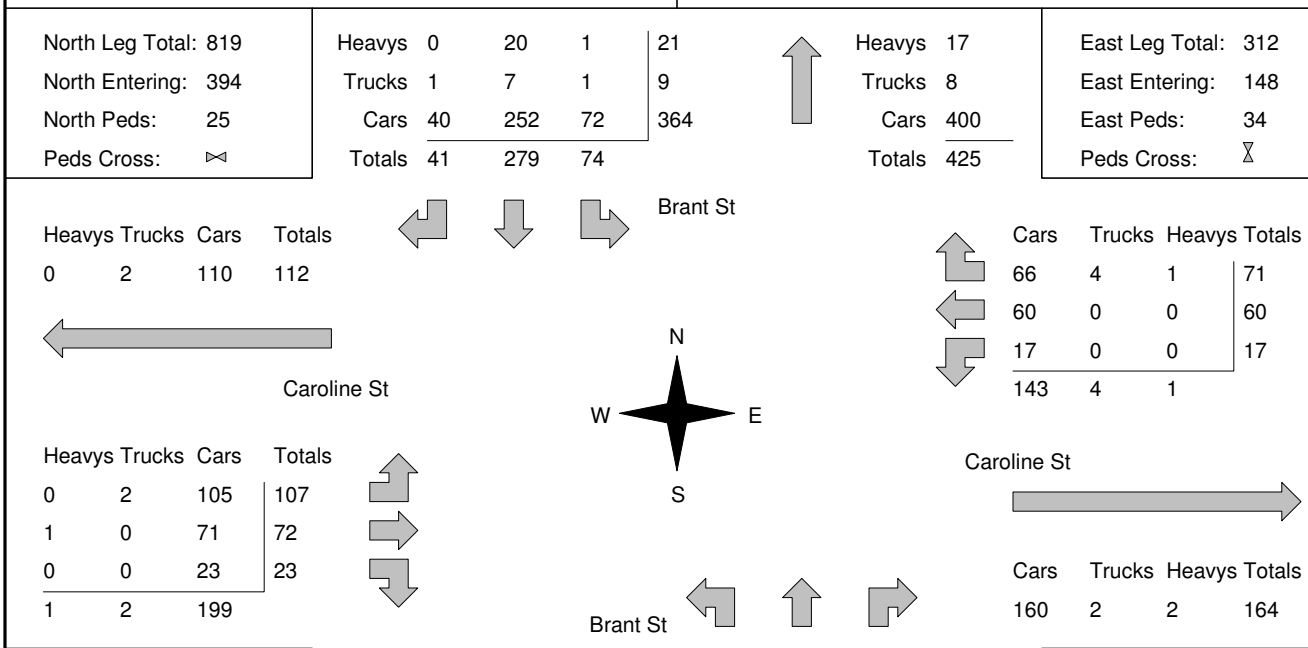
Municipality: Burlington
Site #: 0000000001
Intersection: Brant St & Caroline St
TFR File #: 1
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Brant St runs N/S



Comments

Caroline St @ Brant St

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:15:00
To: 13:15:00

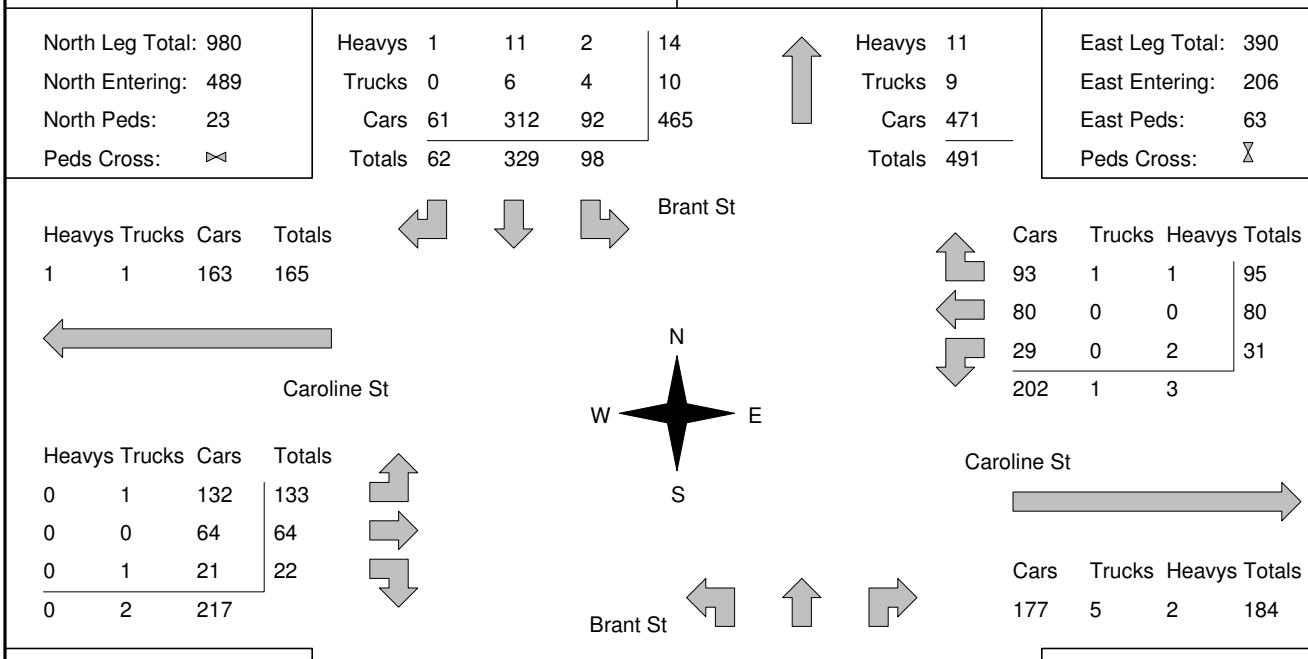
Municipality: Burlington
Site #: 0000000001
Intersection: Brant St & Caroline St
TFR File #: 1
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Brant St runs N/S



Comments

Caroline St @ Brant St

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

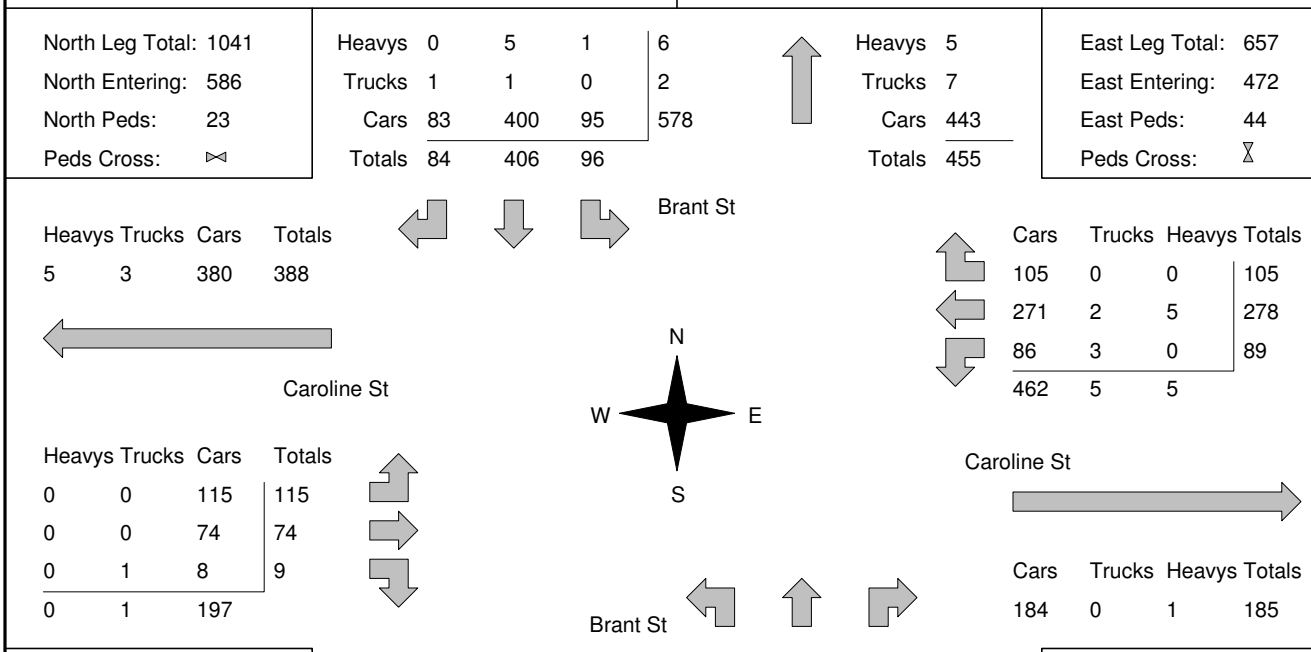
Municipality: Burlington
Site #: 0000000001
Intersection: Brant St & Caroline St
TFR File #: 1
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Brant St runs N/S



Comments

Caroline St @ Brant St

Total Count Diagram

Municipality: Burlington
Site #: 0000000001
Intersection: Brant St & Caroline St
TFR File #: 1
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Brant St runs N/S

North Leg Total:	6817			
North Entering:	3483			
North Peds:	178			
Peds Cross:	⋈			
Heavys	1	85	9	95
Trucks	4	31	9	44
Cars	394	2358	592	3344
Totals	399	2474	610	
Heavys	84			
Trucks	41			
Cars	3209			
Totals	3334			
East Leg Total:	3115			
East Entering:	1870			
East Peds:	343			
Peds Cross:	⧖			

Brant St

Heavys	Trucks	Cars	Totals
6	8	1393	1407

Cars	Trucks	Heavys	Totals
675	13	9	697
873	2	5	880
288	3	2	293
1836	18	16	

Caroline St

N
W E
S

Heavys	Trucks	Cars	Totals
7	5	831	843
3	0	485	488
1	3	117	121
11	8	1433	

Caroline St

Cars	Trucks	Heavys	Totals
1220	12	13	1245

Brant St

Peds Cross:	⧖			
West Peds:	351			
West Entering:	1452			
West Leg Total:	2859			
Cars	2763			
Trucks	37			
Heavys	88			
Totals	2888			
Cars	126	1703	143	1972
Trucks	2	23	3	28
Heavys	0	68	1	69
Totals	128	1794	147	
Peds Cross:	⋈			
South Peds:	289			
South Entering:	2069			
South Leg Total:	4957			

Comments

Caroline St @ Elizabeth St

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

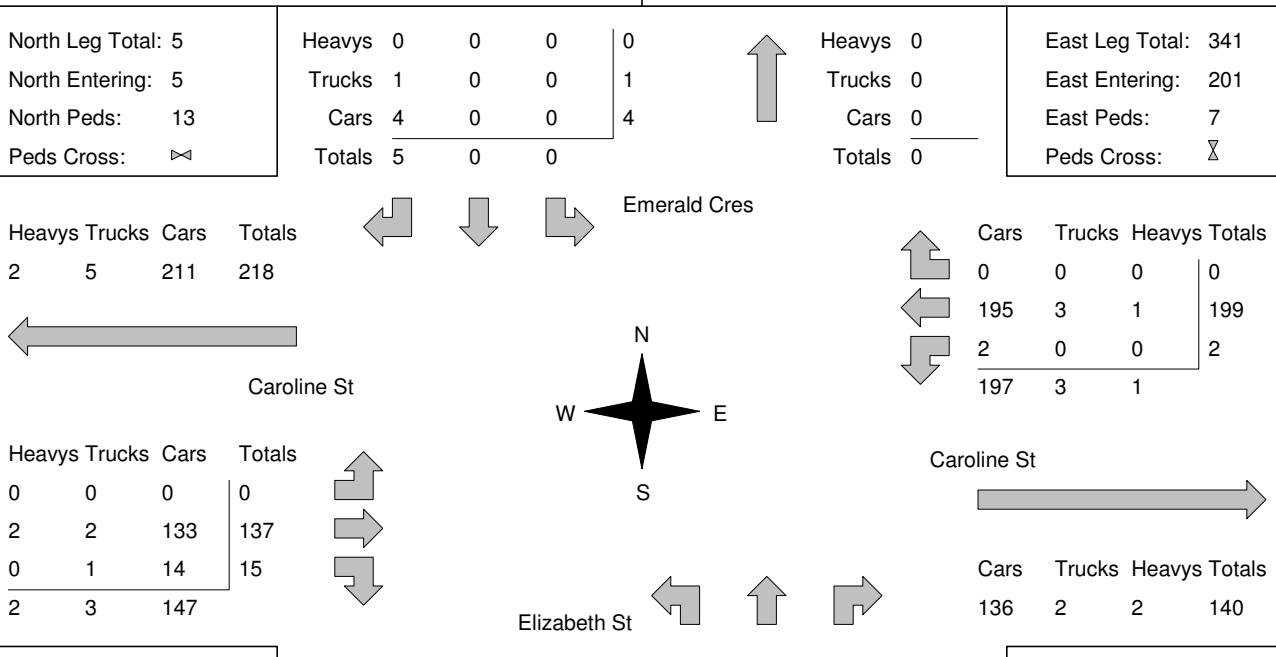
Municipality: Burlington
Site #: 0000000003
Intersection: Caroline St & Elizabeth St
TFR File #: 3
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Caroline St runs W/E



Comments

Caroline St @ Elizabeth St

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:30:00
To: 13:30:00

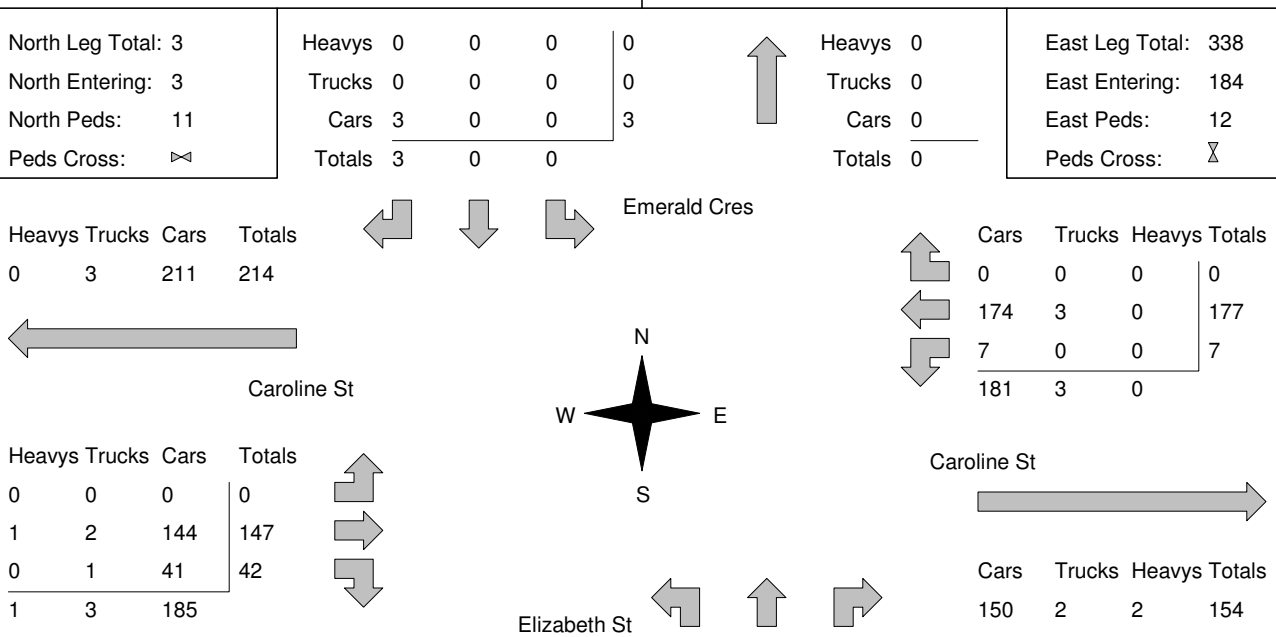
Municipality: Burlington
Site #: 0000000003
Intersection: Caroline St & Elizabeth St
TFR File #: 3
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Caroline St runs W/E



Comments

Caroline St @ Elizabeth St

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

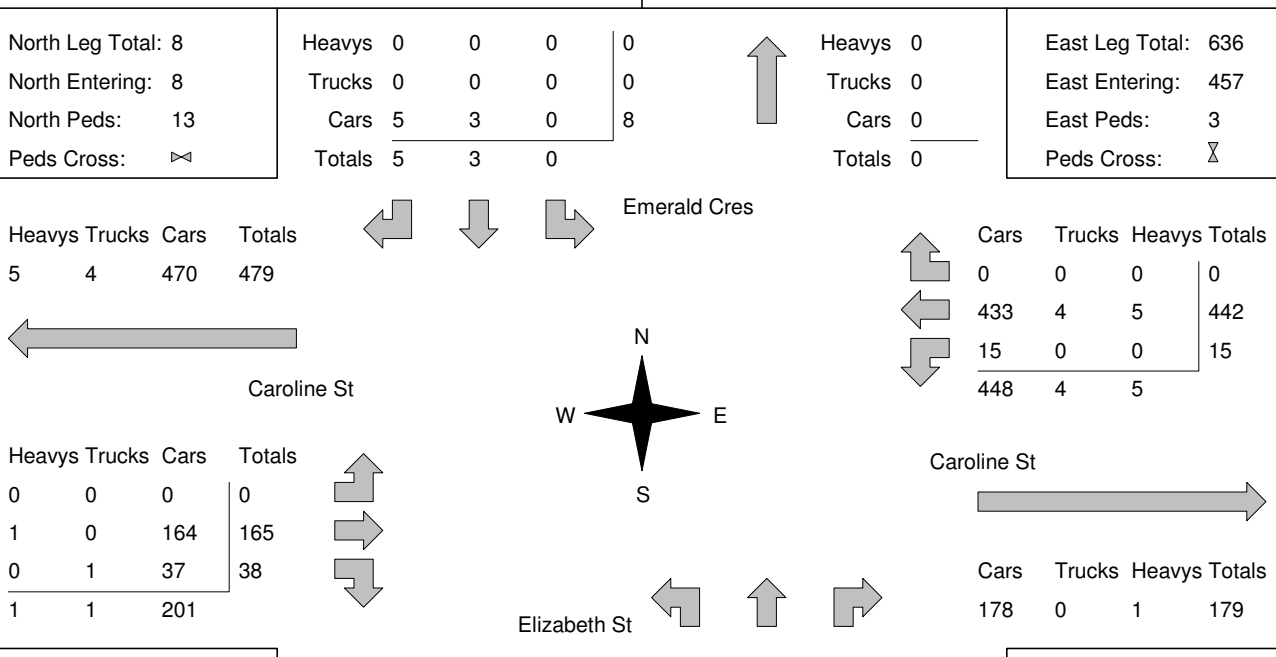
Municipality: Burlington
Site #: 0000000003
Intersection: Caroline St & Elizabeth St
TFR File #: 3
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Caroline St runs W/E



Comments

Caroline St @ Elizabeth St

Total Count Diagram

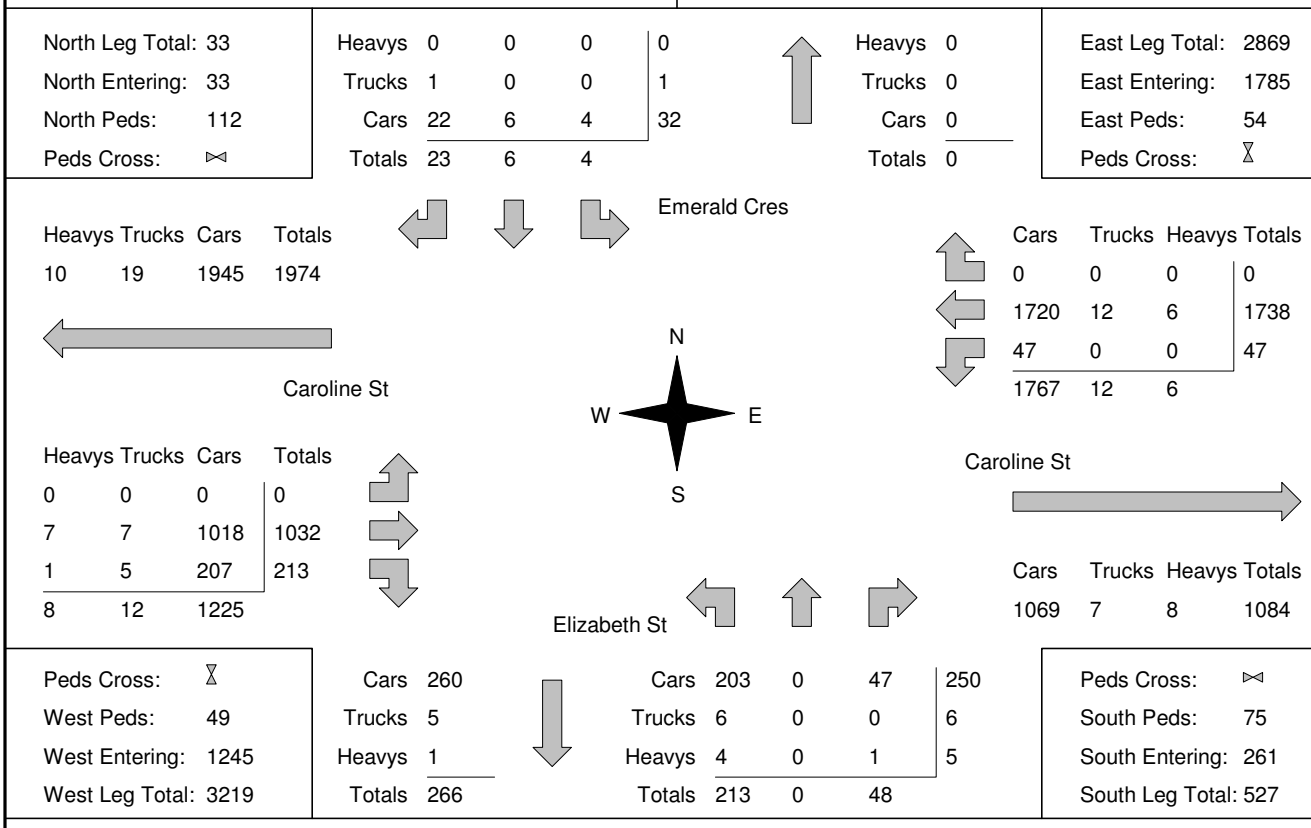
Municipality: Burlington
Site #: 0000000003
Intersection: Caroline St & Elizabeth St
TFR File #: 3
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Caroline St runs W/E



Comments

Caroline St @ John St

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 8:30:00
To: 9:30:00

Municipality: Burlington
Site #: 0000000002
Intersection: Caroline St & John St
TFR File #: 2
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Caroline St runs W/E

North Leg Total: 176
North Entering: 73
North Peds: 19
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	0	1	2	3
Cars	23	16	31	70
Totals	23	17	33	

Heavys	2
Trucks	0
Cars	101
Totals	103

East Leg Total: 368
East Entering: 202
East Peds: 25
Peds Cross: ⧖

Heavys	Trucks	Cars	Totals
1	5	161	167

John St

Cars	Trucks	Heavys	Totals
63	0	0	63
128	4	1	133
6	0	0	6
197	4	1	

Caroline St

N
W E
S

Heavys	Trucks	Cars	Totals
2	0	18	20
1	2	125	128
0	1	29	30
3	3	172	

Caroline St

Cars	Trucks	Heavys	Totals
161	4	1	166

John St

Peds Cross: ⧖
West Peds: 23
West Entering: 178
West Leg Total: 345

Cars	51
Trucks	2
Heavys	0
Totals	53

Cars	10	20	5	35
Trucks	1	0	0	1
Heavys	0	0	0	0
Totals	11	20	5	

Peds Cross: ⋈
South Peds: 15
South Entering: 36
South Leg Total: 89

Comments

Caroline St @ John St

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:30:00
To: 13:30:00

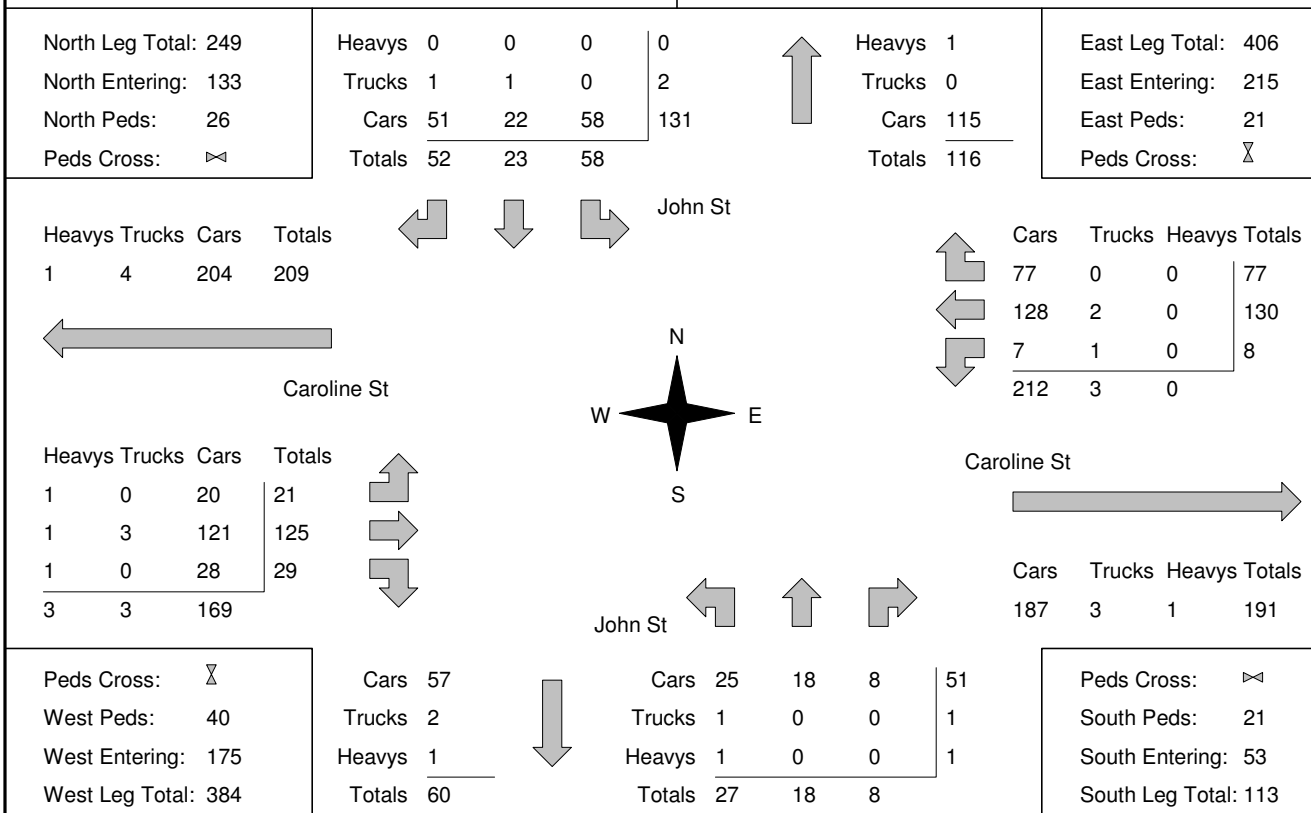
Municipality: Burlington
Site #: 0000000002
Intersection: Caroline St & John St
TFR File #: 2
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Caroline St runs W/E



Comments

Caroline St @ John St

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

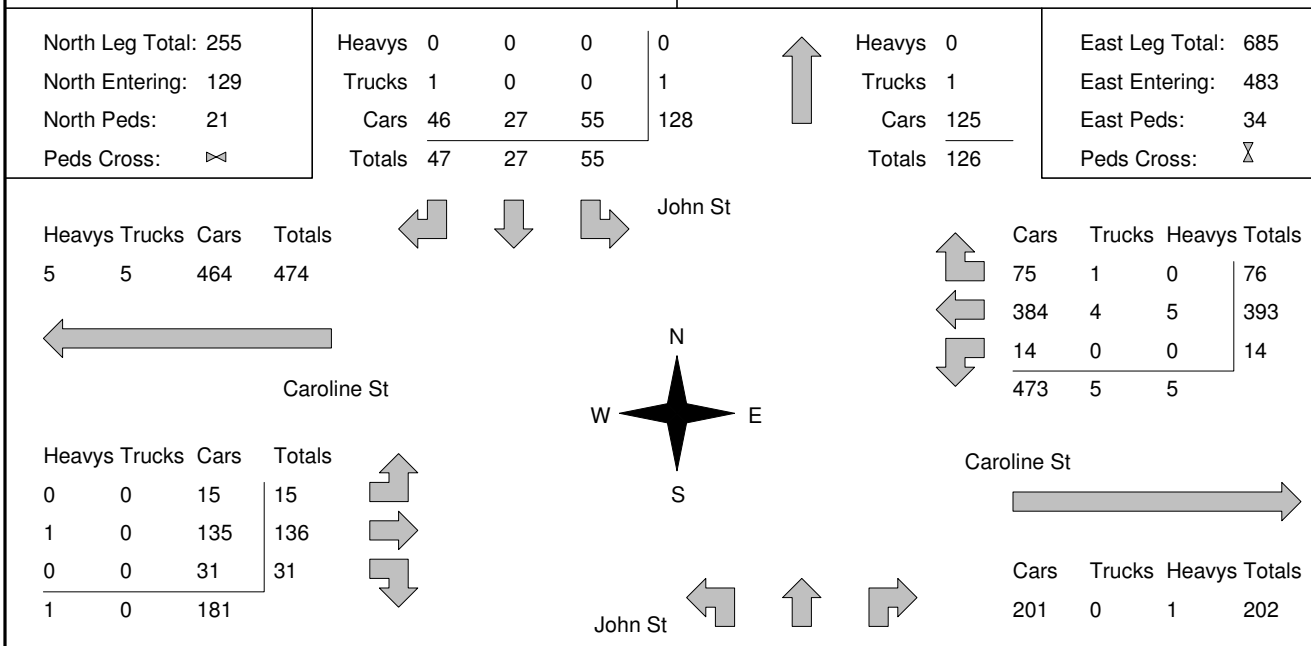
Municipality: Burlington
Site #: 0000000002
Intersection: Caroline St & John St
TFR File #: 2
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Caroline St runs W/E



Comments

Caroline St @ John St

Total Count Diagram

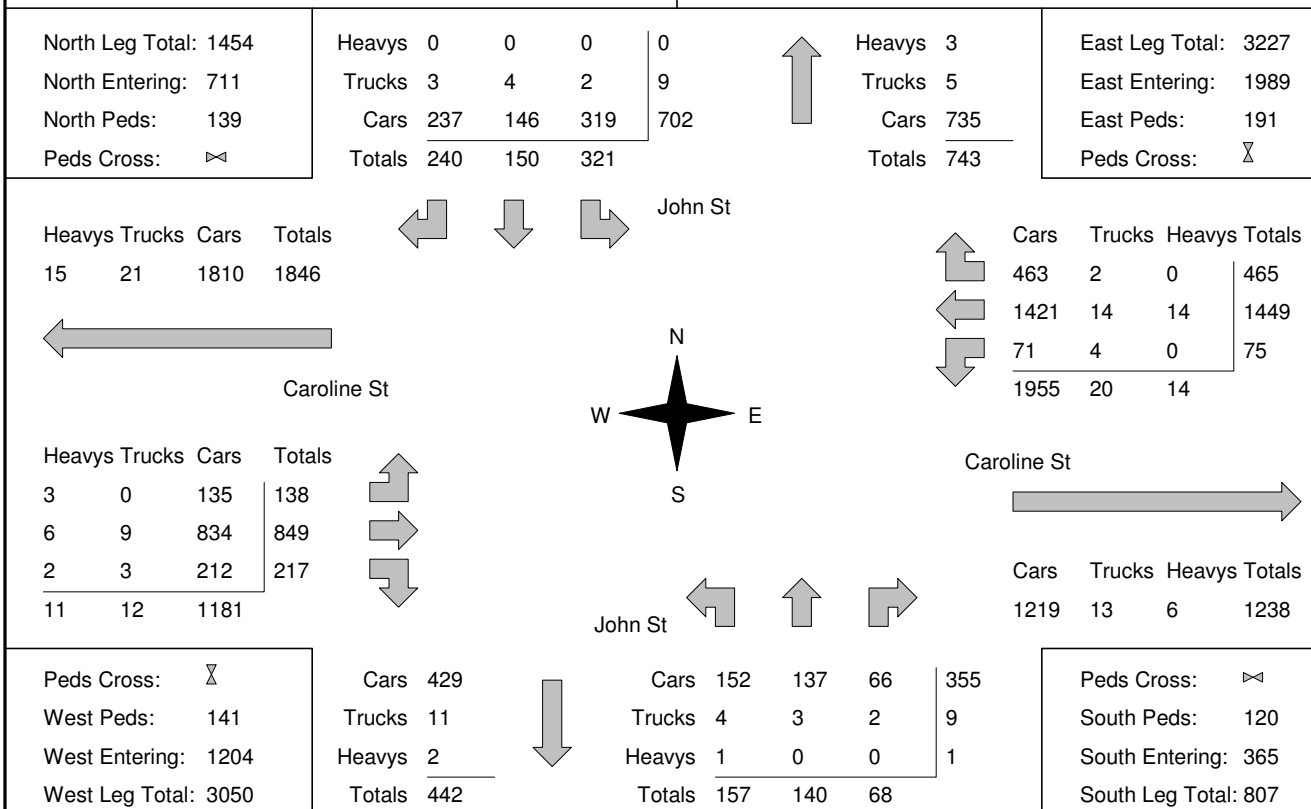
Municipality: Burlington
Site #: 0000000002
Intersection: Caroline St & John St
TFR File #: 2
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Caroline St runs W/E



Comments

Maria St @ Brant St

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 9:00:00
To: 10:00:00

Municipality: Burlington
Site #: 0000000004
Intersection: Brant St & Maria St
TFR File #: 4
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Brant St runs N/S

North Leg Total: 591
North Entering: 314
North Peds: 1
Peds Cross: ⋈

Heavys	22	0	22
Trucks	5	0	5
Cars	269	18	287
Totals	296	18	

Heavys	17
Trucks	3
Cars	257
Totals	277

East Leg Total: 59
East Entering: 32
East Peds: 55
Peds Cross: ⋈

Brant St

Cars	Trucks	Heavys	Totals
18	0	1	19
12	1	0	13
30	1	1	

N
W E
S

Maria St

Cars	Trucks	Heavys	Totals
26	0	1	27

Brant St

Cars	281
Trucks	6
Heavys	22
Totals	309

Cars	239	8	247
Trucks	3	0	3
Heavys	16	1	17
Totals	258	9	

Peds Cross: ⋈
South Peds: 37
South Entering: 267
South Leg Total: 576

Comments

Maria St @ Brant St

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:15:00
To: 13:15:00

Municipality: Burlington
Site #: 0000000004
Intersection: Brant St & Maria St
TFR File #: 4
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Brant St runs N/S

North Leg Total: 690
North Entering: 385
North Peds: 15
Peds Cross: ⋈

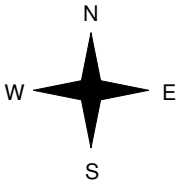
Heavys	12	0	12
Trucks	6	2	8
Cars	338	27	365
Totals	356	29	

Heavys	12
Trucks	7
Cars	286
Totals	305

East Leg Total: 93
East Entering: 45
East Peds: 80
Peds Cross: ⋈



	Cars	Trucks	Heavys	Totals
	30	2	0	32
	12	1	0	13
	42	3	0	



Maria St

	Cars	Trucks	Heavys	Totals
	46	2	0	48

Brant St

Cars	350		
Trucks	7		
Heavys	12		
Totals	369		

Cars	256	19	275
Trucks	5	0	5
Heavys	12	0	12
Totals	273	19	

Peds Cross: ⋈
South Peds: 54
South Entering: 292
South Leg Total: 661

Comments

Maria St @ Brant St

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

Municipality: Burlington
Site #: 0000000004
Intersection: Brant St & Maria St
TFR File #: 4
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Brant St runs N/S

North Leg Total: 770
North Entering: 501
North Peds: 0
Peds Cross: ⋈

Heavys	5	0	5
Trucks	5	0	5
Cars	466	25	491
Totals	476	25	

Heavys	5
Trucks	7
Cars	257
Totals	269

East Leg Total: 209
East Entering: 177
East Peds: 64
Peds Cross: ⋈

Brant St

	Cars	Trucks	Heavys	Totals
	60	0	0	60
	115	1	1	117
	175	1	1	

N
W E
S

Maria St

	Cars	Trucks	Heavys	Totals
	32	0	0	32

Brant St

Cars	581		
Trucks	6		
Heavys	6		
Totals	593		

Cars	197	7	204
Trucks	7	0	7
Heavys	5	0	5
Totals	209	7	

Peds Cross: ⋈
South Peds: 44
South Entering: 216
South Leg Total: 809

Comments

Maria St @ Brant St

Total Count Diagram

Municipality: Burlington
Site #: 0000000004
Intersection: Brant St & Maria St
TFR File #: 4
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Brant St runs N/S

North Leg Total: 4923
North Entering: 2875
North Peds: 28
Peds Cross: ⋈

Heavys	89	1	90
Trucks	31	5	36
Cars	2604	145	2749
Totals	2724	151	

Heavys	72
Trucks	25
Cars	1951
Totals	2048

East Leg Total: 784
East Entering: 546
East Peds: 466
Peds Cross: ⋈

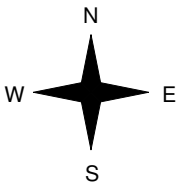


Brant St



Cars	Trucks	Heavys	Totals
268	4	1	273
266	5	2	273
534	9	3	





Maria St



Cars	Trucks	Heavys	Totals
226	10	2	238



Brant St

Cars	2870
Trucks	36
Heavys	91
Totals	2997



Cars	1683	81	1764
Trucks	21	5	26
Heavys	71	1	72
Totals	1775	87	

Peds Cross: ⋈
South Peds: 289
South Entering: 1862
South Leg Total: 4859

Comments

Maria St @ Elizabeth St

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 8:45:00
To: 9:45:00

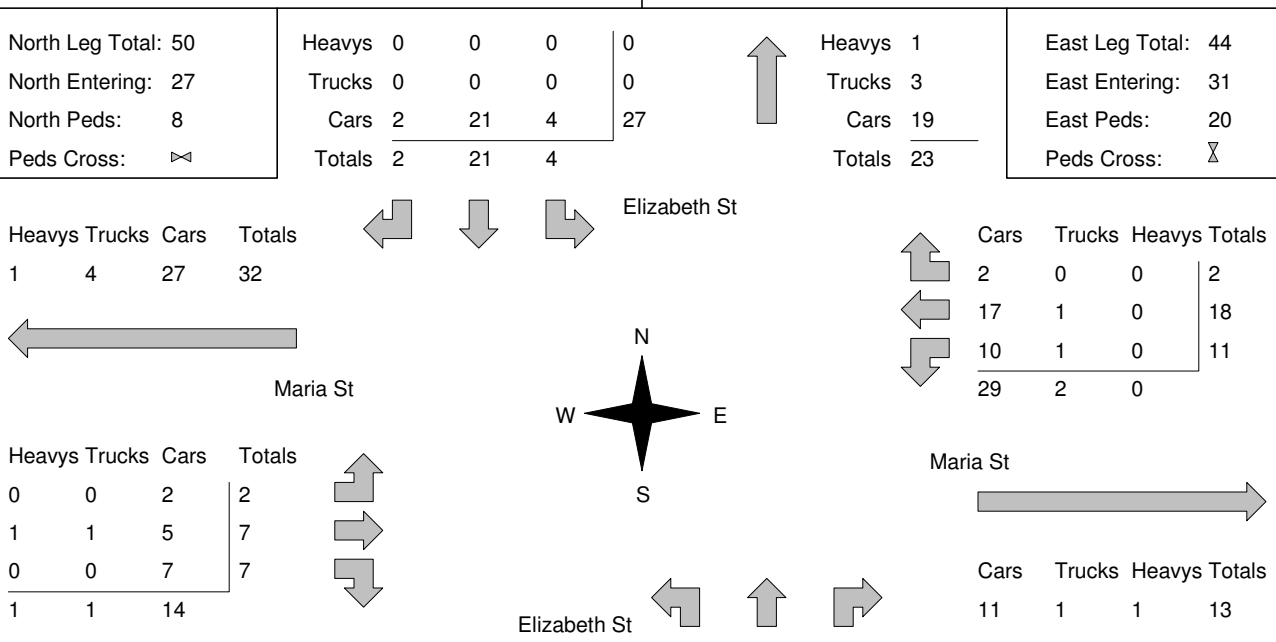
Municipality: Burlington
Site #: 0000000006
Intersection: Maria St & Elizabeth St
TFR File #: 6
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Maria St runs W/E



Comments

Maria St @ Elizabeth St

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:30:00
To: 13:30:00

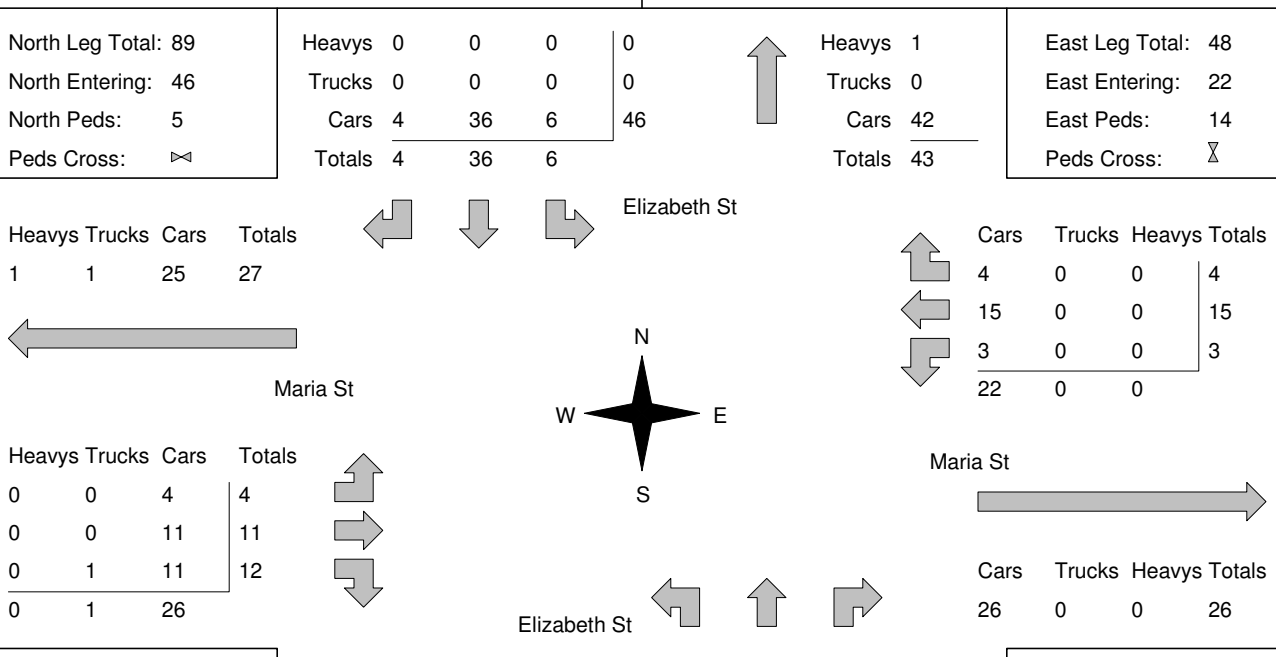
Municipality: Burlington
Site #: 0000000006
Intersection: Maria St & Elizabeth St
TFR File #: 6
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Maria St runs W/E



Comments

Maria St @ Elizabeth St

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

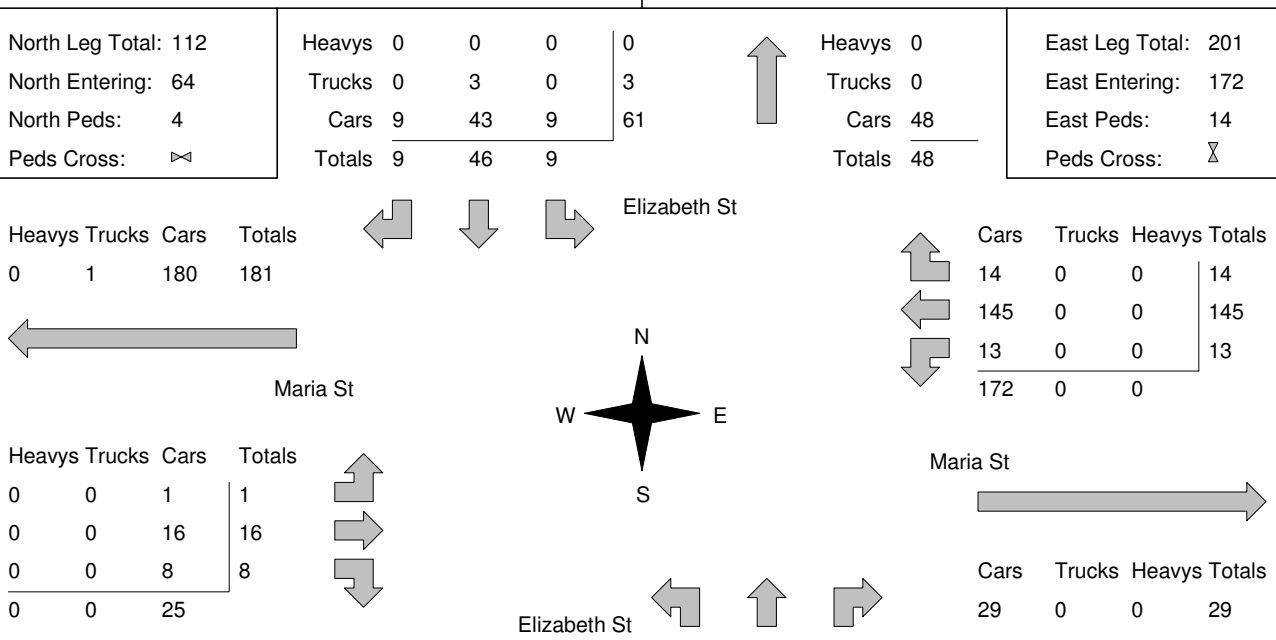
Municipality: Burlington
Site #: 0000000006
Intersection: Maria St & Elizabeth St
TFR File #: 6
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Maria St runs W/E



Comments

Maria St @ Elizabeth St

Total Count Diagram

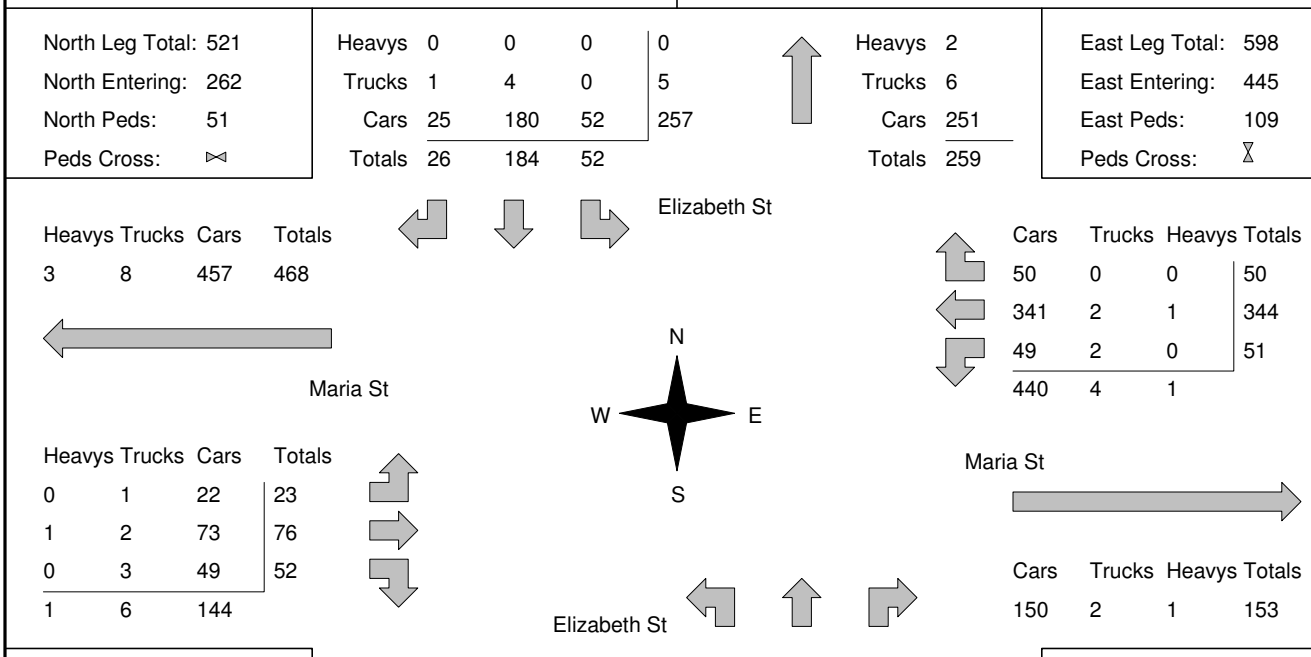
Municipality: Burlington
Site #: 0000000006
Intersection: Maria St & Elizabeth St
TFR File #: 6
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Maria St runs W/E



Comments

Maria St @ John St

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 9:00:00
To: 10:00:00

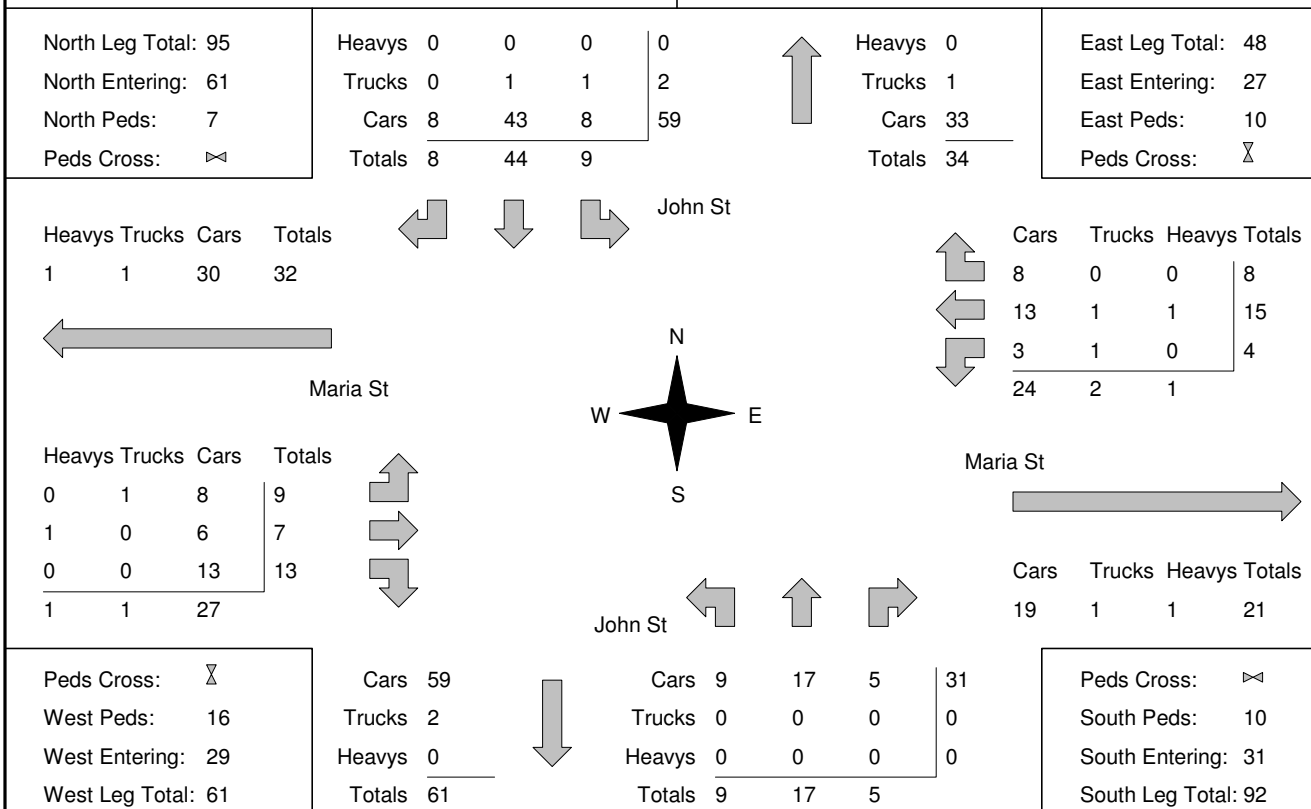
Municipality: Burlington
Site #: 0000000005
Intersection: Maria St & John St
TFR File #: 5
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Maria St runs W/E



Comments

Maria St @ John St

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 11:45:00
To: 12:45:00

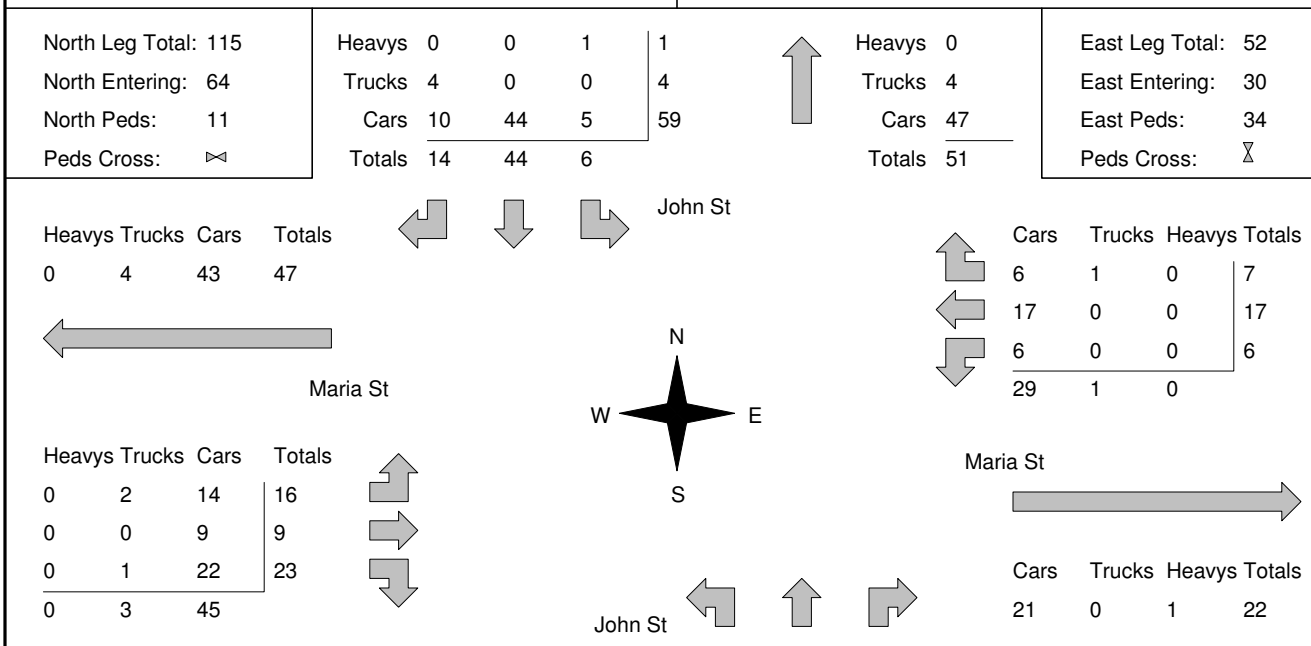
Municipality: Burlington
Site #: 0000000005
Intersection: Maria St & John St
TFR File #: 5
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Maria St runs W/E



Comments

Maria St @ John St

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

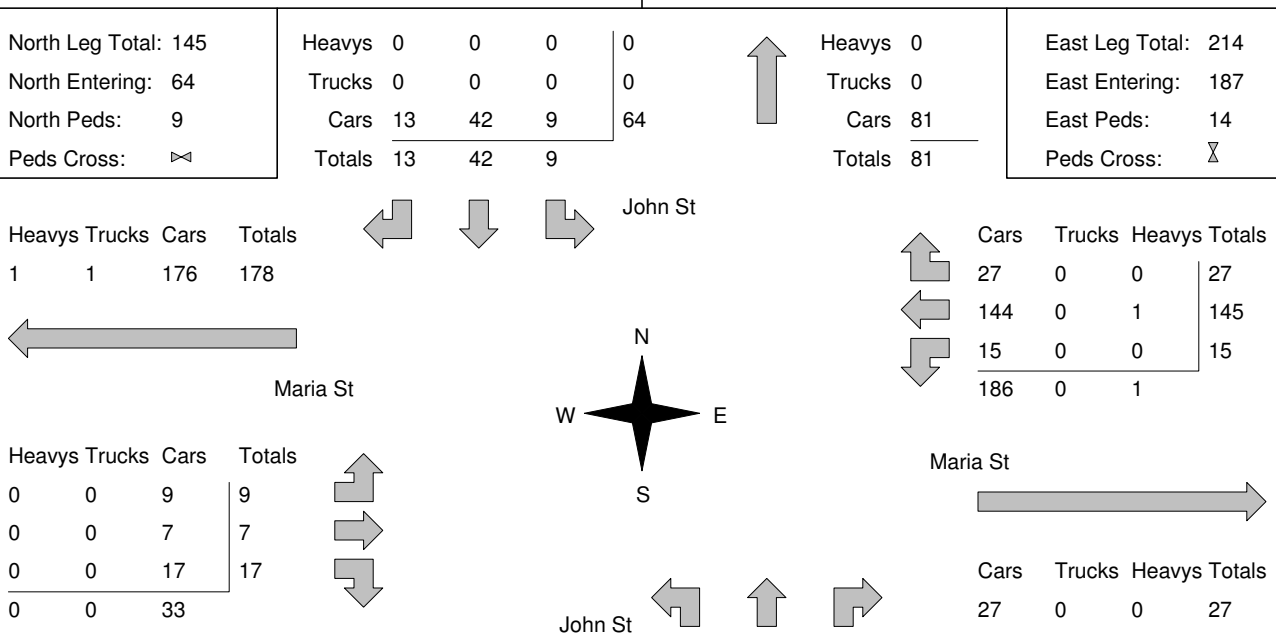
Municipality: Burlington
Site #: 0000000005
Intersection: Maria St & John St
TFR File #: 5
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Maria St runs W/E



Comments

Maria St @ John St

Total Count Diagram

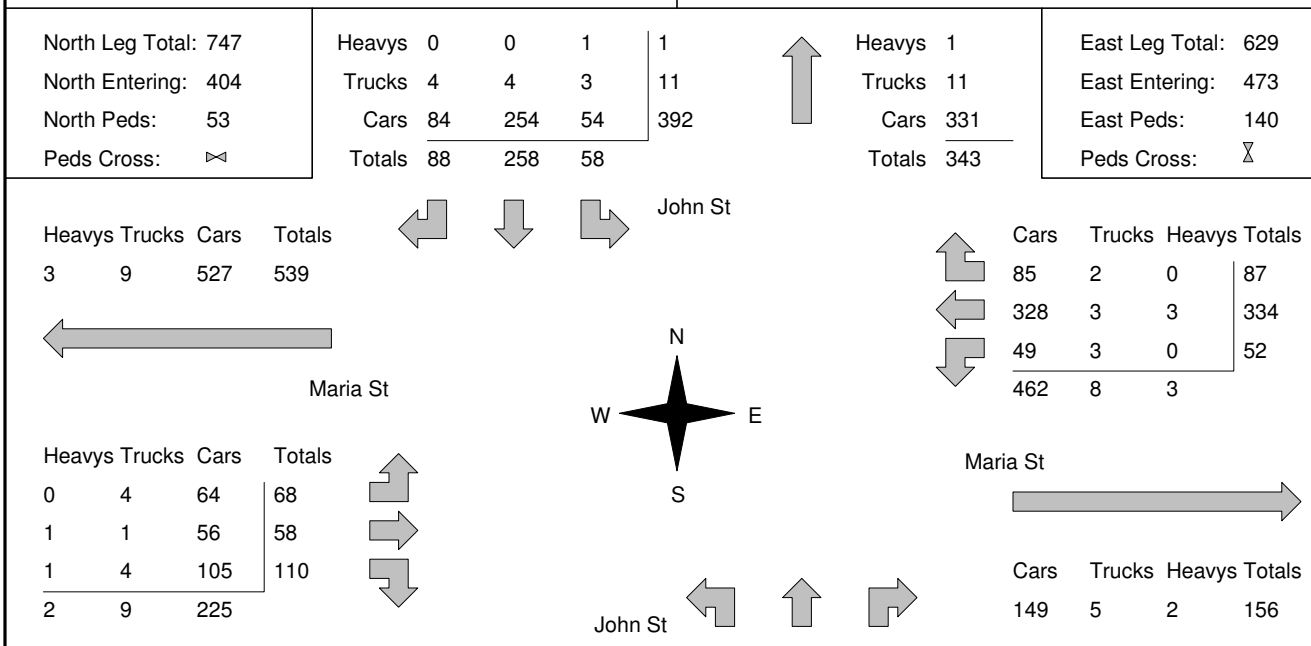
Municipality: Burlington
Site #: 0000000005
Intersection: Maria St & John St
TFR File #: 5
Count date: 30-Nov-2023

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

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

Major Road: Maria St runs W/E



Comments

Intersection Name:	TS ID:	Line No:	Model:	IP address:	Controller Make:
Brant St @ Caroline St	145	1	ACS/3	172.24.61.2	Econolite

Type of Operation: 8 Phase Semi-Actuated

*-Start from Main Menu

No	Date			Description	Prepared by
	Y	M	D		PH
5	2021	1	20	Increased all-red intervals based on field measurement	

PHASE DESCRIPTION

Ph1	SBLT - Brant St	Ph5	
Ph2	NB - Brant St	Ph6	SB - Brant St
Ph3		Ph7	EBLT - Caroline St
Ph4	EB - Caroline St	Ph8	WB - Caroline St

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
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	6	8
Walk		15		10		15		10
Ped. Clearance		8		8		8		8
Pedestrian Carry Over								
Vehicle Extension	3	3		5		3	3	5
MAX 1	10	35		20		35	10	20
MAX 2	10	35		20		35	10	20
Yellow Change	3	4		4		4	3	4
Red Clearance		3		3		3		3
Phase Minimum:	9	30	0	25	0	30	9	25

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		X		X
MAX Recall		X		X		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	80	54	1	1	10	31		39		41	12	27
2	80	50	1	2	11	31		38		42	11	27
3	80	57	1	3	10	31		39		41	12	27
4	90	57	1	4	11	31		48		42	10	38
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	1	07:30	1	1
1	1	2	09:30	2	1
1	1	3	15:30	3	1
1	1	4	16:00	4	1
1	1	3	17:30	3	1
1	1	2	19:00	2	1
1	1	10	22:00	254	1
2	2	2	09:30	2	1
2	2	10	18:00	254	1
3	3	2	10:30	2	1
3	3	10	17:00	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)

Special Programming: **Side street on Max recall during Pm peak split 4**

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

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

Appendix C

Existing Traffic Operations Reports

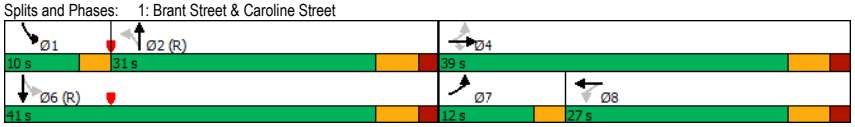
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	72	23	17	60	71	11	247	18	74	279	41
Future Volume (vph)	107	72	23	17	60	71	11	247	18	74	279	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	40.0		10.0	20.0		0.0	25.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96		0.90	0.93	0.96		0.94	0.99		0.97	0.98	
Frt			0.850		0.919			0.990			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1711	1881	1597	1745	1614	0	1601	1750	0	1694	1684	0
Flt Permitted	0.575			0.706			0.552			0.403		
Satd. Flow (perm)	993	1881	1440	1204	1614	0	872	1750	0	696	1684	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82		75			5			12	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		107.3			65.5			116.4			84.2	
Travel Time (s)		9.7			5.9			8.4			6.1	
Confl. Peds. (#/hr)	25		36	36		25	58		34	34		58
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	0%	0%	0%	7%	9%	7%	6%	3%	10%	2%
Adj. Flow (vph)	116	78	25	18	65	77	12	268	20	80	303	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	78	25	18	142	0	12	288	0	80	348	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	8.0	8.0		8.0	8.0		6.0	8.0	
Minimum Split (s)	10.0	25.0	25.0	25.0	25.0		30.0	30.0		10.0	30.0	
Total Split (s)	12.0	39.0	39.0	27.0	27.0		31.0	31.0		10.0	41.0	
Total Split (%)	15.0%	48.8%	48.8%	33.8%	33.8%		38.8%	38.8%		12.5%	51.3%	
Maximum Green (s)	9.0	33.0	33.0	21.0	21.0		25.0	25.0		7.0	35.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		2.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		0.0	-2.0	
Total Lost Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max	Max	Max	Max		C-Max	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0	10.0	10.0		15.0	15.0			15.0	
Flash Dont Walk (s)		8.0	8.0	8.0	8.0		8.0	8.0			8.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	36.0	35.0	35.0	25.7	25.7		29.1	29.1		38.0	37.0	
Actuated g/C Ratio	0.45	0.44	0.44	0.32	0.32		0.36	0.36		0.48	0.46	
v/c Ratio	0.22	0.09	0.04	0.05	0.25		0.04	0.45		0.19	0.44	
Control Delay	14.3	13.7	0.1	21.2	12.5		18.5	22.8		12.9	16.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.3	13.7	0.1	21.2	12.5		18.5	22.8		12.9	16.2	
LOS	B	B	A	C	B		B	C		B	B	
Approach Delay		12.4			13.5			22.6			15.6	
Approach LOS		B			B			C			B	
Queue Length 50th (m)	10.0	6.7	0.0	2.0	7.5		1.2	33.5		6.4	33.0	
Queue Length 95th (m)	19.4	14.2	0.0	6.7	20.6		4.7	55.5		13.6	53.9	
Internal Link Dist (m)		83.3			41.5			92.4			60.2	
Turn Bay Length (m)	40.0		10.0	20.0			25.0			20.0		
Base Capacity (vph)	527	822	676	387	570		316	638		417	785	
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	0.22	0.09	0.04	0.05	0.25		0.04	0.45		0.19	0.44	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 54 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.45			
Intersection Signal Delay: 16.6		Intersection LOS: B	

Intersection Capacity Utilization 60.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Brant Street & Caroline Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	116	78	25	18	142	12	288	80	348
v/c Ratio	0.22	0.09	0.04	0.05	0.25	0.04	0.45	0.19	0.44
Control Delay	14.3	13.7	0.1	21.2	12.5	18.5	22.8	12.9	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	13.7	0.1	21.2	12.5	18.5	22.8	12.9	16.2
Queue Length 50th (m)	10.0	6.7	0.0	2.0	7.5	1.2	33.5	6.4	33.0
Queue Length 95th (m)	19.4	14.2	0.0	6.7	20.6	4.7	55.5	13.6	53.9
Internal Link Dist (m)		83.3			41.5		92.4		60.2
Turn Bay Length (m)	40.0		10.0	20.0		25.0		20.0	
Base Capacity (vph)	527	822	676	387	570	316	638	417	785
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	0.22	0.09	0.04	0.05	0.25	0.04	0.45	0.19	0.44

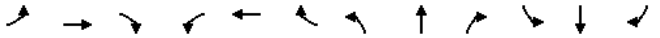
Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	72	23	17	60	71	11	247	18	74	279	41
Future Volume (vph)	107	72	23	17	60	71	11	247	18	74	279	41
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.90	1.00	0.96		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	0.98	1.00	1.00	0.93	1.00		0.94	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1672	1881	1440	1620	1614		1501	1749		1674	1684	
Flt Permitted	0.58	1.00	1.00	0.71	1.00		0.55	1.00		0.40	1.00	
Satd. Flow (perm)	1012	1881	1440	1204	1614		873	1749		711	1684	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	116	78	25	18	65	77	12	268	20	80	303	45
RTOR Reduction (vph)	0	0	14	0	51	0	0	3	0	0	7	0
Lane Group Flow (vph)	116	78	11	18	91	0	12	285	0	80	341	0
Confl. Peds. (#/hr)	25		36	36		25	58		34	34		58
Heavy Vehicles (%)	2%	1%	0%	0%	0%	7%	9%	7%	6%	3%	10%	2%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.6	33.6	33.6	23.7	23.7		25.9	25.9		34.4	34.4	
Effective Green, g (s)	33.6	35.6	35.6	25.7	25.7		27.9	27.9		34.4	36.4	
Actuated g/C Ratio	0.42	0.45	0.45	0.32	0.32		0.35	0.35		0.43	0.45	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	481	837	640	386	518		304	609		371	766	
v/s Ratio Prot	c0.02	0.04			0.06			0.16		0.01	c0.20	
v/s Ratio Perm	c0.08		0.01	0.01			0.01			0.08		
v/c Ratio	0.24	0.09	0.02	0.05	0.18		0.04	0.47		0.22	0.45	
Uniform Delay, d1	14.6	12.9	12.4	18.7	19.5		17.2	20.3		14.2	14.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.0	0.2	0.7		0.2	2.6		0.3	1.9	
Delay (s)	14.8	13.1	12.5	18.9	20.3		17.4	22.8		14.5	16.8	
Level of Service	B	B	B	B	C		B	C		B	B	
Approach Delay (s)		13.9			20.1			22.6			16.4	
Approach LOS		B			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.37			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	60.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	128	30	6	133	63	11	20	5	33	17	23
Future Volume (vph)	20	128	30	6	133	63	11	20	5	33	17	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.6	3.6	3.5
Storage Length (m)	0.0		0.0	0.0		15.0	25.0		0.0	0.0		30.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.977				0.850		0.983				0.850
Flt Protected		0.994			0.998			0.985			0.968	
Satd. Flow (prot)	0	1778	0	0	1827	1615	0	1790	0	0	1735	1597
Flt Permitted		0.994			0.998			0.985			0.968	
Satd. Flow (perm)	0	1778	0	0	1827	1615	0	1790	0	0	1735	1597
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		65.5			60.2			50.9			58.4	
Travel Time (s)		5.9			5.4			3.7			4.2	
Confl. Peds. (#/hr)	19		15	15		19	23		25	25		23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	2%	7%	0%	4%	0%	9%	0%	0%	6%	6%	0%
Adj. Flow (vph)	22	139	33	7	145	68	12	22	5	36	18	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	194	0	0	152	68	0	39	0	0	54	25
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01
Sign Control		Stop			Stop			Stop			Stop	

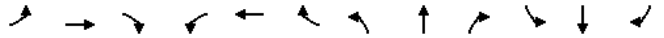
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	128	30	6	133	63	11	20	5	33	17	23
Future Volume (vph)	20	128	30	6	133	63	11	20	5	33	17	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	139	33	7	145	68	12	22	5	36	18	25

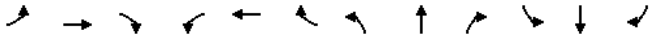
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	194	152	68	39	54	25
Volume Left (vph)	22	7	0	12	36	0
Volume Right (vph)	33	0	68	5	0	25
Hadj (s)	-0.02	0.09	-0.70	0.03	0.44	-0.70
Departure Headway (s)	5.1	5.1	4.3	5.7	6.0	4.9
Degree Utilization, x	0.27	0.22	0.08	0.06	0.09	0.03
Capacity (veh/h)	691	679	801	587	558	682
Control Delay (s)	10.0	8.3	6.5	9.0	8.4	6.8
Approach Delay (s)	10.0	7.7		9.0	7.9	
Approach LOS	A	A		A	A	

Intersection Summary				
Delay		8.7		
Level of Service		A		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A	
Analysis Period (min)		15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	137	15	2	199	0	14	0	3	0	0	5
Future Volume (vph)	0	137	15	2	199	0	14	0	3	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987						0.977			0.865	
Flt Protected								0.960				
Satd. Flow (prot)	0	1814	0	0	1863	0	0	1596	0	0	1370	0
Flt Permitted								0.960				
Satd. Flow (perm)	0	1814	0	0	1863	0	0	1596	0	0	1370	0
Link Speed (k/h)		50			40			50			50	
Link Distance (m)		60.2			118.8			76.6			56.2	
Travel Time (s)		4.3			10.7			5.5			4.0	
Confl. Peds. (#/hr)	13		12	12		13	6		7	7		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	7%	0%	2%	0%	14%	0%	0%	0%	0%	20%
Adj. Flow (vph)	0	149	16	2	216	0	15	0	3	0	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	165	0	0	218	0	0	18	0	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	28.1%	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)	0	137	15	2	199	0	14	0	3	0	0	5
Future Volume (Veh/h)	0	137	15	2	199	0	14	0	3	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	149	16	2	216	0	15	0	3	0	0	5
Pedestrians		6			7			12			13	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	229			177			400	402	176	400	410	235
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	229			177			400	402	176	400	410	235
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.4
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.5
p0 queue free %	100			100			97	100	100	100	100	99
cM capacity (veh/h)	1335			1396			518	527	857	542	522	748

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	165	218	18	5
Volume Left	0	2	15	0
Volume Right	16	0	3	5
cSH	1700	1396	554	748
Volume to Capacity	0.10	0.00	0.03	0.01
Queue Length 95th (m)	0.0	0.0	0.8	0.2
Control Delay (s)	0.0	0.1	11.7	9.8
Lane LOS		A	B	A
Approach Delay (s)	0.0	0.1	11.7	9.8
Approach LOS			B	A

Intersection Summary					
Average Delay			0.7		
Intersection Capacity Utilization			28.1%	ICU Level of Service	A
Analysis Period (min)			15		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	13	19	258	9	18	296
Future Volume (vph)	13	19	258	9	18	296
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.919		0.995			
Flt Protected	0.980					0.997
Satd. Flow (prot)	1611	0	1765	0	0	1746
Flt Permitted	0.980					0.997
Satd. Flow (perm)	1611	0	1765	0	0	1746
Link Speed (k/h)	50		50			50
Link Distance (m)	65.8		60.2			116.4
Travel Time (s)	4.7		4.3			8.4
Confl. Peds. (#/hr)	37	1		55	55	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	5%	7%	11%	0%	9%
Adj. Flow (vph)	14	21	280	10	20	322
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	0	290	0	0	342
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.3			3.3
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

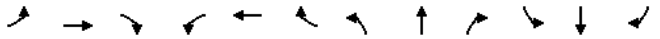
Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	40.6%		ICU Level of Service	A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	13	19	258	9	18	296
Future Volume (Veh/h)	13	19	258	9	18	296
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)	14	21	280	10	20	322
Pedestrians	55		37			1
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	5		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						116
pX, platoon unblocked	0.88					
vC, conflicting volume	739	341			345	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	638	341			345	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	96	97			98	
cM capacity (veh/h)	344	659			1164	

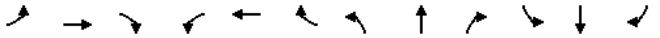
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	35	290	342
Volume Left	14	0	20
Volume Right	21	10	0
cSH	482	1700	1164
Volume to Capacity	0.07	0.17	0.02
Queue Length 95th (m)	1.8	0.0	0.4
Control Delay (s)	13.1	0.0	0.6
Lane LOS	B		A
Approach Delay (s)	13.1	0.0	0.6
Approach LOS	B		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	7	13	4	15	8	9	17	5	9	44	8
Future Volume (vph)	9	7	13	4	15	8	9	17	5	9	44	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.941			0.958			0.980			0.982	
Flt Protected		0.985			0.993			0.985			0.993	
Satd. Flow (prot)	0	1647	0	0	1634	0	0	1834	0	0	1797	0
Flt Permitted		0.985			0.993			0.985			0.993	
Satd. Flow (perm)	0	1647	0	0	1634	0	0	1834	0	0	1797	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		65.8			64.6			101.9			63.3	
Travel Time (s)		4.7			4.7			7.3			4.6	
Confl. Peds. (#/hr)	7		10	10		7	16		10	10		16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	14%	0%	25%	13%	0%	0%	0%	0%	11%	2%	0%
Adj. Flow (vph)	10	8	14	4	16	9	10	18	5	10	48	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	0	29	0	0	33	0	0	67	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

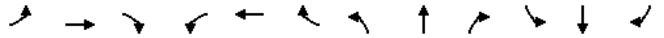
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	20.8%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	7	13	4	15	8	9	17	5	9	44	8
Future Volume (vph)	9	7	13	4	15	8	9	17	5	9	44	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	8	14	4	16	9	10	18	5	10	48	9

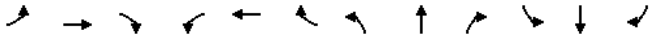
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	32	29	33	67
Volume Left (vph)	10	4	10	10
Volume Right (vph)	14	9	5	9
Hadj (s)	-0.08	0.02	-0.03	0.00
Departure Headway (s)	4.1	4.2	4.1	4.1
Degree Utilization, x	0.04	0.03	0.04	0.08
Capacity (veh/h)	859	838	858	867
Control Delay (s)	7.2	7.3	7.2	7.4
Approach Delay (s)	7.2	7.3	7.2	7.4
Approach LOS	A	A	A	A

Intersection Summary					
Delay			7.3		
Level of Service			A		
Intersection Capacity Utilization			20.8%	ICU Level of Service	A
Analysis Period (min)			15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	7	7	11	18	2	12	19	2	4	21	2
Future Volume (vph)	2	7	7	11	18	2	12	19	2	4	21	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.940			0.992			0.992			0.991	
Flt Protected		0.994			0.983			0.982			0.993	
Satd. Flow (prot)	0	1573	0	0	1736	0	0	1491	0	0	1870	0
Flt Permitted		0.994			0.983			0.982			0.993	
Satd. Flow (perm)	0	1573	0	0	1736	0	0	1491	0	0	1870	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.6			98.7			82.9			36.7	
Travel Time (s)		4.7			7.1			6.0			2.6	
Confl. Peds. (#/hr)	8		18	18		8	2		20	20		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	0%	9%	6%	0%	33%	21%	0%	0%	0%	0%
Adj. Flow (vph)	2	8	8	12	20	2	13	21	2	4	23	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	18	0	0	34	0	0	36	0	0	29	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	22.9%		ICU Level of Service A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	7	7	11	18	2	12	19	2	4	21	2
Future Volume (vph)	2	7	7	11	18	2	12	19	2	4	21	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	8	8	12	20	2	13	21	2	4	23	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	18	34	36	29
Volume Left (vph)	2	12	13	4
Volume Right (vph)	8	2	2	2
Hadj (s)	-0.03	0.15	0.45	-0.01
Departure Headway (s)	4.1	4.2	4.5	4.0
Degree Utilization, x	0.02	0.04	0.04	0.03
Capacity (veh/h)	866	836	781	874
Control Delay (s)	7.1	7.4	7.7	7.2
Approach Delay (s)	7.1	7.4	7.7	7.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay			7.4	
Level of Service			A	
Intersection Capacity Utilization			22.9%	ICU Level of Service
Analysis Period (min)			15	



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	36	0	0	53
Future Volume (vph)	0	0	36	0	0	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	39.5		63.3			50.9
Travel Time (s)	2.8		4.6			3.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	39	0	0	58
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	39	0	0	58
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	6.7%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	36	0	0	53
Future Volume (Veh/h)	0	0	36	0	0	53
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	0	39	0	0	58
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	97	39			39	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	97	39			39	
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	100			100	
cM capacity (veh/h)	902	1033			1571	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	39	58
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1571
Volume to Capacity	0.00	0.02	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		6.7%	ICU Level of Service A
Analysis Period (min)		15	



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	17	17	0
Future Volume (vph)	0	0	0	17	17	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	45.1			36.7	76.6	
Travel Time (s)	3.2			2.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	18	18	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	18	18	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	6.7%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	17	17	0
Future Volume (Veh/h)	0	0	0	17	17	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	0	0	18	18	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	36	18	18			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	36	18	18			
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	100	100			
cM capacity (veh/h)	977	1061	1599			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	18	18
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1599	1700
Volume to Capacity	0.00	0.00	0.01
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		6.7%	ICU Level of Service	A
Analysis Period (min)		15		

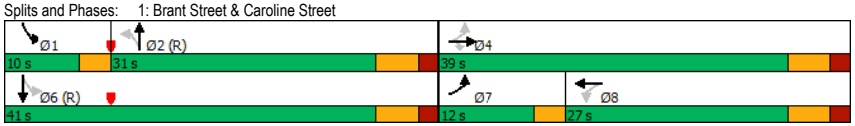
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	74	9	89	278	105	26	235	15	96	406	84
Future Volume (vph)	115	74	9	89	278	105	26	235	15	96	406	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	40.0		10.0	20.0		0.0	25.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		0.91	0.93	0.98		0.97	0.99		0.96	0.99	
Frt			0.850		0.959			0.991			0.974	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1745	1900	1439	1694	1749	0	1745	1788	0	1728	1805	0
Flt Permitted	0.221			0.705			0.371			0.423		
Satd. Flow (perm)	399	1900	1303	1172	1749	0	661	1788	0	736	1805	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82		24			4			17	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		107.3			65.5			116.4			84.2	
Travel Time (s)		9.7			5.9			8.4			6.1	
Confl. Peds. (#/hr)	23		34	34		23	39		44	44		39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	11%	3%	3%	0%	0%	5%	0%	1%	1%	1%
Adj. Flow (vph)	125	80	10	97	302	114	28	255	16	104	441	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	125	80	10	97	416	0	28	271	0	104	532	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	8.0	8.0		8.0	8.0		6.0	8.0	
Minimum Split (s)	10.0	25.0	25.0	25.0	25.0		30.0	30.0		10.0	30.0	
Total Split (s)	12.0	39.0	39.0	27.0	27.0		31.0	31.0		10.0	41.0	
Total Split (%)	15.0%	48.8%	48.8%	33.8%	33.8%		38.8%	38.8%		12.5%	51.3%	
Maximum Green (s)	9.0	33.0	33.0	21.0	21.0		25.0	25.0		7.0	35.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		2.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		0.0	-2.0	
Total Lost Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max	Max	Max	Max		C-Max	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0	10.0	10.0		15.0	15.0			15.0	
Flash Dont Walk (s)		8.0	8.0	8.0	8.0		8.0	8.0			8.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	36.0	35.0	35.0	25.7	25.7		29.0	29.0		38.0	37.0	
Actuated g/C Ratio	0.45	0.44	0.44	0.32	0.32		0.36	0.36		0.48	0.46	
v/c Ratio	0.40	0.10	0.02	0.26	0.72		0.12	0.42		0.24	0.63	
Control Delay	17.0	13.7	0.0	24.2	32.7		20.1	22.3		13.3	19.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	17.0	13.7	0.0	24.2	32.7		20.1	22.3		13.3	19.9	
LOS	B	B	A	C	C		C	C		B	B	
Approach Delay		15.0			31.1			22.1			18.8	
Approach LOS		B			C			C			B	
Queue Length 50th (m)	10.8	6.9	0.0	11.4	54.8		2.9	31.2		8.4	56.7	
Queue Length 95th (m)	20.5	14.5	0.0	23.7	#99.4		8.7	51.9		16.7	88.5	
Internal Link Dist (m)		83.3			41.5			92.4			60.2	
Turn Bay Length (m)	40.0		10.0	20.0			25.0			20.0		
Base Capacity (vph)	330	831	616	376	577		239	651		436	843	
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	0.38	0.10	0.02	0.26	0.72		0.12	0.42		0.24	0.63	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 54 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 22.7		Intersection LOS: C	

Intersection Capacity Utilization 75.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brant Street & Caroline Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	125	80	10	97	416	28	271	104	532
v/c Ratio	0.40	0.10	0.02	0.26	0.72	0.12	0.42	0.24	0.63
Control Delay	17.0	13.7	0.0	24.2	32.7	20.1	22.3	13.3	19.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.0	13.7	0.0	24.2	32.7	20.1	22.3	13.3	19.9
Queue Length 50th (m)	10.8	6.9	0.0	11.4	54.8	2.9	31.2	8.4	56.7
Queue Length 95th (m)	20.5	14.5	0.0	23.7	#99.4	8.7	51.9	16.7	88.5
Internal Link Dist (m)		83.3			41.5		92.4		60.2
Turn Bay Length (m)	40.0		10.0	20.0		25.0		20.0	
Base Capacity (vph)	330	831	616	376	577	239	651	436	843
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	0.38	0.10	0.02	0.26	0.72	0.12	0.42	0.24	0.63

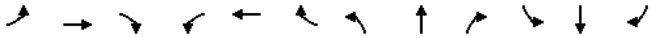
Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	74	9	89	278	105	26	235	15	96	406	84
Future Volume (vph)	115	74	9	89	278	105	26	235	15	96	406	84
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.91	1.00	0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.93	1.00		0.97	1.00		0.98	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1740	1900	1303	1579	1749		1695	1788		1698	1806	
Flt Permitted	0.22	1.00	1.00	0.70	1.00		0.37	1.00		0.42	1.00	
Satd. Flow (perm)	405	1900	1303	1172	1749		662	1788		756	1806	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	80	10	97	302	114	28	255	16	104	441	91
RTOR Reduction (vph)	0	0	6	0	16	0	0	3	0	0	9	0
Lane Group Flow (vph)	125	80	4	97	400	0	28	268	0	104	523	0
Confl. Peds. (#/hr)	23		34	34		23	39		44	44		39
Heavy Vehicles (%)	0%	0%	11%	3%	3%	0%	0%	5%	0%	1%	1%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.6	33.6	33.6	23.7	23.7		25.8	25.8		34.4	34.4	
Effective Green, g (s)	33.6	35.6	35.6	25.7	25.7		27.8	27.8		34.4	36.4	
Actuated g/C Ratio	0.42	0.45	0.45	0.32	0.32		0.35	0.35		0.43	0.45	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	285	845	579	376	561		230	621		391	821	
v/s Ratio Prot	c0.04	0.04			c0.23			0.15		0.02	c0.29	
v/s Ratio Perm	0.15		0.00	0.08			0.04			0.10		
v/c Ratio	0.44	0.09	0.01	0.26	0.71		0.12	0.43		0.27	0.64	
Uniform Delay, d1	16.2	12.9	12.4	20.1	23.9		17.8	20.0		14.3	16.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.2	0.0	1.7	7.5		1.1	2.2		0.4	3.8	
Delay (s)	17.3	13.1	12.4	21.7	31.4		18.9	22.2		14.7	20.5	
Level of Service	B	B	B	C	C		B	C		B	C	
Approach Delay (s)		15.5			29.6			21.9			19.5	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	136	31	14	393	76	34	35	11	55	27	47
Future Volume (vph)	15	136	31	14	393	76	34	35	11	55	27	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.6	3.6	3.5
Storage Length (m)	0.0		0.0	0.0		15.0	25.0		0.0	0.0		30.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.977				0.850		0.981				0.850
Flt Protected		0.996			0.998			0.979			0.967	
Satd. Flow (prot)	0	1849	0	0	1860	1599	0	1825	0	0	1837	1566
Flt Permitted		0.996			0.998			0.979			0.967	
Satd. Flow (perm)	0	1849	0	0	1860	1599	0	1825	0	0	1837	1566
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		65.5			60.2			50.9			58.4	
Travel Time (s)		5.9			5.4			3.7			4.2	
Confl. Peds. (#/hr)	21		20	20		21	13		34	34		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	16	148	34	15	427	83	37	38	12	60	29	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	198	0	0	442	83	0	87	0	0	89	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01
Sign Control		Stop			Stop			Stop			Stop	

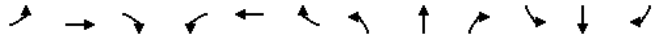
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	136	31	14	393	76	34	35	11	55	27	47
Future Volume (vph)	15	136	31	14	393	76	34	35	11	55	27	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	148	34	15	427	83	37	38	12	60	29	51

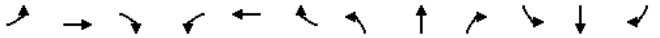
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	198	442	83	87	89	51
Volume Left (vph)	16	15	0	37	60	0
Volume Right (vph)	34	0	83	12	0	51
Hadj (s)	-0.09	0.05	-0.68	0.00	0.34	-0.67
Departure Headway (s)	5.9	5.6	4.8	6.7	6.9	5.9
Degree Utilization, x	0.32	0.68	0.11	0.16	0.17	0.08
Capacity (veh/h)	580	634	722	478	473	548
Control Delay (s)	11.6	18.4	7.2	11.0	10.1	8.2
Approach Delay (s)	11.6	16.7		11.0	9.4	
Approach LOS	B	C		B	A	

Intersection Summary				
Delay		14.0		
Level of Service		B		
Intersection Capacity Utilization	49.5%	ICU Level of Service	A	
Analysis Period (min)		15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	165	38	15	442	0	32	0	14	0	3	5
Future Volume (vph)	0	165	38	15	442	0	32	0	14	0	3	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.975						0.959			0.916	
Flt Protected					0.998			0.966				
Satd. Flow (prot)	0	1842	0	0	1860	0	0	1760	0	0	1740	0
Flt Permitted					0.998			0.966				
Satd. Flow (perm)	0	1842	0	0	1860	0	0	1760	0	0	1740	0
Link Speed (k/h)		50			40			50			50	
Link Distance (m)		60.2			118.8			76.6			56.2	
Travel Time (s)		4.3			10.7			5.5			4.0	
Confl. Peds. (#/hr)	13		12	12		13	9		3	3		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	179	41	16	480	0	35	0	15	0	3	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	220	0	0	496	0	0	50	0	0	8	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	51.8%	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)	0	165	38	15	442	0	32	0	14	0	3	5
Future Volume (Veh/h)	0	165	38	15	442	0	32	0	14	0	3	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	179	41	16	480	0	35	0	15	0	3	5
Pedestrians		9			3			12			13	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	493			232			739	736	214	742	757	502
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	493			232			739	736	214	742	757	502
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			89	100	98	100	99	99
cM capacity (veh/h)	1068			1333			316	337	819	315	328	562

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	220	496	50	8
Volume Left	0	16	35	0
Volume Right	41	0	15	5
cSH	1700	1333	387	443
Volume to Capacity	0.13	0.01	0.13	0.02
Queue Length 95th (m)	0.0	0.3	3.3	0.4
Control Delay (s)	0.0	0.4	15.7	13.3
Lane LOS		A	C	B
Approach Delay (s)	0.0	0.4	15.7	13.3
Approach LOS			C	B

Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	51.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	117	60	209	7	25	476
Future Volume (vph)	117	60	209	7	25	476
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.954		0.995			
Flt Protected	0.968					0.998
Satd. Flow (prot)	1732	0	1787	0	0	1861
Flt Permitted	0.968					0.998
Satd. Flow (perm)	1732	0	1787	0	0	1861
Link Speed (k/h)	50		50			50
Link Distance (m)	65.8		60.2			116.4
Travel Time (s)	4.7		4.3			8.4
Confl. Peds. (#/hr)	44			64	64	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	6%	0%	0%	2%
Adj. Flow (vph)	127	65	227	8	27	517
Shared Lane Traffic (%)						
Lane Group Flow (vph)	192	0	235	0	0	544
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.3			3.3
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

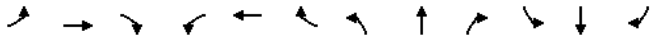
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	117	60	209	7	25	476
Future Volume (Veh/h)	117	60	209	7	25	476
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)	127	65	227	8	27	517
Pedestrians	64		44			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.1		1.1			
Percent Blockage	6		4			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						116
pX, platoon unblocked	0.78					
vC, conflicting volume	910	295			299	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	740	295			299	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	52	91			98	
cM capacity (veh/h)	264	706			1200	

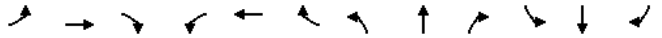
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	192	235	544
Volume Left	127	0	27
Volume Right	65	8	0
cSH	335	1700	1200
Volume to Capacity	0.57	0.14	0.02
Queue Length 95th (m)	25.8	0.0	0.5
Control Delay (s)	29.3	0.0	0.6
Lane LOS	D		A
Approach Delay (s)	29.3	0.0	0.6
Approach LOS	D		

Intersection Summary			
Average Delay		6.2	
Intersection Capacity Utilization		59.7%	ICU Level of Service B
Analysis Period (min)		15	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	7	17	15	145	27	20	45	11	9	42	13
Future Volume (vph)	9	7	17	15	145	27	20	45	11	9	42	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.932			0.981			0.980			0.973	
Flt Protected		0.986			0.996			0.987			0.993	
Satd. Flow (prot)	0	1746	0	0	1856	0	0	1814	0	0	1836	0
Flt Permitted		0.986			0.996			0.987			0.993	
Satd. Flow (perm)	0	1746	0	0	1856	0	0	1814	0	0	1836	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		65.8			64.6			101.9			63.3	
Travel Time (s)		4.7			4.7			7.3			4.6	
Confl. Peds. (#/hr)	9		6	6		9	23		14	14		23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
Adj. Flow (vph)	10	8	18	16	158	29	22	49	12	10	46	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	203	0	0	83	0	0	70	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

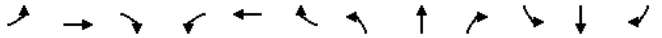
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	27.8%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	7	17	15	145	27	20	45	11	9	42	13
Future Volume (vph)	9	7	17	15	145	27	20	45	11	9	42	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	8	18	16	158	29	22	49	12	10	46	14

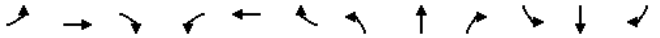
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	36	203	83	70
Volume Left (vph)	10	16	22	10
Volume Right (vph)	18	29	12	14
Hadj (s)	-0.24	-0.07	-0.01	-0.09
Departure Headway (s)	4.2	4.2	4.5	4.4
Degree Utilization, x	0.04	0.24	0.10	0.09
Capacity (veh/h)	806	814	752	755
Control Delay (s)	7.4	8.5	8.0	7.9
Approach Delay (s)	7.4	8.5	8.0	7.9
Approach LOS	A	A	A	A

Intersection Summary					
Delay			8.2		
Level of Service			A		
Intersection Capacity Utilization			27.8%	ICU Level of Service	A
Analysis Period (min)			15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	16	8	13	145	14	27	33	4	9	46	9
Future Volume (vph)	1	16	8	13	145	14	27	33	4	9	46	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.955			0.989			0.992			0.981	
Flt Protected		0.998			0.996			0.979			0.993	
Satd. Flow (prot)	0	1811	0	0	1872	0	0	1815	0	0	1763	0
Flt Permitted		0.998			0.996			0.979			0.993	
Satd. Flow (perm)	0	1811	0	0	1872	0	0	1815	0	0	1763	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.6			98.7			82.9			36.7	
Travel Time (s)		4.7			7.1			6.0			2.6	
Confl. Peds. (#/hr)	4		3	3		4	11		14	14		11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	7%	0%
Adj. Flow (vph)	1	17	9	14	158	15	29	36	4	10	50	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	187	0	0	69	0	0	70	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	30.4%		ICU Level of Service	A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	16	8	13	145	14	27	33	4	9	46	9
Future Volume (vph)	1	16	8	13	145	14	27	33	4	9	46	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	17	9	14	158	15	29	36	4	10	50	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	27	187	69	70
Volume Left (vph)	1	14	29	10
Volume Right (vph)	9	15	4	10
Hadj (s)	-0.19	-0.03	0.08	0.03
Departure Headway (s)	4.2	4.2	4.5	4.5
Degree Utilization, x	0.03	0.22	0.09	0.09
Capacity (veh/h)	808	826	749	752
Control Delay (s)	7.4	8.4	8.0	7.9
Approach Delay (s)	7.4	8.4	8.0	7.9
Approach LOS	A	A	A	A

Intersection Summary				
Delay			8.1	
Level of Service			A	
Intersection Capacity Utilization			30.4%	ICU Level of Service
Analysis Period (min)			15	



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	80	0	0	72
Future Volume (vph)	0	0	80	0	0	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	39.5		63.3			50.9
Travel Time (s)	2.8		4.6			3.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	87	0	0	78
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	87	0	0	78
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	7.5%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	80	0	0	72
Future Volume (Veh/h)	0	0	80	0	0	72
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	0	87	0	0	78
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	165	87			87	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	165	87			87	
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	100			100	
cM capacity (veh/h)	826	971			1509	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	87	78
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1509
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		7.5%	ICU Level of Service A
Analysis Period (min)		15	



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	48	56	0
Future Volume (vph)	0	0	0	48	56	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	45.1			36.7	76.6	
Travel Time (s)	3.2			2.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	52	61	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	52	61	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	6.7%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	48	56	0
Future Volume (Veh/h)	0	0	0	48	56	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	0	0	52	61	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	113	61	61			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	113	61	61			
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	100	100			
cM capacity (veh/h)	884	1004	1542			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	52	61
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1542	1700
Volume to Capacity	0.00	0.00	0.04
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		6.7%	ICU Level of Service	A
Analysis Period (min)		15		

Appendix D

ITE Trip Reduction Worksheet & TTS Data

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	535-551 Brant Street	**Organization:**	PTSL
Project Location:	Burlington	**Performed By:**	
Scenario Description:		**Date:**	Nov-22
Analysis Year:		**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	4,015	sq.ft	16	10	6
Restaurant				0		
Cinema/Entertainment				0		
Residential	220,222	302	Units	87	23	64
Hotel				0		
All Other Land Uses[2]				0		
Total				103	33	70

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	103	33	70
Internal Capture Percentage	2%	3%	1%
External Vehicle-Trips[3]	101	32	69
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	10%	0%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	0%	2%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	535-551 Brant Street
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	10	10	1.00	6	6
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	23	23	1.00	64	64
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	2		1	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	1	13	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	1		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	2	0	0		0
Hotel	0	0	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	1	9	10	9	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	23	23	23	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	0	6	6	6	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	63	64	63	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	535-551 Brant Street	**Organization:**	PTSL
Project Location:	Burlington	**Performed By:**	MM
Scenario Description:		**Date:**	Nov-22
Analysis Year:		**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	4,015	sq.ft	42	21	21
Restaurant				0		
Cinema/Entertainment				0		
Residential	220,222	302	Units	104	64	40
Hotel				0		
All Other Land Uses[2]				0		
Total				146	85	61

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					0	
Restaurant						
Cinema/Entertainment						
Residential		0				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	5	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	2	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	146	85	61
Internal Capture Percentage	10%	8%	11%
External Vehicle-Trips[3]	132	78	54
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	10%	24%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	8%	5%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	535-551 Brant Street
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	21	21	1.00	21	21
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	64	64	1.00	40	40
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		6	1	5	1
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	17	8	0		1
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	0	0	3	0
Retail	0		0	0	29	0
Restaurant	0	11		0	10	0
Cinema/Entertainment	0	1	0		3	0
Residential	0	2	0	0		0
Hotel	0	0	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	2	19	21	19	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	5	59	64	59	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	5	16	21	16	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	2	38	40	38	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

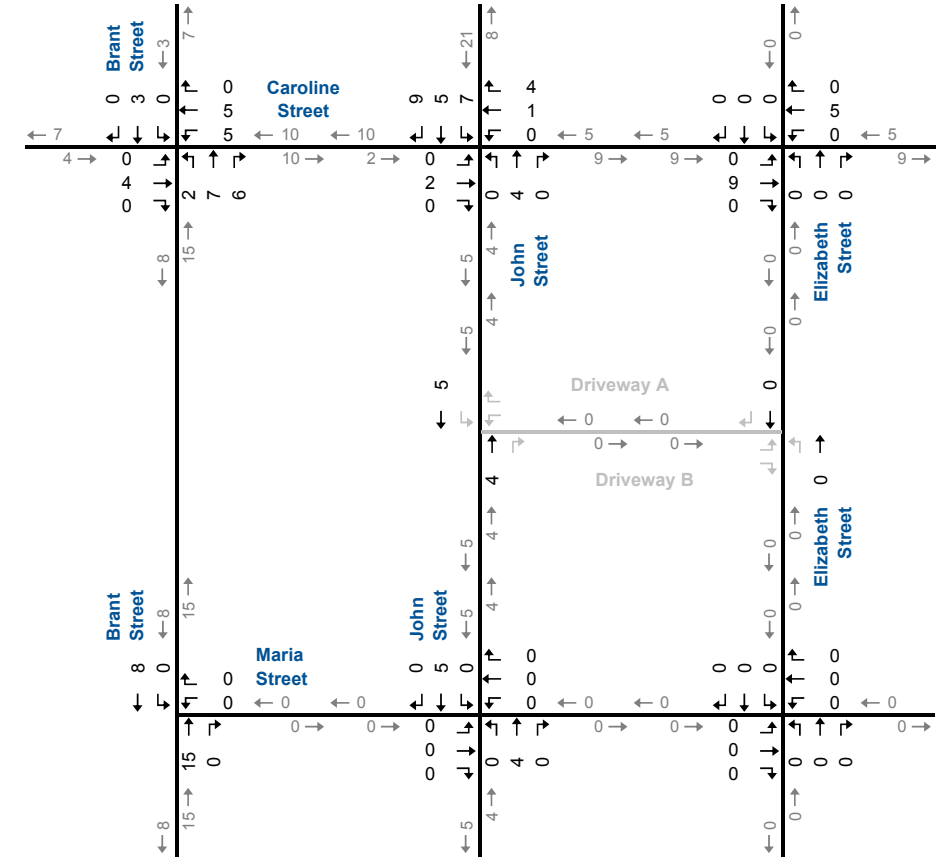
[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

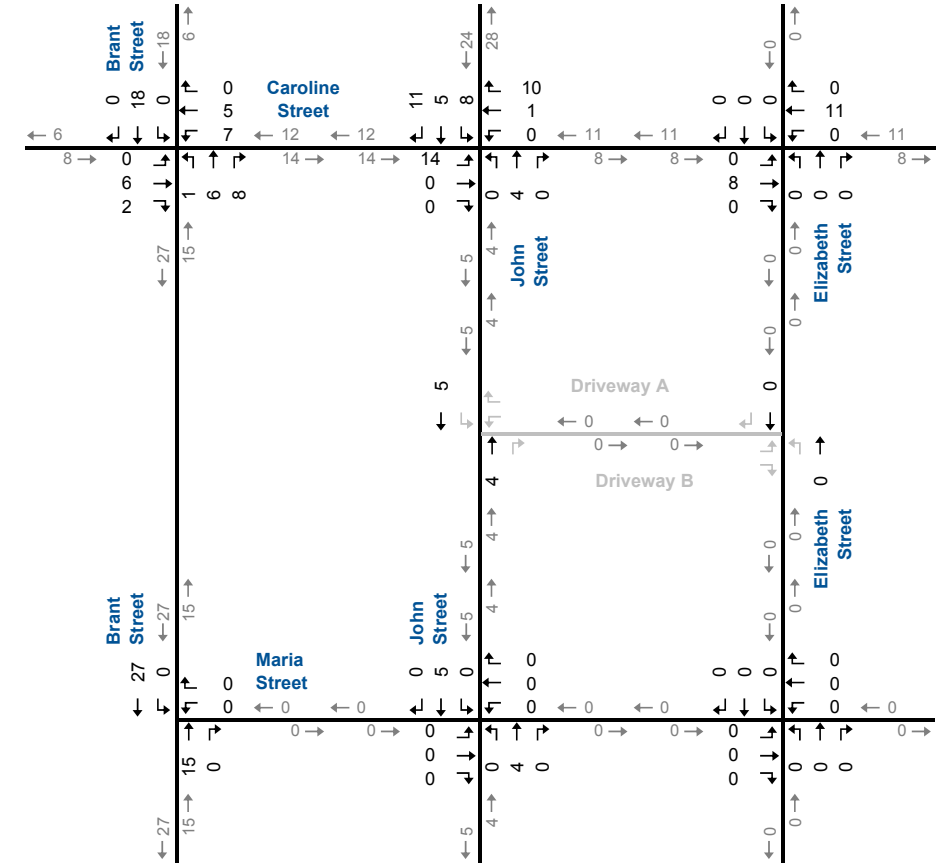
Appendix E

In-Stream Development Traffic Projections

AM Peak Hour



PM Peak Hour



Appendix F

Background Traffic Operations Reports

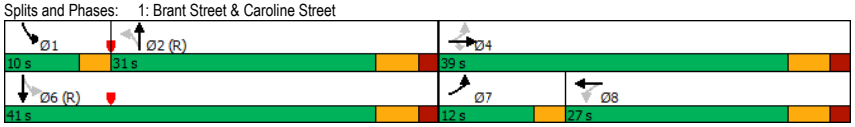
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	80	24	23	68	75	14	267	25	78	296	43
Future Volume (vph)	112	80	24	23	68	75	14	267	25	78	296	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	40.0		10.0	20.0		0.0	25.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96		0.90	0.93	0.96		0.94	0.99		0.97	0.98	
Frt			0.850		0.921			0.987			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1711	1881	1597	1745	1622	0	1601	1742	0	1694	1684	0
Flt Permitted	0.556			0.701			0.542			0.368		
Satd. Flow (perm)	962	1881	1440	1196	1622	0	858	1742	0	637	1684	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82		70			6			12	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		107.3			65.5			116.4			84.2	
Travel Time (s)		9.7			5.9			8.4			6.1	
Confl. Peds. (#/hr)	25		36	36		25	58		34	34		58
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	0%	0%	0%	7%	9%	7%	6%	3%	10%	2%
Adj. Flow (vph)	122	87	26	25	74	82	15	290	27	85	322	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	122	87	26	25	156	0	15	317	0	85	369	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	8.0	8.0		8.0	8.0		6.0	8.0	
Minimum Split (s)	10.0	25.0	25.0	25.0	25.0		30.0	30.0		10.0	30.0	
Total Split (s)	12.0	39.0	39.0	27.0	27.0		31.0	31.0		10.0	41.0	
Total Split (%)	15.0%	48.8%	48.8%	33.8%	33.8%		38.8%	38.8%		12.5%	51.3%	
Maximum Green (s)	9.0	33.0	33.0	21.0	21.0		25.0	25.0		7.0	35.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		2.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		0.0	-2.0	
Total Lost Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max	Max	Max	Max		C-Max	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0	10.0	10.0		15.0	15.0			15.0	
Flash Dont Walk (s)		8.0	8.0	8.0	8.0		8.0	8.0			8.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	36.0	35.0	35.0	25.7	25.7		29.0	29.0		38.0	37.0	
Actuated g/C Ratio	0.45	0.44	0.44	0.32	0.32		0.36	0.36		0.48	0.46	
v/c Ratio	0.24	0.11	0.04	0.07	0.27		0.05	0.50		0.22	0.47	
Control Delay	14.4	13.8	0.1	21.4	14.0		18.6	23.7		13.1	16.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.4	13.8	0.1	21.4	14.0		18.6	23.7		13.1	16.7	
LOS	B	B	A	C	B		B	C		B	B	
Approach Delay		12.6			15.1			23.5			16.0	
Approach LOS		B			B			C			B	
Queue Length 50th (m)	10.6	7.5	0.0	2.7	9.7		1.5	37.7		6.8	35.5	
Queue Length 95th (m)	20.2	15.5	0.0	8.3	24.1		5.5	61.5		14.2	57.7	
Internal Link Dist (m)		83.3			41.5			92.4			60.2	
Turn Bay Length (m)	40.0		10.0	20.0			25.0			20.0		
Base Capacity (vph)	517	822	676	384	568		311	635		395	785	
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	0.24	0.11	0.04	0.07	0.27		0.05	0.50		0.22	0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 54 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 17.3		Intersection LOS: B	

Intersection Capacity Utilization 60.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Brant Street & Caroline Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	122	87	26	25	156	15	317	85	369
v/c Ratio	0.24	0.11	0.04	0.07	0.27	0.05	0.50	0.22	0.47
Control Delay	14.4	13.8	0.1	21.4	14.0	18.6	23.7	13.1	16.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	13.8	0.1	21.4	14.0	18.6	23.7	13.1	16.7
Queue Length 50th (m)	10.6	7.5	0.0	2.7	9.7	1.5	37.7	6.8	35.5
Queue Length 95th (m)	20.2	15.5	0.0	8.3	24.1	5.5	61.5	14.2	57.7
Internal Link Dist (m)		83.3			41.5		92.4		60.2
Turn Bay Length (m)	40.0		10.0	20.0		25.0		20.0	
Base Capacity (vph)	517	822	676	384	568	311	635	395	785
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	0.24	0.11	0.04	0.07	0.27	0.05	0.50	0.22	0.47

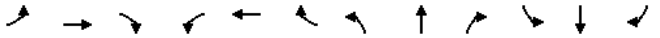
Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	80	24	23	68	75	14	267	25	78	296	43
Future Volume (vph)	112	80	24	23	68	75	14	267	25	78	296	43
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.90	1.00	0.96		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	0.98	1.00	1.00	0.93	1.00		0.94	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1675	1881	1440	1621	1622		1504	1743		1677	1684	
Flt Permitted	0.56	1.00	1.00	0.70	1.00		0.54	1.00		0.37	1.00	
Satd. Flow (perm)	979	1881	1440	1195	1622		858	1743		649	1684	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	122	87	26	25	74	82	15	290	27	85	322	47
RTOR Reduction (vph)	0	0	14	0	48	0	0	4	0	0	7	0
Lane Group Flow (vph)	122	87	12	25	108	0	15	313	0	85	362	0
Confl. Peds. (#/hr)	25		36	36		25	58		34	34		58
Heavy Vehicles (%)	2%	1%	0%	0%	0%	7%	9%	7%	6%	3%	10%	2%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.6	33.6	33.6	23.7	23.7		25.8	25.8		34.4	34.4	
Effective Green, g (s)	33.6	35.6	35.6	25.7	25.7		27.8	27.8		34.4	36.4	
Actuated g/C Ratio	0.42	0.45	0.45	0.32	0.32		0.35	0.35		0.43	0.45	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	471	837	640	383	521		298	605		351	766	
v/s Ratio Prot	c0.02	0.05			0.07			c0.18		0.02	c0.22	
v/s Ratio Perm	c0.09		0.01	0.02			0.02			0.09		
v/c Ratio	0.26	0.10	0.02	0.07	0.21		0.05	0.52		0.24	0.47	
Uniform Delay, d1	14.6	12.9	12.4	18.8	19.7		17.3	20.8		14.4	15.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.1	0.3	0.9		0.3	3.1		0.4	2.1	
Delay (s)	14.9	13.2	12.5	19.2	20.7		17.7	23.9		14.8	17.2	
Level of Service	B	B	B	B	C		B	C		B	B	
Approach Delay (s)		14.0			20.4			23.6			16.8	
Approach LOS		B			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.39			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	60.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	137	32	6	141	70	12	25	5	42	23	33
Future Volume (vph)	21	137	32	6	141	70	12	25	5	42	23	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.6	3.6	3.5
Storage Length (m)	0.0		0.0	0.0		15.0	25.0		0.0	0.0		30.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.977				0.850		0.985				0.850
Flt Protected		0.994			0.998			0.986			0.969	
Satd. Flow (prot)	0	1779	0	0	1826	1615	0	1799	0	0	1737	1597
Flt Permitted		0.994			0.998			0.986			0.969	
Satd. Flow (perm)	0	1779	0	0	1826	1615	0	1799	0	0	1737	1597
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		65.5			60.2			50.9			58.4	
Travel Time (s)		5.9			5.4			3.7			4.2	
Confl. Peds. (#/hr)	19		15	15		19	23		25	25		23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	2%	7%	0%	4%	0%	9%	0%	0%	6%	6%	0%
Adj. Flow (vph)	23	149	35	7	153	76	13	27	5	46	25	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	207	0	0	160	76	0	45	0	0	71	36
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01
Sign Control		Stop			Stop			Stop			Stop	

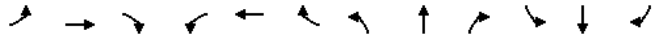
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	21	137	32	6	141	70	12	25	5	42	23	33
Future Volume (vph)	21	137	32	6	141	70	12	25	5	42	23	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	149	35	7	153	76	13	27	5	46	25	36

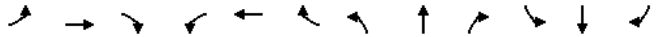
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	207	160	76	45	71	36
Volume Left (vph)	23	7	0	13	46	0
Volume Right (vph)	35	0	76	5	0	36
Hadj (s)	-0.02	0.09	-0.70	0.04	0.43	-0.70
Departure Headway (s)	5.2	5.2	4.4	5.8	6.1	5.0
Degree Utilization, x	0.30	0.23	0.09	0.07	0.12	0.05
Capacity (veh/h)	663	660	774	570	549	666
Control Delay (s)	10.4	8.6	6.7	9.3	8.7	7.0
Approach Delay (s)	10.4	8.0		9.3	8.1	
Approach LOS	B	A		A	A	

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	43.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	153	16	2	214	0	15	0	3	0	0	5
Future Volume (vph)	0	153	16	2	214	0	15	0	3	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987						0.979			0.865	
Flt Protected								0.960				
Satd. Flow (prot)	0	1814	0	0	1863	0	0	1597	0	0	1370	0
Flt Permitted								0.960				
Satd. Flow (perm)	0	1814	0	0	1863	0	0	1597	0	0	1370	0
Link Speed (k/h)		50			40			50			50	
Link Distance (m)		60.2			118.8			76.6			56.2	
Travel Time (s)		4.3			10.7			5.5			4.0	
Confl. Peds. (#/hr)	13		12	12		13	6		7	7		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	7%	0%	2%	0%	14%	0%	0%	0%	0%	20%
Adj. Flow (vph)	0	166	17	2	233	0	16	0	3	0	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	183	0	0	235	0	0	19	0	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

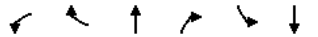
Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	28.6%	ICU Level of Service A		
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	153	16	2	214	0	15	0	3	0	0	5
Future Volume (Veh/h)	0	153	16	2	214	0	15	0	3	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	166	17	2	233	0	16	0	3	0	0	5
Pedestrians		6			7			12			13	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	246			195			434	436	194	434	445	252
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	246			195			434	436	194	434	445	252
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.4
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.5
p0 queue free %	100			100			97	100	100	100	100	99
cM capacity (veh/h)	1316			1375			491	504	838	514	499	732

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	183	235	19	5
Volume Left	0	2	16	0
Volume Right	17	0	3	5
cSH	1700	1375	525	732
Volume to Capacity	0.11	0.00	0.04	0.01
Queue Length 95th (m)	0.0	0.0	0.9	0.2
Control Delay (s)	0.0	0.1	12.1	10.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	0.1	12.1	10.0
Approach LOS			B	A

Intersection Summary												
Average Delay			0.7									
Intersection Capacity Utilization			28.6%		ICU Level of Service				A			
Analysis Period (min)			15									



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	20	286	9	19	319
Future Volume (vph)	14	20	286	9	19	319
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.920		0.996			
Flt Protected	0.980					0.997
Satd. Flow (prot)	1613	0	1767	0	0	1746
Flt Permitted	0.980					0.997
Satd. Flow (perm)	1613	0	1767	0	0	1746
Link Speed (k/h)	50		50			50
Link Distance (m)	65.8		60.2			116.4
Travel Time (s)	4.7		4.3			8.4
Confl. Peds. (#/hr)	37	1		55	55	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	5%	7%	11%	0%	9%
Adj. Flow (vph)	15	22	311	10	21	347
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	0	321	0	0	368
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.3			3.3
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization	42.7%			ICU Level of Service A		
Analysis Period (min)	15					

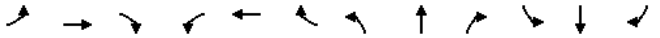
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	14	20	286	9	19	319
Future Volume (Veh/h)	14	20	286	9	19	319
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	22	311	10	21	347
Pedestrians	55		37			1
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	5		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						116
pX, platoon unblocked	0.87					
vC, conflicting volume	797	372			376	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	693	372			376	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	95	97			98	
cM capacity (veh/h)	314	633			1134	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	37	321	368
Volume Left	15	0	21
Volume Right	22	10	0
cSH	449	1700	1134
Volume to Capacity	0.08	0.19	0.02
Queue Length 95th (m)	2.0	0.0	0.4
Control Delay (s)	13.7	0.0	0.7
Lane LOS	B		A
Approach Delay (s)	13.7	0.0	0.7
Approach LOS	B		

Intersection Summary			
Average Delay		1.0	
Intersection Capacity Utilization		42.7%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	7	14	4	16	8	9	22	5	9	51	8
Future Volume (vph)	9	7	14	4	16	8	9	22	5	9	51	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.939			0.959			0.983			0.984	
Flt Protected		0.985			0.993			0.987			0.993	
Satd. Flow (prot)	0	1647	0	0	1634	0	0	1843	0	0	1803	0
Flt Permitted		0.985			0.993			0.987			0.993	
Satd. Flow (perm)	0	1647	0	0	1634	0	0	1843	0	0	1803	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		65.8			64.6			101.9			63.3	
Travel Time (s)		4.7			4.7			7.3			4.6	
Confl. Peds. (#/hr)	7		10	10		7	16		10	10		16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	14%	0%	25%	13%	0%	0%	0%	0%	11%	2%	0%
Adj. Flow (vph)	10	8	15	4	17	9	10	24	5	10	55	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	33	0	0	30	0	0	39	0	0	74	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

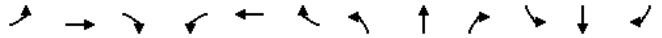
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	21.2%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	7	14	4	16	8	9	22	5	9	51	8
Future Volume (vph)	9	7	14	4	16	8	9	22	5	9	51	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	8	15	4	17	9	10	24	5	10	55	9

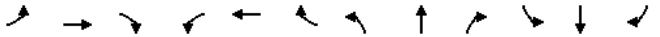
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	33	30	39	74
Volume Left (vph)	10	4	10	10
Volume Right (vph)	15	9	5	9
Hadj (s)	-0.10	0.03	-0.03	0.00
Departure Headway (s)	4.1	4.2	4.1	4.1
Degree Utilization, x	0.04	0.04	0.04	0.08
Capacity (veh/h)	854	829	854	864
Control Delay (s)	7.2	7.4	7.3	7.5
Approach Delay (s)	7.2	7.4	7.3	7.5
Approach LOS	A	A	A	A

Intersection Summary					
Delay			7.4		
Level of Service			A		
Intersection Capacity Utilization			21.2%	ICU Level of Service	A
Analysis Period (min)			15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	7	7	12	19	2	13	20	2	4	22	2
Future Volume (vph)	2	7	7	12	19	2	13	20	2	4	22	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.940			0.992			0.993			0.991	
Flt Protected		0.994			0.982			0.982			0.993	
Satd. Flow (prot)	0	1573	0	0	1734	0	0	1490	0	0	1870	0
Flt Permitted		0.994			0.982			0.982			0.993	
Satd. Flow (perm)	0	1573	0	0	1734	0	0	1490	0	0	1870	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.6			98.7			82.9			36.7	
Travel Time (s)		4.7			7.1			6.0			2.6	
Confl. Peds. (#/hr)	8		18	18		8	2		20	20		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	0%	9%	6%	0%	33%	21%	0%	0%	0%	0%
Adj. Flow (vph)	2	8	8	13	21	2	14	22	2	4	24	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	18	0	0	36	0	0	38	0	0	30	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	7	7	12	19	2	13	20	2	4	22	2
Future Volume (vph)	2	7	7	12	19	2	13	20	2	4	22	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	8	8	13	21	2	14	22	2	4	24	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	18	36	38	30
Volume Left (vph)	2	13	14	4
Volume Right (vph)	8	2	2	2
Hadj (s)	-0.03	0.15	0.46	-0.01
Departure Headway (s)	4.1	4.2	4.5	4.0
Degree Utilization, x	0.02	0.04	0.05	0.03
Capacity (veh/h)	864	834	778	872
Control Delay (s)	7.2	7.4	7.7	7.2
Approach Delay (s)	7.2	7.4	7.7	7.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay			7.4	
Level of Service			A	
Intersection Capacity Utilization			23.1%	ICU Level of Service
Analysis Period (min)			15	



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	42	0	0	61
Future Volume (vph)	0	0	42	0	0	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	39.5		63.3			50.9
Travel Time (s)	2.8		4.6			3.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	46	0	0	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	46	0	0	66
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

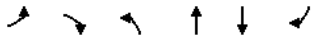
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	6.7%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	42	0	0	61
Future Volume (Veh/h)	0	0	42	0	0	61
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	0	46	0	0	66
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	112	46			46	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	112	46			46	
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	100			100	
cM capacity (veh/h)	885	1023			1562	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	46	66
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1562
Volume to Capacity	0.00	0.03	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	6.7%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	18	18	0
Future Volume (vph)	0	0	0	18	18	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	45.1			36.7	76.6	
Travel Time (s)	3.2			2.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	20	20	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	20	20	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	18	18	0
Future Volume (Veh/h)	0	0	0	18	18	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	0	0	20	20	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	40	20	20			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	40	20	20			
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	100	100			
cM capacity (veh/h)	972	1058	1596			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	20	20
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1596	1700
Volume to Capacity	0.00	0.00	0.01
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	6.7%	ICU Level of Service		A
Analysis Period (min)	15			

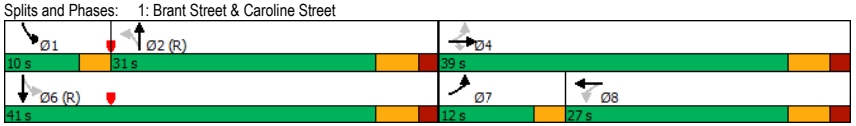
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	84	11	101	297	110	28	253	24	101	445	88
Future Volume (vph)	121	84	11	101	297	110	28	253	24	101	445	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	40.0		10.0	20.0		0.0	25.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.91	0.93	0.98		0.97	0.99		0.96	0.99	
Frt			0.850		0.959			0.987			0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1745	1900	1439	1694	1749	0	1745	1779	0	1728	1808	0
Flt Permitted	0.187			0.698			0.316			0.387		
Satd. Flow (perm)	339	1900	1303	1162	1749	0	565	1779	0	676	1808	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82		23			6			17	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		107.3			65.5			116.4			84.2	
Travel Time (s)		9.7			5.9			8.4			6.1	
Confl. Peds. (#/hr)	23		34	34		23	39		44	44		39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	11%	3%	3%	0%	0%	5%	0%	1%	1%	1%
Adj. Flow (vph)	132	91	12	110	323	120	30	275	26	110	484	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	132	91	12	110	443	0	30	301	0	110	580	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	8.0	8.0		8.0	8.0		6.0	8.0	
Minimum Split (s)	10.0	25.0	25.0	25.0	25.0		30.0	30.0		10.0	30.0	
Total Split (s)	12.0	39.0	39.0	27.0	27.0		31.0	31.0		10.0	41.0	
Total Split (%)	15.0%	48.8%	48.8%	33.8%	33.8%		38.8%	38.8%		12.5%	51.3%	
Maximum Green (s)	9.0	33.0	33.0	21.0	21.0		25.0	25.0		7.0	35.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		2.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		0.0	-2.0	
Total Lost Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max	Max	Max	Max		C-Max	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0	10.0	10.0		15.0	15.0			15.0	
Flash Dont Walk (s)		8.0	8.0	8.0	8.0		8.0	8.0			8.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	36.0	35.0	35.0	25.6	25.6		29.0	29.0		38.0	37.0	
Actuated g/C Ratio	0.45	0.44	0.44	0.32	0.32		0.36	0.36		0.48	0.46	
v/c Ratio	0.44	0.11	0.02	0.30	0.77		0.15	0.46		0.27	0.69	
Control Delay	18.2	13.8	0.1	24.9	35.6		21.0	23.0		13.6	21.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.2	13.8	0.1	24.9	35.6		21.0	23.0		13.6	21.6	
LOS	B	B	A	C	D		C	C		B	C	
Approach Delay		15.6			33.5			22.8			20.3	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	11.5	7.9	0.0	13.1	60.2		3.2	35.1		8.9	64.5	
Queue Length 95th (m)	21.6	16.0	0.0	26.5	#109.8		9.4	57.6		17.5	100.1	
Internal Link Dist (m)		83.3			41.5			92.4			60.2	
Turn Bay Length (m)	40.0		10.0	20.0			25.0			20.0		
Base Capacity (vph)	310	831	616	372	575		204	648		413	845	
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	0.43	0.11	0.02	0.30	0.77		0.15	0.46		0.27	0.69	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 54 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 24.2		Intersection LOS: C	

Intersection Capacity Utilization 78.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brant Street & Caroline Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	132	91	12	110	443	30	301	110	580
v/c Ratio	0.44	0.11	0.02	0.30	0.77	0.15	0.46	0.27	0.69
Control Delay	18.2	13.8	0.1	24.9	35.6	21.0	23.0	13.6	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	13.8	0.1	24.9	35.6	21.0	23.0	13.6	21.6
Queue Length 50th (m)	11.5	7.9	0.0	13.1	60.2	3.2	35.1	8.9	64.5
Queue Length 95th (m)	21.6	16.0	0.0	26.5	#109.8	9.4	57.6	17.5	100.1
Internal Link Dist (m)		83.3			41.5		92.4		60.2
Turn Bay Length (m)	40.0		10.0	20.0		25.0		20.0	
Base Capacity (vph)	310	831	616	372	575	204	648	413	845
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	0.43	0.11	0.02	0.30	0.77	0.15	0.46	0.27	0.69

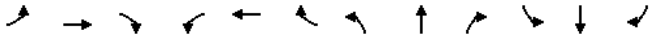
Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	84	11	101	297	110	28	253	24	101	445	88
Future Volume (vph)	121	84	11	101	297	110	28	253	24	101	445	88
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.91	1.00	0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.93	1.00		0.98	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1741	1900	1303	1581	1750		1701	1779		1703	1808	
Flt Permitted	0.19	1.00	1.00	0.70	1.00		0.32	1.00		0.39	1.00	
Satd. Flow (perm)	343	1900	1303	1162	1750		565	1779		693	1808	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	91	12	110	323	120	30	275	26	110	484	96
RTOR Reduction (vph)	0	0	7	0	16	0	0	4	0	0	9	0
Lane Group Flow (vph)	132	91	5	110	427	0	30	297	0	110	571	0
Confl. Peds. (#/hr)	23		34	34		23	39		44	44		39
Heavy Vehicles (%)	0%	0%	11%	3%	3%	0%	0%	5%	0%	1%	1%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.6	33.6	33.6	23.6	23.6		25.8	25.8		34.4	34.4	
Effective Green, g (s)	33.6	35.6	35.6	25.6	25.6		27.8	27.8		34.4	36.4	
Actuated g/C Ratio	0.42	0.45	0.45	0.32	0.32		0.35	0.35		0.43	0.45	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	845	579	371	560		196	618		368	822	
v/s Ratio Prot	c0.04	0.05			c0.24			0.17		0.02	c0.32	
v/s Ratio Perm	0.16		0.00	0.09			0.05			0.11		
v/c Ratio	0.50	0.11	0.01	0.30	0.76		0.15	0.48		0.30	0.69	
Uniform Delay, d1	16.6	12.9	12.4	20.4	24.5		18.0	20.4		14.5	17.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.3	0.0	2.0	9.5		1.7	2.7		0.5	4.8	
Delay (s)	18.1	13.2	12.4	22.5	34.0		19.6	23.1		15.0	22.2	
Level of Service	B	B	B	C	C		B	C		B	C	
Approach Delay (s)		15.9			31.7			22.8			21.0	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	78.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	143	33	15	414	90	36	41	12	66	33	60
Future Volume (vph)	30	143	33	15	414	90	36	41	12	66	33	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.6	3.6	3.5
Storage Length (m)	0.0		0.0	0.0		15.0	25.0		0.0	0.0		30.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.978				0.850		0.982				0.850
Flt Protected		0.993			0.998			0.980			0.968	
Satd. Flow (prot)	0	1845	0	0	1860	1599	0	1828	0	0	1839	1566
Flt Permitted		0.993			0.998			0.980			0.968	
Satd. Flow (perm)	0	1845	0	0	1860	1599	0	1828	0	0	1839	1566
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		65.5			60.2			50.9			58.4	
Travel Time (s)		5.9			5.4			3.7			4.2	
Confl. Peds. (#/hr)	21		20	20		21	13		34	34		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	33	155	36	16	450	98	39	45	13	72	36	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	224	0	0	466	98	0	97	0	0	108	65
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01
Sign Control		Stop			Stop			Stop			Stop	

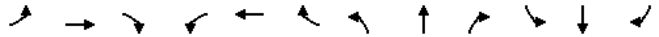
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	55.5%	ICU Level of Service B	
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	30	143	33	15	414	90	36	41	12	66	33	60
Future Volume (vph)	30	143	33	15	414	90	36	41	12	66	33	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	155	36	16	450	98	39	45	13	72	36	65

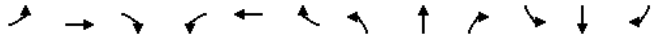
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	224	466	98	97	108	65
Volume Left (vph)	33	16	0	39	72	0
Volume Right (vph)	36	0	98	13	0	65
Hadj (s)	-0.07	0.05	-0.68	0.00	0.33	-0.67
Departure Headway (s)	6.1	5.8	5.1	7.0	7.2	6.2
Degree Utilization, x	0.38	0.75	0.14	0.19	0.22	0.11
Capacity (veh/h)	553	610	689	453	456	524
Control Delay (s)	12.9	22.9	7.7	11.6	10.9	8.7
Approach Delay (s)	12.9	20.2		11.6	10.1	
Approach LOS	B	C		B	B	

Intersection Summary				
Delay	16.2			
Level of Service	C			
Intersection Capacity Utilization	55.5%	ICU Level of Service	B	
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	181	40	16	476	0	34	0	15	0	3	5
Future Volume (vph)	0	181	40	16	476	0	34	0	15	0	3	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.976						0.959			0.916	
Flt Protected					0.998			0.966				
Satd. Flow (prot)	0	1844	0	0	1860	0	0	1760	0	0	1740	0
Flt Permitted					0.998			0.966				
Satd. Flow (perm)	0	1844	0	0	1860	0	0	1760	0	0	1740	0
Link Speed (k/h)		50			40			50			50	
Link Distance (m)		60.2			118.8			76.6			56.2	
Travel Time (s)		4.3			10.7			5.5			4.0	
Confl. Peds. (#/hr)	13		12	12		13	9		3	3		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	197	43	17	517	0	37	0	16	0	3	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	240	0	0	534	0	0	53	0	0	8	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

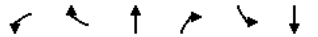
Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	54.6%	ICU Level of Service A		
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	181	40	16	476	0	34	0	15	0	3	5
Future Volume (Veh/h)	0	181	40	16	476	0	34	0	15	0	3	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	197	43	17	517	0	37	0	16	0	3	5
Pedestrians		9			3			12			13	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	530			252			797	794	234	802	816	539
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	530			252			797	794	234	802	816	539
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			87	100	98	100	99	99
cM capacity (veh/h)	1035			1311			288	311	800	286	303	536

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	240	534	53	8
Volume Left	0	17	37	0
Volume Right	43	0	16	5
cSH	1700	1311	357	416
Volume to Capacity	0.14	0.01	0.15	0.02
Queue Length 95th (m)	0.0	0.3	3.9	0.4
Control Delay (s)	0.0	0.4	16.8	13.8
Lane LOS		A	C	B
Approach Delay (s)	0.0	0.4	16.8	13.8
Approach LOS			C	B

Intersection Summary					
Average Delay			1.4		
Intersection Capacity Utilization			54.6%	ICU Level of Service	A
Analysis Period (min)			15		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	123	63	235	7	26	527
Future Volume (vph)	123	63	235	7	26	527
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.955		0.996			
Flt Protected	0.968					0.998
Satd. Flow (prot)	1733	0	1788	0	0	1861
Flt Permitted	0.968					0.998
Satd. Flow (perm)	1733	0	1788	0	0	1861
Link Speed (k/h)	50		50			50
Link Distance (m)	65.8		60.2			116.4
Travel Time (s)	4.7		4.3			8.4
Confl. Peds. (#/hr)	44			64	64	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	6%	0%	0%	2%
Adj. Flow (vph)	134	68	255	8	28	573
Shared Lane Traffic (%)						
Lane Group Flow (vph)	202	0	263	0	0	601
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.3			3.3
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

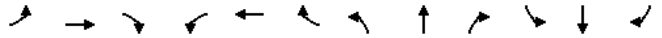
Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	63.1%		ICU Level of Service	B
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	123	63	235	7	26	527
Future Volume (Veh/h)	123	63	235	7	26	527
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)	134	68	255	8	28	573
Pedestrians	64		44			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.1		1.1			
Percent Blockage	6		4			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						116
pX, platoon unblocked	0.74					
vC, conflicting volume	996	323			327	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	814	323			327	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	41	90			98	
cM capacity (veh/h)	225	681			1172	

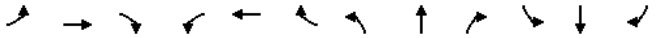
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	202	263	601
Volume Left	134	0	28
Volume Right	68	8	0
cSH	291	1700	1172
Volume to Capacity	0.69	0.15	0.02
Queue Length 95th (m)	36.3	0.0	0.6
Control Delay (s)	41.4	0.0	0.7
Lane LOS	E		A
Approach Delay (s)	41.4	0.0	0.7
Approach LOS	E		

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	7	18	16	152	28	21	51	12	9	49	14
Future Volume (vph)	9	7	18	16	152	28	21	51	12	9	49	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.929			0.981			0.981			0.974	
Flt Protected		0.987			0.996			0.988			0.994	
Satd. Flow (prot)	0	1742	0	0	1856	0	0	1819	0	0	1839	0
Flt Permitted		0.987			0.996			0.988			0.994	
Satd. Flow (perm)	0	1742	0	0	1856	0	0	1819	0	0	1839	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		65.8			64.6			101.9			63.3	
Travel Time (s)		4.7			4.7			7.3			4.6	
Confl. Peds. (#/hr)	9		6	6		9	23		14	14		23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
Adj. Flow (vph)	10	8	20	17	165	30	23	55	13	10	53	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	0	0	212	0	0	91	0	0	78	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

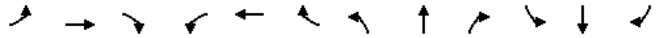
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	28.8%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	7	18	16	152	28	21	51	12	9	49	14
Future Volume (vph)	9	7	18	16	152	28	21	51	12	9	49	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	8	20	17	165	30	23	55	13	10	53	15

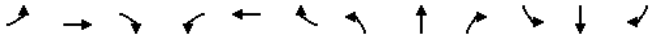
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	38	212	91	78
Volume Left (vph)	10	17	23	10
Volume Right (vph)	20	30	13	15
Hadj (s)	-0.26	-0.07	-0.01	-0.09
Departure Headway (s)	4.3	4.3	4.5	4.5
Degree Utilization, x	0.05	0.25	0.11	0.10
Capacity (veh/h)	795	803	744	747
Control Delay (s)	7.5	8.7	8.1	8.0
Approach Delay (s)	7.5	8.7	8.1	8.0
Approach LOS	A	A	A	A

Intersection Summary					
Delay			8.3		
Level of Service			A		
Intersection Capacity Utilization			28.8%	ICU Level of Service	A
Analysis Period (min)			15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	17	8	14	152	15	28	35	4	9	48	9
Future Volume (vph)	1	17	8	14	152	15	28	35	4	9	48	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.957			0.989			0.992			0.981	
Flt Protected		0.998			0.996			0.980			0.993	
Satd. Flow (prot)	0	1815	0	0	1872	0	0	1817	0	0	1762	0
Flt Permitted		0.998			0.996			0.980			0.993	
Satd. Flow (perm)	0	1815	0	0	1872	0	0	1817	0	0	1762	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.6			98.7			82.9			36.7	
Travel Time (s)		4.7			7.1			6.0			2.6	
Confl. Peds. (#/hr)	4		3	3		4	11		14	14		11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	7%	0%
Adj. Flow (vph)	1	18	9	15	165	16	30	38	4	10	52	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	28	0	0	196	0	0	72	0	0	72	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	31.7%		ICU Level of Service A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	17	8	14	152	15	28	35	4	9	48	9
Future Volume (vph)	1	17	8	14	152	15	28	35	4	9	48	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	18	9	15	165	16	30	38	4	10	52	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	28	196	72	72
Volume Left (vph)	1	15	30	10
Volume Right (vph)	9	16	4	10
Hadj (s)	-0.19	-0.03	0.08	0.03
Departure Headway (s)	4.3	4.2	4.6	4.5
Degree Utilization, x	0.03	0.23	0.09	0.09
Capacity (veh/h)	801	823	743	745
Control Delay (s)	7.4	8.5	8.0	8.0
Approach Delay (s)	7.4	8.5	8.0	8.0
Approach LOS	A	A	A	A

Intersection Summary				
Delay			8.2	
Level of Service			A	
Intersection Capacity Utilization			31.7%	ICU Level of Service
Analysis Period (min)			15	A



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	88	0	0	81
Future Volume (vph)	0	0	88	0	0	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	39.5		63.3			50.9
Travel Time (s)	2.8		4.6			3.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	96	0	0	88
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	96	0	0	88
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	8.0%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	88	0	0	81
Future Volume (Veh/h)	0	0	88	0	0	81
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	0	96	0	0	88
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	184	96			96	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	184	96			96	
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	100			100	
cM capacity (veh/h)	805	960			1498	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	96	88
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1498
Volume to Capacity	0.00	0.06	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	8.0%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	50	59	0
Future Volume (vph)	0	0	0	50	59	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	45.1			36.7	76.6	
Travel Time (s)	3.2			2.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	54	64	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	54	64	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	6.7%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	50	59	0
Future Volume (Veh/h)	0	0	0	50	59	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	0	0	54	64	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	118	64	64			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	118	64	64			
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	100	100			
cM capacity (veh/h)	878	1000	1538			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	54	64
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1538	1700
Volume to Capacity	0.00	0.00	0.04
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	6.7%	ICU Level of Service		A
Analysis Period (min)	15			

Appendix G

Total Traffic Operations Reports

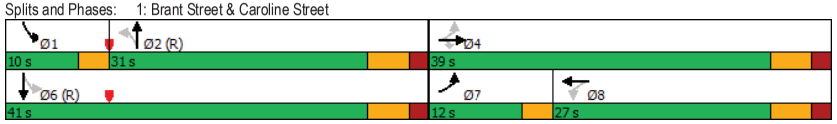
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	83	24	23	74	109	14	267	25	95	296	43
Future Volume (vph)	112	83	24	23	74	109	14	267	25	95	296	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	40.0		10.0	20.0		0.0	25.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96		0.90	0.93	0.96		0.94	0.99		0.97	0.98	
Frt			0.850		0.911			0.987			0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1711	1881	1597	1745	1588	0	1601	1742	0	1694	1684	0
Flt Permitted	0.498			0.699			0.542			0.368		
Satd. Flow (perm)	865	1881	1440	1193	1588	0	858	1742	0	637	1684	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82		93			6			12	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		107.3			65.5			116.4			84.2	
Travel Time (s)		9.7			5.9			8.4			6.1	
Confl. Peds. (#/hr)	25		36	36		25	58		34	34		58
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	0%	0%	0%	7%	9%	7%	6%	3%	10%	2%
Adj. Flow (vph)	122	90	26	25	80	118	15	290	27	103	322	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	122	90	26	25	198	0	15	317	0	103	369	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	8.0	8.0		8.0	8.0		6.0	8.0	
Minimum Split (s)	10.0	25.0	25.0	25.0	25.0		30.0	30.0		10.0	30.0	
Total Split (s)	12.0	39.0	39.0	27.0	27.0		31.0	31.0		10.0	41.0	
Total Split (%)	15.0%	48.8%	48.8%	33.8%	33.8%		38.8%	38.8%		12.5%	51.3%	
Maximum Green (s)	9.0	33.0	33.0	21.0	21.0		25.0	25.0		7.0	35.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		2.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		0.0	-2.0	
Total Lost Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max	Max	Max	Max		C-Max	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0	10.0	10.0		15.0	15.0			15.0	
Flash Dont Walk (s)		8.0	8.0	8.0	8.0		8.0	8.0			8.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	36.0	35.0	35.0	25.7	25.7		29.0	29.0		38.0	37.0	
Actuated g/C Ratio	0.45	0.44	0.44	0.32	0.32		0.36	0.36		0.48	0.46	
v/c Ratio	0.26	0.11	0.04	0.07	0.35		0.05	0.50		0.26	0.47	
Control Delay	14.6	13.8	0.1	21.4	14.1		18.6	23.8		13.6	16.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.6	13.8	0.1	21.4	14.1		18.6	23.8		13.6	16.7	
LOS	B	B	A	C	B		B	C		B	B	
Approach Delay		12.7			14.9			23.5			16.0	
Approach LOS		B			B			C			B	
Queue Length 50th (m)	10.6	7.8	0.0	2.7	12.1		1.5	37.7		8.3	35.5	
Queue Length 95th (m)	20.2	16.0	0.0	8.3	28.8		5.5	61.5		16.7	57.7	
Internal Link Dist (m)		83.3			41.5			92.4			60.2	
Turn Bay Length (m)	40.0		10.0	20.0			25.0			20.0		
Base Capacity (vph)	484	822	676	382	573		310	634		395	785	
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	0.25	0.11	0.04	0.07	0.35		0.05	0.50		0.26	0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 54 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 17.2		Intersection LOS: B	

Intersection Capacity Utilization 60.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Brant Street & Caroline Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	122	90	26	25	198	15	317	103	369
v/c Ratio	0.26	0.11	0.04	0.07	0.35	0.05	0.50	0.26	0.47
Control Delay	14.6	13.8	0.1	21.4	14.1	18.6	23.8	13.6	16.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.6	13.8	0.1	21.4	14.1	18.6	23.8	13.6	16.7
Queue Length 50th (m)	10.6	7.8	0.0	2.7	12.1	1.5	37.7	8.3	35.5
Queue Length 95th (m)	20.2	16.0	0.0	8.3	28.8	5.5	61.5	16.7	57.7
Internal Link Dist (m)		83.3			41.5		92.4		60.2
Turn Bay Length (m)	40.0		10.0	20.0		25.0		20.0	
Base Capacity (vph)	484	822	676	382	573	310	634	395	785
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	0.25	0.11	0.04	0.07	0.35	0.05	0.50	0.26	0.47

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	83	24	23	74	109	14	267	25	95	296	43
Future Volume (vph)	112	83	24	23	74	109	14	267	25	95	296	43
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.90	1.00	0.96		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	0.98	1.00	1.00	0.93	1.00		0.94	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1682	1881	1440	1622	1587		1504	1743		1677	1684	
Flt Permitted	0.50	1.00	1.00	0.70	1.00		0.54	1.00		0.37	1.00	
Satd. Flow (perm)	881	1881	1440	1193	1587		858	1743		649	1684	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	122	90	26	25	80	118	15	290	27	103	322	47
RTOR Reduction (vph)	0	0	14	0	63	0	0	4	0	0	7	0
Lane Group Flow (vph)	122	90	12	25	135	0	15	313	0	103	362	0
Confl. Peds. (#/hr)	25		36	36		25	58		34	34		58
Heavy Vehicles (%)	2%	1%	0%	0%	0%	7%	9%	7%	6%	3%	10%	2%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.6	33.6	33.6	23.7	23.7		25.8	25.8		34.4	34.4	
Effective Green, g (s)	33.6	35.6	35.6	25.7	25.7		27.8	27.8		34.4	36.4	
Actuated g/C Ratio	0.42	0.45	0.45	0.32	0.32		0.35	0.35		0.43	0.45	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	439	837	640	383	509		298	605		351	766	
v/s Ratio Prot	c0.02	0.05			0.08			c0.18		0.02	c0.22	
v/s Ratio Perm	c0.09		0.01	0.02			0.02			0.11		
v/c Ratio	0.28	0.11	0.02	0.07	0.26		0.05	0.52		0.29	0.47	
Uniform Delay, d1	14.7	12.9	12.4	18.8	20.1		17.3	20.8		14.6	15.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3	0.1	0.3	1.3		0.3	3.1		0.5	2.1	
Delay (s)	15.1	13.2	12.5	19.2	21.4		17.7	23.9		15.0	17.2	
Level of Service	B	B	B	B	C		B	C		B	B	
Approach Delay (s)		14.1			21.2			23.6			16.8	
Approach LOS		B			C			C			B	

Intersection Summary				
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.40			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	60.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	149	40	7	165	70	28	28	5	42	23	33
Future Volume (vph)	21	149	40	7	165	70	28	28	5	42	23	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.6	3.6	3.5
Storage Length (m)	0.0		0.0	0.0		15.0	25.0		0.0	0.0		30.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.975				0.850		0.990				0.850
Flt Protected		0.995			0.998			0.977			0.969	
Satd. Flow (prot)	0	1777	0	0	1826	1615	0	1764	0	0	1737	1597
Flt Permitted		0.995			0.998			0.977			0.969	
Satd. Flow (perm)	0	1777	0	0	1826	1615	0	1764	0	0	1737	1597
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		65.5			60.2			50.9			58.4	
Travel Time (s)		5.9			5.4			3.7			4.2	
Confl. Peds. (#/hr)	19		15	15		19	23		25	25		23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	2%	7%	0%	4%	0%	9%	0%	0%	6%	6%	0%
Adj. Flow (vph)	23	162	43	8	179	76	30	30	5	46	25	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	228	0	0	187	76	0	65	0	0	71	36
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	45.4%	ICU Level of Service A	
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	21	149	40	7	165	70	28	28	5	42	23	33
Future Volume (vph)	21	149	40	7	165	70	28	28	5	42	23	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	162	43	8	179	76	30	30	5	46	25	36

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	228	187	76	65	71	36
Volume Left (vph)	23	8	0	30	46	0
Volume Right (vph)	43	0	76	5	0	36
Hadj (s)	-0.03	0.09	-0.70	0.12	0.43	-0.70
Departure Headway (s)	5.3	5.3	4.6	6.0	6.3	5.1
Degree Utilization, x	0.34	0.28	0.10	0.11	0.12	0.05
Capacity (veh/h)	649	646	754	547	529	638
Control Delay (s)	11.0	9.2	6.8	9.8	8.9	7.2
Approach Delay (s)	11.0	8.5		9.8	8.4	
Approach LOS	B	A		A	A	

Intersection Summary					
Delay	9.4				
Level of Service	A				
Intersection Capacity Utilization	45.4%	ICU Level of Service		A	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	156	28	4	215	0	39	0	7	0	0	5
Future Volume (vph)	0	156	28	4	215	0	39	0	7	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.980						0.978			0.865	
Flt Protected					0.999			0.960				
Satd. Flow (prot)	0	1797	0	0	1861	0	0	1596	0	0	1370	0
Flt Permitted					0.999			0.960				
Satd. Flow (perm)	0	1797	0	0	1861	0	0	1596	0	0	1370	0
Link Speed (k/h)		50			40			50			50	
Link Distance (m)		60.2			118.8			76.6			56.2	
Travel Time (s)		4.3			10.7			5.5			4.0	
Confl. Peds. (#/hr)	13		12	12		13	6		7	7		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	7%	0%	2%	0%	14%	0%	0%	0%	0%	20%
Adj. Flow (vph)	0	170	30	4	234	0	42	0	8	0	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	200	0	0	238	0	0	50	0	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 31.4%		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)	0	156	28	4	215	0	39	0	7	0	0	5
Future Volume (Veh/h)	0	156	28	4	215	0	39	0	7	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	170	30	4	234	0	42	0	8	0	0	5
Pedestrians		6			7			12			13	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	247			212			450	452	204	455	467	253
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	247			212			450	452	204	455	467	253
tC, single (s)	4.1			4.1			7.2	6.5	6.2	7.1	6.5	6.4
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.3	3.5	4.0	3.5
p0 queue free %	100			100			91	100	99	100	100	99
cM capacity (veh/h)	1315			1355			479	493	827	495	484	731

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	200	238	50	5
Volume Left	0	4	42	0
Volume Right	30	0	8	5
cSH	1700	1355	513	731
Volume to Capacity	0.12	0.00	0.10	0.01
Queue Length 95th (m)	0.0	0.1	2.4	0.2
Control Delay (s)	0.0	0.2	12.8	10.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	0.2	12.8	10.0
Approach LOS			B	A

Intersection Summary						
Average Delay	1.5					
Intersection Capacity Utilization	31.4%	ICU Level of Service			A	
Analysis Period (min)	15					



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	19	20	286	12	19	319
Future Volume (vph)	19	20	286	12	19	319
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.931		0.995			
Flt Protected	0.976					0.997
Satd. Flow (prot)	1622	0	1764	0	0	1746
Flt Permitted	0.976					0.997
Satd. Flow (perm)	1622	0	1764	0	0	1746
Link Speed (k/h)	50		50			50
Link Distance (m)	65.8		60.2			116.4
Travel Time (s)	4.7		4.3			8.4
Confl. Peds. (#/hr)	37	1		55	55	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	5%	7%	11%	0%	9%
Adj. Flow (vph)	21	22	311	13	21	347
Shared Lane Traffic (%)						
Lane Group Flow (vph)	43	0	324	0	0	368
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.3			3.3
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization	42.7%			ICU Level of Service A		
Analysis Period (min)	15					



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	20	286	12	19	319
Future Volume (Veh/h)	19	20	286	12	19	319
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)	21	22	311	13	21	347
Pedestrians	55		37			1
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	5		3			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						116
pX, platoon unblocked	0.87					
vC, conflicting volume	798	374			379	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	695	374			379	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	93	97			98	
cM capacity (veh/h)	313	632			1131	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	43	324	368
Volume Left	21	0	21
Volume Right	22	13	0
cSH	422	1700	1131
Volume to Capacity	0.10	0.19	0.02
Queue Length 95th (m)	2.6	0.0	0.4
Control Delay (s)	14.5	0.0	0.7
Lane LOS	B		A
Approach Delay (s)	14.5	0.0	0.7
Approach LOS	B		

Intersection Summary				
Average Delay		1.2		
Intersection Capacity Utilization		42.7%	ICU Level of Service	A
Analysis Period (min)		15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	9	14	6	19	8	9	22	6	10	52	10
Future Volume (vph)	10	9	14	6	19	8	9	22	6	10	52	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.944			0.967			0.977			0.981	
Flt Protected		0.985			0.991			0.988			0.993	
Satd. Flow (prot)	0	1647	0	0	1624	0	0	1834	0	0	1797	0
Flt Permitted		0.985			0.991			0.988			0.993	
Satd. Flow (perm)	0	1647	0	0	1624	0	0	1834	0	0	1797	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		65.8			64.6			101.9			63.3	
Travel Time (s)		4.7			4.7			7.3			4.6	
Confl. Peds. (#/hr)	7		10	10		7	16		10	10		16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	14%	0%	25%	13%	0%	0%	0%	0%	11%	2%	0%
Adj. Flow (vph)	11	10	15	7	21	9	10	24	7	11	57	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	37	0	0	41	0	0	79	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.3%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	9	14	6	19	8	9	22	6	10	52	10
Future Volume (vph)	10	9	14	6	19	8	9	22	6	10	52	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	10	15	7	21	9	10	24	7	11	57	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	36	37	41	79
Volume Left (vph)	11	7	10	11
Volume Right (vph)	15	9	7	11
Hadj (s)	-0.07	0.10	-0.05	-0.01
Departure Headway (s)	4.1	4.3	4.1	4.1
Degree Utilization, x	0.04	0.04	0.05	0.09
Capacity (veh/h)	841	811	852	858
Control Delay (s)	7.3	7.5	7.3	7.5
Approach Delay (s)	7.3	7.5	7.3	7.5
Approach LOS	A	A	A	A

Intersection Summary					
Delay			7.4		
Level of Service			A		
Intersection Capacity Utilization			21.3%	ICU Level of Service	A
Analysis Period (min)			15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	7	8	12	19	2	13	21	2	4	24	7
Future Volume (vph)	5	7	8	12	19	2	13	21	2	4	24	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.945			0.992			0.993			0.972	
Flt Protected		0.989			0.982			0.982			0.995	
Satd. Flow (prot)	0	1606	0	0	1734	0	0	1491	0	0	1838	0
Flt Permitted		0.989			0.982			0.982			0.995	
Satd. Flow (perm)	0	1606	0	0	1734	0	0	1491	0	0	1838	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.6			98.7			82.9			36.7	
Travel Time (s)		4.7			7.1			6.0			2.6	
Confl. Peds. (#/hr)	8		18	18		8	2		20	20		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	29%	0%	9%	6%	0%	33%	21%	0%	0%	0%	0%
Adj. Flow (vph)	5	8	9	13	21	2	14	23	2	4	26	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	36	0	0	39	0	0	38	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	23.4%	ICU Level of Service A		
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	7	8	12	19	2	13	21	2	4	24	7
Future Volume (vph)	5	7	8	12	19	2	13	21	2	4	24	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	8	9	13	21	2	14	23	2	4	26	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	22	36	39	38
Volume Left (vph)	5	13	14	4
Volume Right (vph)	9	2	2	8
Hadj (s)	-0.02	0.15	0.45	-0.11
Departure Headway (s)	4.1	4.2	4.5	4.0
Degree Utilization, x	0.02	0.04	0.05	0.04
Capacity (veh/h)	857	828	775	889
Control Delay (s)	7.2	7.4	7.7	7.1
Approach Delay (s)	7.2	7.4	7.7	7.1
Approach LOS	A	A	A	A

Intersection Summary				
Delay			7.4	
Level of Service			A	
Intersection Capacity Utilization			23.4%	ICU Level of Service
Analysis Period (min)			15	



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	3	18	42	1	9	61
Future Volume (vph)	3	18	42	1	9	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.883		0.997			
Flt Protected	0.994					0.993
Satd. Flow (prot)	1635	0	1857	0	0	1850
Flt Permitted	0.994					0.993
Satd. Flow (perm)	1635	0	1857	0	0	1850
Link Speed (k/h)	50		50			50
Link Distance (m)	39.5		63.3			50.9
Travel Time (s)	2.8		4.6			3.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	20	46	1	10	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	23	0	47	0	0	76
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

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



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	18	42	1	9	61
Future Volume (Veh/h)	3	18	42	1	9	61
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)	3	20	46	1	10	66
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	132	46			47	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	132	46			47	
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	98			99	
cM capacity (veh/h)	856	1023			1560	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	23	47	76
Volume Left	3	0	10
Volume Right	20	1	0
cSH	997	1700	1560
Volume to Capacity	0.02	0.03	0.01
Queue Length 95th (m)	0.5	0.0	0.1
Control Delay (s)	8.7	0.0	1.0
Lane LOS	A		A
Approach Delay (s)	8.7	0.0	1.0
Approach LOS	A		

Intersection Summary			
Average Delay		1.9	
Intersection Capacity Utilization		20.4%	ICU Level of Service A
Analysis Period (min)		15	



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	28	7	4	18	18	14
Future Volume (vph)	28	7	4	18	18	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.972				0.942	
Flt Protected	0.962			0.992		
Satd. Flow (prot)	1742	0	0	1848	1755	0
Flt Permitted	0.962			0.992		
Satd. Flow (perm)	1742	0	0	1848	1755	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	45.1			36.7	76.6	
Travel Time (s)	3.2			2.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	8	4	20	20	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	38	0	0	24	35	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 14.4%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	7	4	18	18	14
Future Volume (Veh/h)	28	7	4	18	18	14
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)	30	8	4	20	20	15
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	56	28	35			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56	28	35			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	100			
cM capacity (veh/h)	950	1048	1576			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	38	24	35
Volume Left	30	4	0
Volume Right	8	0	15
cSH	969	1576	1700
Volume to Capacity	0.04	0.00	0.02
Queue Length 95th (m)	0.9	0.1	0.0
Control Delay (s)	8.9	1.2	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	1.2	0.0
Approach LOS	A		

Intersection Summary				
Average Delay			3.8	
Intersection Capacity Utilization			14.4%	ICU Level of Service A
Analysis Period (min)			15	



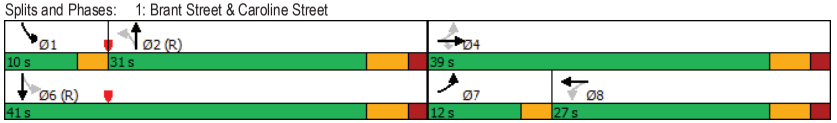
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	90	11	101	301	134	28	253	24	136	445	88
Future Volume (vph)	121	90	11	101	301	134	28	253	24	136	445	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Storage Length (m)	40.0		10.0	20.0		0.0	25.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.91	0.93	0.98		0.97	0.99		0.96	0.99	
Frt			0.850		0.954			0.987			0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1745	1900	1439	1694	1737	0	1745	1779	0	1728	1808	0
Flt Permitted	0.152			0.694			0.331			0.372		
Satd. Flow (perm)	279	1900	1303	1156	1737	0	592	1779	0	650	1808	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82		28			6			17	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		107.3			65.5			116.4			84.2	
Travel Time (s)		9.7			5.9			8.4			6.1	
Confl. Peds. (#/hr)	23		34	34		23	39		44	44		39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	11%	3%	3%	0%	0%	5%	0%	1%	1%	1%
Adj. Flow (vph)	132	98	12	110	327	146	30	275	26	148	484	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	132	98	12	110	473	0	30	301	0	148	580	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.01	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	8.0	8.0		8.0	8.0		6.0	8.0	
Minimum Split (s)	10.0	25.0	25.0	25.0	25.0		30.0	30.0		10.0	30.0	
Total Split (s)	12.0	39.0	39.0	27.0	27.0		31.0	31.0		10.0	41.0	
Total Split (%)	15.0%	48.8%	48.8%	33.8%	33.8%		38.8%	38.8%		12.5%	51.3%	
Maximum Green (s)	9.0	33.0	33.0	21.0	21.0		25.0	25.0		7.0	35.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		2.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		0.0	-2.0	
Total Lost Time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max	Max	Max	Max		C-Max	C-Max		None	C-Max	
Walk Time (s)		10.0	10.0	10.0	10.0		15.0	15.0			15.0	
Flash Dont Walk (s)		8.0	8.0	8.0	8.0		8.0	8.0			8.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	36.0	35.0	35.0	25.6	25.6		27.1	27.1		38.0	37.0	
Actuated g/C Ratio	0.45	0.44	0.44	0.32	0.32		0.34	0.34		0.48	0.46	
v/c Ratio	0.48	0.12	0.02	0.30	0.82		0.15	0.50		0.37	0.69	
Control Delay	19.2	13.9	0.1	24.9	39.4		21.0	24.1		14.9	21.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.2	13.9	0.1	24.9	39.4		21.0	24.1		14.9	21.6	
LOS	B	B	A	C	D		C	C		B	C	
Approach Delay		16.1			36.7			23.8			20.2	
Approach LOS		B			D			C			C	
Queue Length 50th (m)	11.5	8.5	0.0	13.1	65.4		3.2	35.1		12.3	64.5	
Queue Length 95th (m)	21.6	17.0	0.0	26.5	#120.4		9.3	57.6		22.7	100.1	
Internal Link Dist (m)		83.3			41.5			92.4			60.2	
Turn Bay Length (m)	40.0		10.0	20.0			25.0			20.0		
Base Capacity (vph)	290	831	616	370	575		200	606		403	845	
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	0.46	0.12	0.02	0.30	0.82		0.15	0.50		0.37	0.69	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 54 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 25.4		Intersection LOS: C	

Intersection Capacity Utilization 80.7% ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Brant Street & Caroline Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	132	98	12	110	473	30	301	148	580
v/c Ratio	0.48	0.12	0.02	0.30	0.82	0.15	0.50	0.37	0.69
Control Delay	19.2	13.9	0.1	24.9	39.4	21.0	24.1	14.9	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	13.9	0.1	24.9	39.4	21.0	24.1	14.9	21.6
Queue Length 50th (m)	11.5	8.5	0.0	13.1	65.4	3.2	35.1	12.3	64.5
Queue Length 95th (m)	21.6	17.0	0.0	26.5	#120.4	9.3	57.6	22.7	100.1
Internal Link Dist (m)		83.3			41.5		92.4		60.2
Turn Bay Length (m)	40.0		10.0	20.0		25.0		20.0	
Base Capacity (vph)	290	831	616	370	575	200	606	403	845
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	0.46	0.12	0.02	0.30	0.82	0.15	0.50	0.37	0.69

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)	121	90	11	101	301	134	28	253	24	136	445	88
Future Volume (vph)	121	90	11	101	301	134	28	253	24	136	445	88
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	3.6	3.3	3.6	3.6	3.3	3.6	3.6
Total Lost time (s)	3.0	4.0	4.0	4.0	4.0		4.0	4.0		3.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.91	1.00	0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.93	1.00		0.97	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1745	1900	1303	1582	1737		1700	1779		1704	1808	
Flt Permitted	0.15	1.00	1.00	0.69	1.00		0.33	1.00		0.37	1.00	
Satd. Flow (perm)	279	1900	1303	1155	1737		592	1779		668	1808	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	98	12	110	327	146	30	275	26	148	484	96
RTOR Reduction (vph)	0	0	7	0	19	0	0	4	0	0	9	0
Lane Group Flow (vph)	132	98	5	110	454	0	30	297	0	148	571	0
Confl. Peds. (#/hr)	23		34	34		23	39		44	44		39
Heavy Vehicles (%)	0%	0%	11%	3%	3%	0%	0%	5%	0%	1%	1%	1%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.6	33.6	33.6	23.6	23.6		24.5	24.5		34.4	34.4	
Effective Green, g (s)	33.6	35.6	35.6	25.6	25.6		26.5	26.5		34.4	36.4	
Actuated g/C Ratio	0.42	0.45	0.45	0.32	0.32		0.33	0.33		0.43	0.45	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		6.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	245	845	579	369	555		196	589		376	822	
v/s Ratio Prot	c0.05	0.05			c0.26			0.17		0.03	c0.32	
v/s Ratio Perm	0.18		0.00	0.10			0.05			0.14		
v/c Ratio	0.54	0.12	0.01	0.30	0.82		0.15	0.50		0.39	0.69	
Uniform Delay, d1	17.0	13.0	12.4	20.4	25.1		18.8	21.5		14.9	17.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	0.3	0.0	2.1	12.6		1.7	3.1		0.7	4.8	
Delay (s)	19.3	13.3	12.4	22.5	37.7		20.5	24.5		15.6	22.2	
Level of Service	B	B	B	C	D		C	C		B	C	
Approach Delay (s)		16.5			34.8			24.2			20.8	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	168	49	17	431	90	47	43	12	66	33	60
Future Volume (vph)	30	168	49	17	431	90	47	43	12	66	33	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.6	3.3	3.6	3.6	3.3	3.6	3.6	3.6	3.6	3.5
Storage Length (m)	0.0		0.0	0.0		15.0	25.0		0.0	0.0		30.0
Storage Lanes	0		0	0		1	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.973				0.850		0.984				0.850
Flt Protected		0.994			0.998			0.978			0.968	
Satd. Flow (prot)	0	1838	0	0	1860	1599	0	1828	0	0	1839	1566
Flt Permitted		0.994			0.998			0.978			0.968	
Satd. Flow (perm)	0	1838	0	0	1860	1599	0	1828	0	0	1839	1566
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		65.5			60.2			50.9			58.4	
Travel Time (s)		5.9			5.4			3.7			4.2	
Confl. Peds. (#/hr)	21		20	20		21	13		34	34		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	33	183	53	18	468	98	51	47	13	72	36	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	269	0	0	486	98	0	111	0	0	108	65
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.04	1.00	1.00	1.04	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	58.0%	ICU Level of Service B	
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	30	168	49	17	431	90	47	43	12	66	33	60
Future Volume (vph)	30	168	49	17	431	90	47	43	12	66	33	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	183	53	18	468	98	51	47	13	72	36	65

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	269	486	98	111	108	65
Volume Left (vph)	33	18	0	51	72	0
Volume Right (vph)	53	0	98	13	0	65
Hadj (s)	-0.09	0.05	-0.68	0.02	0.33	-0.67
Departure Headway (s)	6.3	6.0	5.2	7.3	7.4	6.4
Degree Utilization, x	0.47	0.81	0.14	0.22	0.22	0.12
Capacity (veh/h)	544	583	667	456	445	510
Control Delay (s)	14.7	27.8	7.9	12.4	11.4	9.1
Approach Delay (s)	14.7	24.5		12.4	10.5	
Approach LOS	B	C		B	B	

Intersection Summary					
Delay	18.9				
Level of Service	C				
Intersection Capacity Utilization	58.0%	ICU Level of Service		B	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	183	65	21	478	0	51	0	18	0	3	5
Future Volume (vph)	0	183	65	21	478	0	51	0	18	0	3	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.964						0.964			0.916	
Flt Protected					0.998			0.965				
Satd. Flow (prot)	0	1817	0	0	1861	0	0	1767	0	0	1740	0
Flt Permitted					0.998			0.965				
Satd. Flow (perm)	0	1817	0	0	1861	0	0	1767	0	0	1740	0
Link Speed (k/h)		50			40			50			50	
Link Distance (m)		60.2			118.8			76.6			56.2	
Travel Time (s)		4.3			10.7			5.5			4.0	
Confl. Peds. (#/hr)	13		12	12		13	9		3	3		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	3%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	199	71	23	520	0	55	0	20	0	3	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	270	0	0	543	0	0	75	0	0	8	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	183	65	21	478	0	51	0	18	0	3	5
Future Volume (Veh/h)	0	183	65	21	478	0	51	0	18	0	3	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	199	71	23	520	0	55	0	20	0	3	5
Pedestrians		9			3			12			13	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	533			282			828	826	250	836	861	542
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	533			282			828	826	250	836	861	542
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			80	100	97	100	99	99
cM capacity (veh/h)	1033			1278			273	297	783	269	284	533

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	270	543	75	8
Volume Left	0	23	55	0
Volume Right	71	0	20	5
cSH	1700	1278	331	401
Volume to Capacity	0.16	0.02	0.23	0.02
Queue Length 95th (m)	0.0	0.4	6.5	0.5
Control Delay (s)	0.0	0.5	19.0	14.2
Lane LOS		A	C	B
Approach Delay (s)	0.0	0.5	19.0	14.2
Approach LOS			C	B

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	59.8%	ICU Level of Service		B
Analysis Period (min)	15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	127	63	235	12	26	527
Future Volume (vph)	127	63	235	12	26	527
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.955		0.993			
Flt Protected	0.968					0.998
Satd. Flow (prot)	1733	0	1785	0	0	1861
Flt Permitted	0.968					0.998
Satd. Flow (perm)	1733	0	1785	0	0	1861
Link Speed (k/h)	50		50			50
Link Distance (m)	65.8		60.2			116.4
Travel Time (s)	4.7		4.3			8.4
Confl. Peds. (#/hr)	44			64	64	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	6%	0%	0%	2%
Adj. Flow (vph)	138	68	255	13	28	573
Shared Lane Traffic (%)						
Lane Group Flow (vph)	206	0	268	0	0	601
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.3			3.3
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	127	63	235	12	26	527
Future Volume (Veh/h)	127	63	235	12	26	527
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)	138	68	255	13	28	573
Pedestrians	64		44			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.1		1.1			
Percent Blockage	6		4			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						116
pX, platoon unblocked	0.74					
vC, conflicting volume	998	326			332	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	818	326			332	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	38	90			98	
cM capacity (veh/h)	224	678			1167	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	206	268	601
Volume Left	138	0	28
Volume Right	68	13	0
cSH	288	1700	1167
Volume to Capacity	0.72	0.16	0.02
Queue Length 95th (m)	38.4	0.0	0.6
Control Delay (s)	43.6	0.0	0.7
Lane LOS	E		A
Approach Delay (s)	43.6	0.0	0.7
Approach LOS	E		

Intersection Summary			
Average Delay	8.7		
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	11	18	17	154	29	21	52	13	9	49	15
Future Volume (vph)	10	11	18	17	154	29	21	52	13	9	49	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.937			0.980			0.980			0.973	
Flt Protected		0.987			0.996			0.988			0.994	
Satd. Flow (prot)	0	1757	0	0	1855	0	0	1817	0	0	1838	0
Flt Permitted		0.987			0.996			0.988			0.994	
Satd. Flow (perm)	0	1757	0	0	1855	0	0	1817	0	0	1838	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		65.8			64.6			101.9			63.3	
Travel Time (s)		4.7			4.7			7.3			4.6	
Confl. Peds. (#/hr)	9		6	6		9	23		14	14		23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
Adj. Flow (vph)	11	12	20	18	167	32	23	57	14	10	53	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	217	0	0	94	0	0	79	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	29.1%	ICU Level of Service A		
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	11	18	17	154	29	21	52	13	9	49	15
Future Volume (vph)	10	11	18	17	154	29	21	52	13	9	49	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	12	20	18	167	32	23	57	14	10	53	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	43	217	94	79
Volume Left (vph)	11	18	23	10
Volume Right (vph)	20	32	14	16
Hadj (s)	-0.23	-0.07	-0.02	-0.10
Departure Headway (s)	4.3	4.3	4.6	4.5
Degree Utilization, x	0.05	0.26	0.12	0.10
Capacity (veh/h)	785	800	740	742
Control Delay (s)	7.6	8.8	8.2	8.0
Approach Delay (s)	7.6	8.8	8.2	8.0
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.4			
Level of Service	A			
Intersection Capacity Utilization	29.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	17	8	14	152	15	29	37	4	9	49	13
Future Volume (vph)	6	17	8	14	152	15	29	37	4	9	49	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.964			0.989			0.993			0.975	
Flt Protected		0.990			0.996			0.979			0.994	
Satd. Flow (prot)	0	1813	0	0	1872	0	0	1816	0	0	1757	0
Flt Permitted		0.990			0.996			0.979			0.994	
Satd. Flow (perm)	0	1813	0	0	1872	0	0	1816	0	0	1757	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		64.6			98.7			82.9			36.7	
Travel Time (s)		4.7			7.1			6.0			2.6	
Confl. Peds. (#/hr)	4		3	3		4	11		14	14		11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	7%	0%
Adj. Flow (vph)	7	18	9	15	165	16	32	40	4	10	53	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	34	0	0	196	0	0	76	0	0	77	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	28.6%	ICU Level of Service A	
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	17	8	14	152	15	29	37	4	9	49	13
Future Volume (vph)	6	17	8	14	152	15	29	37	4	9	49	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	18	9	15	165	16	32	40	4	10	53	14

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	34	196	76	77
Volume Left (vph)	7	15	32	10
Volume Right (vph)	9	16	4	14
Hadj (s)	-0.12	-0.03	0.08	0.00
Departure Headway (s)	4.4	4.3	4.6	4.5
Degree Utilization, x	0.04	0.23	0.10	0.10
Capacity (veh/h)	783	806	738	746
Control Delay (s)	7.6	8.6	8.1	8.0
Approach Delay (s)	7.6	8.6	8.1	8.0
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.3		
Level of Service	A		
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2	13	88	3	19	81
Future Volume (vph)	2	13	88	3	19	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.882		0.996			
Flt Protected	0.994					0.990
Satd. Flow (prot)	1633	0	1855	0	0	1844
Flt Permitted	0.994					0.990
Satd. Flow (perm)	1633	0	1855	0	0	1844
Link Speed (k/h)	50		50			50
Link Distance (m)	39.5		63.3			50.9
Travel Time (s)	2.8		4.6			3.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	14	96	3	21	88
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	0	99	0	0	109
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	22.0%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	13	88	3	19	81
Future Volume (Veh/h)	2	13	88	3	19	81
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)	2	14	96	3	21	88
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	228	98			99	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	228	98			99	
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	99			99	
cM capacity (veh/h)	750	959			1494	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	99	109
Volume Left	2	0	21
Volume Right	14	3	0
cSH	926	1700	1494
Volume to Capacity	0.02	0.06	0.01
Queue Length 95th (m)	0.4	0.0	0.3
Control Delay (s)	9.0	0.0	1.5
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	1.5
Approach LOS	A		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	24	8	11	46	56	33
Future Volume (vph)	24	8	11	46	56	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.965				0.950	
Flt Protected	0.964			0.990		
Satd. Flow (prot)	1733	0	0	1844	1770	0
Flt Permitted	0.964			0.990		
Satd. Flow (perm)	1733	0	0	1844	1770	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	45.1			36.7	76.6	
Travel Time (s)	3.2			2.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	9	12	50	61	36
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	0	0	62	97	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		

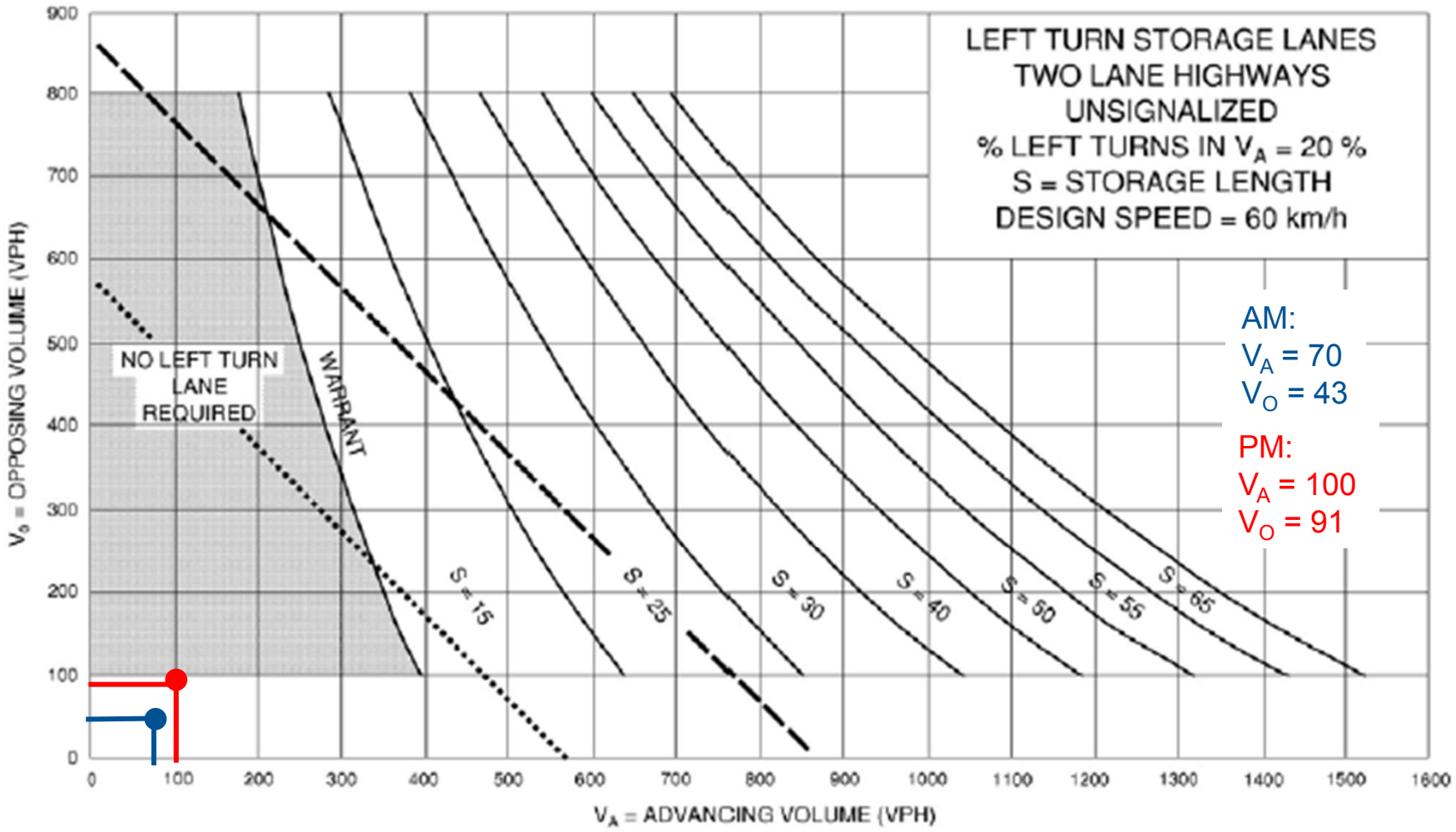
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	24	8	11	46	56	33
Future Volume (Veh/h)	24	8	11	46	56	33
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	9	12	50	61	36
Pedestrians						
Lane Width (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	153	79	97			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	153	79	97			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	832	981	1496			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	35	62	97
Volume Left	26	12	0
Volume Right	9	0	36
cSH	866	1496	1700
Volume to Capacity	0.04	0.01	0.06
Queue Length 95th (m)	1.0	0.2	0.0
Control Delay (s)	9.3	1.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	1.5	0.0
Approach LOS	A		

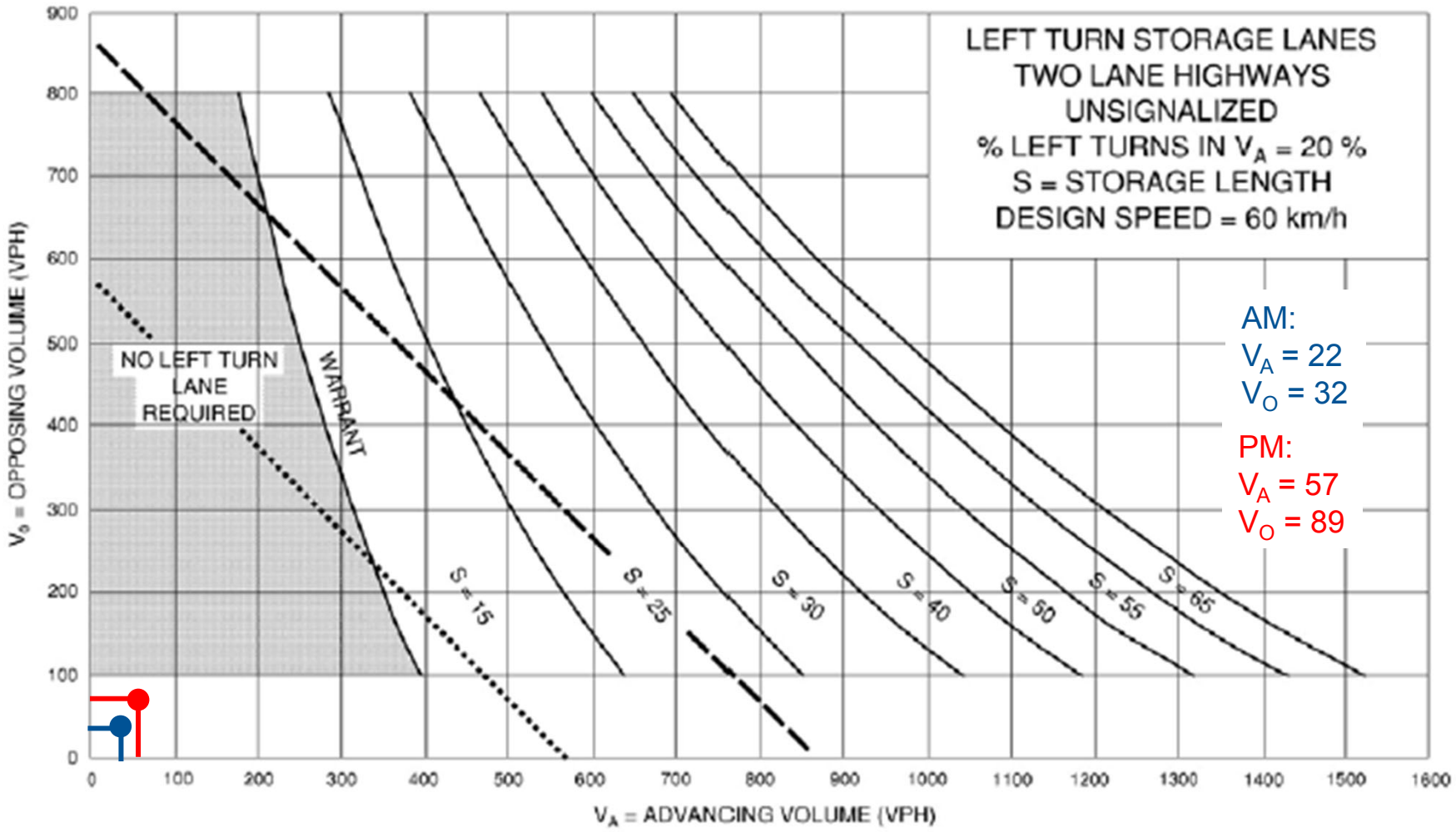
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	19.7%	ICU Level of Service		A
Analysis Period (min)	15			

Appendix H

Left-Turn Lane Warrants



Driveway A
Southbound Left-Turn Lane Warrant



Driveway B
Northbound Left-Turn Lane Warrant

Appendix I

TTS Data

Thu Feb 13 2020 16:00:21 GMT-0500 (Eastern Standard Time) - Run Time: 386ms

Cross Tabulation Query Form - Household - 2016 v1.1

Row: Type of dwelling unit - dwell_type
Column: No. of vehicles in household - n_vehicle

Filters:
2006 GTA zone of household - gta06_hhld In 4059-4069

Household 2016
ROW : dwell_type
COLUMN : n_vehicle

Dwelling Type	Number of Vehicles in Household 0	1	2	3	4	Total Units					
Apartment	1107	3943	992	46	35	6123	**18%**	**64%**	**16%**	**1%**	**1%**
Total	**1107**	**3943**	**992**	**46**	**35**	**6123**					

Dwelling Type	Number of Vehicles 0	1	2	3	4	Total Units
Apartment	0	3943	1984	138	140	6205
Total	**0**	**3943**	**1984**	**138**	**140**	**6205**

1.01 veh/unit

Appendix J

Off-Site Parking Survey Data



Appendix C - Survey Data

City of Burlington Downtown Survey Data (April 6th - May 8th, 2021)

					Surveyed				
Address	Intensification Zone	LandUse	Date	Time (24 Hr)	Occupant (Observed)	Visitor (Observed)	Number of Units	Calculated Occupant Rate	Calculated Visitor Rate
442 Maple Ave	Primary	Apartment Building	Tues, April 6	8:00	146	5	135	1.08	0.04
442 Maple Ave	Primary	Apartment Building	Tues, April 6	9:00	148	5	135	1.10	0.04
442 Maple Ave	Primary	Apartment Building	Tues, April 6	10:00	148	6	135	1.10	0.04
505 Locust St	Primary	Apartment Building	Tues, April 6	8:30	101	0	117	0.86	
505 Locust St	Primary	Apartment Building	Tues, April 6	9:30	103	0	117	0.88	
505 Locust St	Primary	Apartment Building	Tues, April 6	10:30	103	0	117	0.88	
442 Maple Ave	Primary	Apartment Building	Thurs, April 8	8:00	143	8	135	1.06	0.06
442 Maple Ave	Primary	Apartment Building	Thurs, April 8	9:00	146	5	135	1.08	0.04
442 Maple Ave	Primary	Apartment Building	Thurs, April 8	10:00	145	5	135	1.07	0.04
505 Locust St	Primary	Apartment Building	Thurs, April 8	8:30	116	0	117	0.99	
505 Locust St	Primary	Apartment Building	Thurs, April 8	9:30	120	0	117	1.03	
505 Locust St	Primary	Apartment Building	Thurs, April 8	10:30	121	0	117	1.03	
505 Locust St	Primary	Apartment Building	Sat, April 17	8:30	100	0	117	0.85	
505 Locust St	Primary	Apartment Building	Sat, April 17	9:30	104	0	117	0.89	
505 Locust St	Primary	Apartment Building	Sat, April 17	10:30	107	0	117	0.91	
442 Maple Ave	Primary	Apartment Building	Sat, April 17	8:00	137	9	135	1.01	0.07
442 Maple Ave	Primary	Apartment Building	Sat, April 17	9:00	139	4	135	1.03	0.03
442 Maple Ave	Primary	Apartment Building	Sat, April 17	10:00	138	4	135	1.02	0.03
360 Pearl St	Primary	Apartment Building	Tues, April 27	8:00	87	0	75	1.16	
360 Pearl St	Primary	Apartment Building	Tues, April 27	9:00	93	0	75	1.24	
360 Pearl St	Primary	Apartment Building	Tues, April 27	10:00	94	0	75	1.25	
360 Pearl St	Primary	Apartment Building	Thurs, April 29	8:00	75	0	75	1.00	
360 Pearl St	Primary	Apartment Building	Thurs, April 29	9:00	78	0	75	1.04	
360 Pearl St	Primary	Apartment Building	Thurs, April 29	10:00	84	0	75	1.12	
2121 Lakeshore Rd	Primary	Apartment Building	Sat, May 1	8:15	36	2	39	0.92	0.05
2121 Lakeshore Rd	Primary	Apartment Building	Sat, May 1	9:15	39	1	39	1.00	0.03
2121 Lakeshore Rd	Primary	Apartment Building	Sat, May 1	10:00	40	1	39	1.03	0.03
1477 Lakeshore Rd	Primary	Apartment Building	Sat, May 1	9:00	61	0	60	1.02	
1477 Lakeshore Rd	Primary	Apartment Building	Sat, May 1	9:45	63	0	60	1.05	
1477 Lakeshore Rd	Primary	Apartment Building	Sat, May 1	10:30	63	0	60	1.05	
2121 Lakeshore Rd	Primary	Apartment Building	Tues, May 4	8:00	42	1	39	1.08	0.03
2121 Lakeshore Rd	Primary	Apartment Building	Tues, May 4	9:00	42	1	39	1.08	0.03

2121 Lakeshore Rd	Primary	Apartment Building	Tues, May 4	10:00	45	0	39	1.15	0.00
1477 Lakeshore Rd	Primary	Apartment Building	Tues, May 4	8:30	65	0	60	1.08	
1477 Lakeshore Rd	Primary	Apartment Building	Tues, May 4	9:30	66	0	60	1.10	
1477 Lakeshore Rd	Primary	Apartment Building	Tues, May 4	10:30	65	0	60	1.08	
2121 Lakeshore Rd	Primary	Apartment Building	Thurs, May 6	8:00	39	1	39	1.00	0.03
2121 Lakeshore Rd	Primary	Apartment Building	Thurs, May 6	9:00	41	0	39	1.05	0
2121 Lakeshore Rd	Primary	Apartment Building	Thurs, May 6	10:00	41	0	39	1.05	0
1477 Lakeshore Rd	Primary	Apartment Building	Thurs, May 6	8:30	64	0	60	1.07	
1477 Lakeshore Rd	Primary	Apartment Building	Thurs, May 6	9:30	63	0	60	1.05	
1477 Lakeshore Rd	Primary	Apartment Building	Thurs, May 6	10:30	64	0	60	1.07	
360 Pearl St	Primary	Apartment Building	Sat, May 8	8:00	69	0	75	0.92	
360 Pearl St	Primary	Apartment Building	Sat, May 8	9:00	77	0	75	1.03	
360 Pearl St	Primary	Apartment Building	Sat, May 8	10:00	78	0	75	1.04	

Parking Survey
Berkely Condominium
2025 Maria Street, Burlington ON
(154 Residential Units)

Time	Wednesday January 23, 2024		Thursday January 24, 2024		Friday January 25, 2024		Saturday January 26, 2024		Sunday January 27, 2024	
	Parking Demand		Parking Demand		Parking Demand		Parking Demand		Parking Demand	
	On-Site	Overall	On-Site	Overall	On-Site	Overall	On-Site	Overall	On-Site	Overall
12:00 AM	125	0.81	120	0.78	120	0.78	124	0.81	119	0.77
12:15 AM	125	0.81	120	0.78	120	0.78	125	0.81	119	0.77
12:30 AM	125	0.81	120	0.78	121	0.79	125	0.81	119	0.77
12:45 AM	125	0.81	120	0.78	121	0.79	125	0.81	119	0.77
1:00 AM	125	0.81	120	0.78	121	0.79	124	0.81	119	0.77
1:15 AM	125	0.81	120	0.78	121	0.79	124	0.81	120	0.78
1:30 AM	125	0.81	120	0.78	121	0.79	124	0.81	120	0.78
1:45 AM	125	0.81	120	0.78	121	0.79	125	0.81	120	0.78
2:00 AM	125	0.81	120	0.78	121	0.79	125	0.81	120	0.78
2:15 AM	125	0.81	120	0.78	121	0.79	125	0.81	120	0.78
2:30 AM	125	0.81	120	0.78	121	0.79	125	0.81	120	0.78
2:45 AM	125	0.81	120	0.78	121	0.79	125	0.81	120	0.78
3:00 AM	125	0.81	120	0.78	122	0.79	125	0.81	120	0.78
3:15 AM	125	0.81	120	0.78	122	0.79	125	0.81	120	0.78
3:30 AM	125	0.81	120	0.78	122	0.79	125	0.81	120	0.78
3:45 AM	125	0.81	120	0.78	122	0.79	125	0.81	120	0.78
4:00 AM	125	0.81	120	0.78	122	0.79	125	0.81	-	-
4:15 AM	125	0.81	120	0.78	122	0.79	125	0.81	-	-
4:30 AM	125	0.81	120	0.78	122	0.79	125	0.81	-	-
4:45 AM	125	0.81	119	0.77	122	0.79	125	0.81	-	-
5:00 AM	125	0.81	119	0.77	122	0.79	125	0.81	-	-
5:15 AM	125	0.81	119	0.77	122	0.79	125	0.81	-	-
5:30 AM	124	0.81	119	0.77	121	0.79	125	0.81	-	-
5:45 AM	124	0.81	119	0.77	120	0.78	125	0.81	-	-
6:00 AM	123	0.80	118	0.77	120	0.78	124	0.81	-	-
6:15 AM	123	0.80	118	0.77	119	0.77	124	0.81	-	-
6:30 AM	122	0.79	118	0.77	119	0.77	123	0.80	-	-
6:45 AM	121	0.79	117	0.76	118	0.77	122	0.79	-	-
7:00 AM	119	0.77	115	0.75	117	0.76	122	0.79	-	-
7:15 AM	116	0.75	110	0.71	114	0.74	122	0.79	-	-
7:30 AM	107	0.69	104	0.68	114	0.74	123	0.80	-	-
7:45 AM	105	0.68	102	0.66	109	0.71	124	0.81	-	-
8:00 AM	104	0.68	101	0.66	106	0.69	122	0.79	-	-
8:15 AM	98	0.64	96	0.62	103	0.67	119	0.77	-	-
8:30 AM	95	0.62	93	0.60	102	0.66	117	0.76	-	-
8:45 AM	92	0.60	93	0.60	98	0.64	118	0.77	-	-
9:00 AM	90	0.58	90	0.58	95	0.62	113	0.73	-	-
9:15 AM	89	0.58	88	0.57	93	0.60	111	0.72	-	-
9:30 AM	86	0.56	85	0.55	90	0.58	111	0.72	-	-
9:45 AM	82	0.53	84	0.55	84	0.55	109	0.71	-	-
10:00 AM	81	0.53	81	0.53	83	0.54	106	0.69	-	-
10:15 AM	79	0.51	78	0.51	85	0.55	101	0.66	-	-
10:30 AM	79	0.51	78	0.51	82	0.53	96	0.62	-	-
10:45 AM	76	0.49	77	0.50	83	0.54	93	0.60	-	-
11:00 AM	74	0.48	76	0.49	85	0.55	93	0.60	-	-
11:15 AM	71	0.46	73	0.47	83	0.54	88	0.57	-	-
11:30 AM	72	0.47	73	0.47	79	0.51	86	0.56	-	-
11:45 AM	73	0.47	72	0.47	77	0.50	84	0.55	-	-
12:00 PM	73	0.47	76	0.49	75	0.49	82	0.53	-	-
12:15 PM	75	0.49	77	0.50	73	0.47	82	0.53	-	-
12:30 PM	73	0.47	71	0.46	74	0.48	79	0.51	-	-
12:45 PM	74	0.48	70	0.45	72	0.47	79	0.51	-	-
1:00 PM	75	0.49	69	0.45	75	0.49	79	0.51	-	-
1:15 PM	74	0.48	69	0.45	79	0.51	80	0.52	-	-
1:30 PM	77	0.50	69	0.45	81	0.53	79	0.51	-	-
1:45 PM	76	0.49	69	0.45	86	0.56	77	0.50	-	-
2:00 PM	77	0.50	69	0.45	86	0.56	82	0.53	-	-
2:15 PM	75	0.49	72	0.47	90	0.58	85	0.55	-	-
2:30 PM	75	0.49	81	0.53	91	0.59	83	0.54	-	-
2:45 PM	74	0.48	81	0.53	91	0.59	83	0.54	-	-
3:00 PM	74	0.48	78	0.51	91	0.59	83	0.54	-	-
3:15 PM	74	0.48	79	0.51	90	0.58	87	0.56	-	-
3:30 PM	77	0.50	80	0.52	93	0.60	89	0.58	-	-
3:45 PM	78	0.51	79	0.51	93	0.60	89	0.58	-	-
4:00 PM	81	0.53	83	0.54	90	0.58	92	0.60	-	-
4:15 PM	84	0.55	85	0.55	87	0.56	97	0.63	-	-
4:30 PM	83	0.54	85	0.55	90	0.58	93	0.60	-	-
4:45 PM	87	0.56	88	0.57	93	0.60	95	0.62	-	-
5:00 PM	91	0.59	94	0.61	94	0.61	99	0.64	-	-
5:15 PM	91	0.59	98	0.64	96	0.62	101	0.66	-	-
5:30 PM	96	0.62	98	0.64	96	0.62	100	0.65	-	-
5:45 PM	102	0.66	98	0.64	97	0.63	102	0.66	-	-
6:00 PM	106	0.69	96	0.62	99	0.64	107	0.69	-	-
6:15 PM	106	0.69	94	0.61	99	0.64	108	0.70	-	-
6:30 PM	102	0.66	94	0.61	100	0.65	109	0.71	-	-
6:45 PM	104	0.68	95	0.62	102	0.66	108	0.70	-	-
7:00 PM	105	0.68	97	0.63	102	0.66	111	0.72	-	-
7:15 PM	105	0.68	98	0.64	105	0.68	111	0.72	-	-
7:30 PM	106	0.69	99	0.64	105	0.68	110	0.71	-	-
7:45 PM	106	0.69	100	0.65	107	0.69	111	0.72	-	-
8:00 PM	107	0.69	102	0.66	105	0.68	112	0.73	-	-
8:15 PM	109	0.71	102	0.66	107	0.69	112	0.73	-	-
8:30 PM	112	0.73	104	0.68	107	0.69	112	0.73	-	-
8:45 PM	112	0.73	105	0.68	108	0.70	113	0.73	-	-
9:00 PM	114	0.74	108	0.70	111	0.72	115	0.75	-	-
9:15 PM	115	0.75	112	0.73	113	0.73	116	0.75	-	-
9:30 PM	117	0.76	113	0.73	113	0.73	116	0.75	-	-
9:45 PM	118	0.77	113	0.73	116	0.75	117	0.76	-	-
10:00 PM	118	0.77	114	0.74	115	0.75	119	0.77	-	-
10:15 PM	119	0.77	114	0.74	116	0.75	119	0.77	-	-
10:30 PM	121	0.79	116	0.75	116	0.75	119	0.77	-	-
10:45 PM	121	0.79	117	0.76	116	0.75	121	0.79	-	-
11:00 PM	122	0.79	118	0.77	116	0.75	122	0.79	-	-
11:15 PM	122	0.79	120	0.78	119	0.77	122	0.79	-	-
11:30 PM	122	0.79	120	0.78	119	0.77	123	0.80	-	-
11:45 PM	122	0.79	120	0.78	119	0.77	123	0.80	-	-
Peak	**125**	**0.81**	**120**	**0.78**	**122**	**0.79**	**125**	**0.81**	**120**	**0.78**

Parking Survey
Berkely Condominium
2025 Maria Street, Burlington ON
(154 Residential Units)

Time	Wednesday November 23, 2022		Thursday November 24, 2022		Friday November 25, 2022		Saturday November 26, 2022		Sunday November 27, 2022	
	Parking Demand		Parking Demand		Parking Demand		Parking Demand		Parking Demand	
	On-Site	Overall	On-Site	Overall	On-Site	Overall	On-Site	Overall	On-Site	Overall
12:00 AM	123	0.80	121	0.79	119	0.77	121	0.79	121	0.79
12:15 AM	123	0.80	121	0.79	119	0.77	122	0.79	121	0.79
12:30 AM	123	0.80	121	0.79	120	0.78	123	0.80	121	0.79
12:45 AM	123	0.80	121	0.79	120	0.78	123	0.80	121	0.79
1:00 AM	123	0.80	121	0.79	120	0.78	122	0.79	121	0.79
1:15 AM	123	0.80	121	0.79	120	0.78	122	0.79	122	0.79
1:30 AM	123	0.80	121	0.79	120	0.78	122	0.79	122	0.79
1:45 AM	123	0.80	121	0.79	120	0.78	123	0.80	122	0.79
2:00 AM	123	0.80	121	0.79	120	0.78	123	0.80	122	0.79
2:15 AM	123	0.80	121	0.79	120	0.78	123	0.80	122	0.79
2:30 AM	123	0.80	121	0.79	120	0.78	123	0.80	122	0.79
2:45 AM	123	0.80	121	0.79	120	0.78	123	0.80	122	0.79
3:00 AM	123	0.80	121	0.79	120	0.78	123	0.80	122	0.79
3:15 AM	123	0.80	121	0.79	120	0.78	123	0.80	122	0.79
3:30 AM	123	0.80	121	0.79	120	0.78	123	0.80	122	0.79
3:45 AM	123	0.80	121	0.79	120	0.78	123	0.80	122	0.79
4:00 AM	123	0.80	121	0.79	120	0.78	123	0.80	-	-
4:15 AM	123	0.80	121	0.79	120	0.78	123	0.80	-	-
4:30 AM	123	0.80	121	0.79	120	0.78	123	0.80	-	-
4:45 AM	123	0.80	120	0.78	120	0.78	123	0.80	-	-
5:00 AM	123	0.80	120	0.78	120	0.78	123	0.80	-	-
5:15 AM	123	0.80	120	0.78	120	0.78	123	0.80	-	-
5:30 AM	122	0.79	120	0.78	119	0.77	123	0.80	-	-
5:45 AM	122	0.79	120	0.78	118	0.77	123	0.80	-	-
6:00 AM	121	0.79	119	0.77	118	0.77	122	0.79	-	-
6:15 AM	121	0.79	119	0.77	117	0.76	122	0.79	-	-
6:30 AM	120	0.78	119	0.77	117	0.76	121	0.79	-	-
6:45 AM	119	0.77	118	0.77	116	0.75	120	0.78	-	-
7:00 AM	117	0.76	116	0.75	115	0.75	120	0.78	-	-
7:15 AM	114	0.74	111	0.72	112	0.73	120	0.78	-	-
7:30 AM	105	0.68	105	0.68	112	0.73	121	0.79	-	-
7:45 AM	103	0.67	103	0.67	107	0.69	122	0.79	-	-
8:00 AM	102	0.66	102	0.66	104	0.68	120	0.78	-	-
8:15 AM	96	0.62	97	0.63	101	0.66	117	0.76	-	-
8:30 AM	93	0.60	94	0.61	100	0.65	115	0.75	-	-
8:45 AM	90	0.58	94	0.61	96	0.62	116	0.75	-	-
9:00 AM	88	0.57	91	0.59	93	0.60	111	0.72	-	-
9:15 AM	87	0.56	89	0.58	91	0.59	109	0.71	-	-
9:30 AM	84	0.55	86	0.56	88	0.57	109	0.71	-	-
9:45 AM	80	0.52	85	0.55	82	0.53	107	0.69	-	-
10:00 AM	79	0.51	83	0.54	81	0.53	104	0.68	-	-
10:15 AM	77	0.50	80	0.52	83	0.54	99	0.64	-	-
10:30 AM	77	0.50	80	0.52	80	0.52	94	0.61	-	-
10:45 AM	74	0.48	79	0.51	81	0.53	91	0.59	-	-
11:00 AM	72	0.47	78	0.51	83	0.54	91	0.59	-	-
11:15 AM	69	0.45	75	0.49	81	0.53	86	0.56	-	-
11:30 AM	70	0.45	75	0.49	77	0.50	84	0.55	-	-
11:45 AM	71	0.46	74	0.48	75	0.49	82	0.53	-	-
12:00 PM	71	0.46	78	0.51	73	0.47	80	0.52	-	-
12:15 PM	73	0.47	79	0.51	71	0.46	80	0.52	-	-
12:30 PM	71	0.46	73	0.47	72	0.47	77	0.50	-	-
12:45 PM	72	0.47	72	0.47	70	0.45	77	0.50	-	-
1:00 PM	73	0.47	71	0.46	73	0.47	77	0.50	-	-
1:15 PM	72	0.47	71	0.46	77	0.50	78	0.51	-	-
1:30 PM	75	0.49	71	0.46	79	0.51	77	0.50	-	-
1:45 PM	74	0.48	71	0.46	84	0.55	75	0.49	-	-
2:00 PM	75	0.49	71	0.46	84	0.55	80	0.52	-	-
2:15 PM	73	0.47	74	0.48	88	0.57	83	0.54	-	-
2:30 PM	73	0.47	79	0.51	89	0.58	81	0.53	-	-
2:45 PM	72	0.47	79	0.51	89	0.58	81	0.53	-	-
3:00 PM	72	0.47	76	0.49	89	0.58	81	0.53	-	-
3:15 PM	72	0.47	77	0.50	88	0.57	85	0.55	-	-
3:30 PM	75	0.49	78	0.51	91	0.59	87	0.56	-	-
3:45 PM	76	0.49	77	0.50	91	0.59	87	0.56	-	-
4:00 PM	79	0.51	81	0.53	88	0.57	90	0.58	-	-
4:15 PM	82	0.53	83	0.54	88	0.57	95	0.62	-	-
4:30 PM	81	0.53	83	0.54	91	0.59	91	0.59	-	-
4:45 PM	85	0.55	86	0.56	94	0.61	93	0.60	-	-
5:00 PM	89	0.58	92	0.60	95	0.62	97	0.63	-	-
5:15 PM	89	0.58	96	0.62	97	0.63	99	0.64	-	-
5:30 PM	94	0.61	96	0.62	97	0.63	98	0.64	-	-
5:45 PM	100	0.65	96	0.62	98	0.64	100	0.65	-	-
6:00 PM	104	0.68	94	0.61	100	0.65	105	0.68	-	-
6:15 PM	104	0.68	92	0.60	100	0.65	106	0.69	-	-
6:30 PM	100	0.65	92	0.60	101	0.66	107	0.69	-	-
6:45 PM	102	0.66	93	0.60	103	0.67	106	0.69	-	-
7:00 PM	103	0.67	95	0.62	103	0.67	109	0.71	-	-
7:15 PM	103	0.67	96	0.62	106	0.69	109	0.71	-	-
7:30 PM	104	0.68	97	0.63	106	0.69	108	0.70	-	-
7:45 PM	104	0.68	98	0.64	108	0.70	109	0.71	-	-
8:00 PM	105	0.68	100	0.65	106	0.69	110	0.71	-	-
8:15 PM	107	0.69	100	0.65	108	0.70	110	0.71	-	-
8:30 PM	110	0.71	102	0.66	108	0.70	110	0.71	-	-
8:45 PM	110	0.71	103	0.67	109	0.71	111	0.72	-	-
9:00 PM	112	0.73	106	0.69	112	0.73	113	0.73	-	-
9:15 PM	113	0.73	110	0.71	114	0.74	114	0.74	-	-
9:30 PM	115	0.75	111	0.72	114	0.74	114	0.74	-	-
9:45 PM	116	0.75	111	0.72	117	0.76	115	0.75	-	-
10:00 PM	116	0.75	112	0.73	116	0.75	117	0.76	-	-
10:15 PM	117	0.76	112	0.73	117	0.76	117	0.76	-	-
10:30 PM	119	0.77	114	0.74	117	0.76	117	0.76	-	-
10:45 PM	119	0.77	115	0.75	117	0.76	119	0.77	-	-
11:00 PM	120	0.78	116	0.75	117	0.76	120	0.78	-	-
11:15 PM	120	0.78	118	0.77	120	0.78	120	0.78	-	-
11:30 PM	120	0.78	118	0.77	120	0.78	121	0.79	-	-
11:45 PM	120	0.78	118	0.77	120	0.78	121	0.79	-	-
Peak	**123**	**0.80**	**121**	**0.79**	**120**	**0.78**	**123**	**0.80**	**122**	**0.79**

Municipal Address:	**1284 Guelph Line**
	Burlington, ON L7L 4X5
Name:	**Mod'rn**
Type:	**Stacked Townhouse**
Units	**78**
Occupied	75
Parking Supply	**111**
Residents	83
Visitors	27
Car Share	1
Parking Supply Ratio	
Spaces/Unit	1.42
Resident spaces/unit	1.08
Visitor spaces/unit	0.35
Parking Rate (occupied)	
Day 1	
Visitor	0.17
Resident	0.69
Overall	**0.84**
Day 2	
Visitor	0.24
Resident	0.68
Overall	**0.92**

Wednesday - 13 April 2016				
Time	**Visitors**	**Residents**	**Car Share**	**Total**
16:00	11	13	1	25
16:15	9	17	1	27
16:30	11	15	1	27
16:45	13	17	1	31
17:00	12	19	1	32
17:15	10	20	1	31
17:30	7	25	1	33
17:45	9	29	1	39
18:00	9	32	1	42
18:15	10	35	1	46
18:30	9	38	1	48
18:45	13	39	1	53
19:00	12	42	1	55
19:15	10	45	1	56
19:30	12	45	1	58
19:45	10	44	1	55
20:00	13	43	1	57
20:15	13	42	1	56
20:30	12	44	1	57
20:45	12	46	1	59
21:00	**13**	47	1	61
21:15	12	49	1	62
21:30	11	50	1	62
21:45	11	**51**	1	63
22:00	12	50	**1**	**63**

Thursday - 14 April 2016				
Time	**Visitors**	**Residents**	**Car Share**	**Total**
16:00	7	14	1	**22**
16:15	7	19	1	**27**
16:30	5	19	1	**25**
16:45	5	19	1	**25**
17:00	4	18	1	**23**
17:15	4	20	1	**25**
17:30	5	23	1	**29**
17:45	7	23	1	**31**
18:00	8	25	1	**34**
18:15	8	28	1	**37**
18:30	9	31	1	**41**
18:45	9	34	1	**44**
19:00	9	36	1	**46**
19:15	8	35	1	**44**
19:30	10	36	1	**47**
19:45	10	39	1	**50**
20:00	10	41	1	**52**
20:15	11	42	1	**54**
20:30	12	42	1	**55**
20:45	15	44	1	**60**
21:00	14	47	1	**62**
21:15	16	48	1	**65**
21:30	17	50	1	**68**
21:45	18	50	1	**69**
22:00	**18**	**50**	**1**	**69**

NOTE: Car share is assumed to be related to the Resident demand only.

Municipal Address:	**1284 Guelph Line**
	Burlington, ON L7L 4X5
Name:	**Mod'rn**
Type:	**Stacked Townhouse**
Units	**78**
Occupied	70
Parking Supply	**111**
Residents	83
Visitors	27
Car Share	1
Parking Supply Ratio	
Spaces/Unit	1.42
Resident spaces/unit	1.08
Visitor spaces/unit	0.35
Parking Rate (occupied)	
Day 1 - 17 August 2016	
Visitor	0.10
Resident	0.87
Total	**0.96**
Day 2 - 23 April 2016	
Visitor	0.14
Resident	0.93
Total	**1.07**

Wednesday - 17 August 2016					
Time	**Visitors**	**Adj. Visitor**	**Residents**	**Car Share**	**Total**
16:00	8	2	26	1	**29**
16:15	10	4	27	1	**32**
16:30	12	5	30	1	**36**
16:45	10	3	28	1	**32**
17:00	9	2	29	1	**32**
17:15	8	1	33	1	**35**
17:30	8	1	34	1	**36**
17:45	8	1	34	1	**36**
18:00	9	1	46	1	**48**
18:15	9	2	46	1	**49**
18:30	10	2	46	1	**49**
18:45	10	2	46	1	**49**
19:00	13	4	47	1	**52**
19:15	13	4	48	1	**53**
19:30	11	2	43	1	**46**
19:45	11	2	44	1	**47**
20:00	12	2	47	1	**50**
20:15	13	3	49	1	**53**
20:30	16	6	50	1	**57**
20:45	16	6	55	1	**62**
21:00	16	6	56	1	**63**
21:15	17	7	56	1	**64**
21:30	17	7	57	1	**65**
21:45	17	**7**	58	1	**66**
22:00	16	6	**60**	**1**	**67**

NOTE: Car share is assumed to be related to the Resident demand only.

Tuesday - 23 August 2016					
Time	**Visitors**	**Adj. Visitor**	**Residents**	**Car Share**	**Total**
16:00	3	1	32	1	**34**
16:15	6	4	30	1	**35**
16:30	6	4	29	1	**34**
16:45	6	4	31	1	**36**
17:00	6	4	34	1	**39**
17:15	8	6	36	1	**43**
17:30	11	7	40	1	**48**
17:45	10	6	40	1	**47**
18:00	9	5	39	1	**45**
18:15	8	3	42	1	**46**
18:30	8	3	43	1	**47**
18:45	7	2	43	1	**46**
19:00	7	2	45	1	**48**
19:15	7	2	46	1	**49**
19:30	8	2	47	1	**50**
19:45	7	2	47	1	**50**
20:00	7	2	46	1	**49**
20:15	7	2	49	1	**52**
20:30	7	2	50	1	**53**
20:45	6	1	52	1	**54**
21:00	7	2	56	1	**59**
21:15	8	3	58	1	**62**
21:30	11	6	59	1	**66**
21:45	10	5	60	1	**66**
22:00	11	6	62	1	**69**
22:15	13	8	61	1	**70**
22:30	13	8	62	1	**71**
22:45	14	9	63	1	**73**
23:00	14	9	63	1	**73**
23:15	14	9	64	1	**74**
23:30	15	10	63	1	**74**
23:45	15	10	63	1	**74**
00:00	15	**10**	**64**	**1**	**75**

NOTE: Car share is assumed to be related to the Resident demand only.

4.4 Parking Utilization Surveys

To better understand of the actual parking demand that can be expected for a development of this type, a number of parking utilization surveys were undertaken by the City of Burlington at local sites with land uses similar to the development proposal for 374 Martha Street. The data collected at these proxy sites will be the best indicator of the parking demands expected at the proposed development as this is current and local data. The parking surveys are provided in **Appendix F** and the following sub-sections further describes the locations as well as the parking rates observed.

4.4.1 Millcroft Place (1998 Ironstone Drive, Burlington)

Millcroft Place is an eleven storey condominium building. Built in 2006, Millcroft Place has 134 two bedroom suites. Floor plans range between 1,196 and 1,482 square feet. Millcroft Place amenities include a party room with billiards, fitness room and hobby room. The parking utilization survey was carried out on a Saturday in November 2013.

The observed parking demand for the survey was calculated at 0.83 parking spaces per residential unit. Visitor parking was calculated at 0.07 parking spaces per residential unit.

4.4.2 Appleby Woods (1980 Imperial Way, Burlington)

Appleby Woods is a six storey condominium building. Built in 2009, Appleby Woods has 101 units with floor plans ranging from 977 up to 1,285 square feet. Appleby Woods amenities include a party room, fitness room, games room and library. The parking utilization survey was carried out on two separate Saturday's in November 2013.

The average observed parking demand for the survey days was calculated at 0.95 parking spaces per residential unit. The average visitor parking was calculated at 0.08 parking spaces per residential unit.

4.4.3 Strata (551 Maple Avenue, Burlington)

Strata is a twenty-one storey condominium building. Built in 2012, Strata has 186 units with floor plans ranging from 1 bedrooms up to 3 bedrooms. Strata amenities include indoor pool, hot tub, fitness room, party room, meditation garden and guest suites. The parking utilization survey was carried out on a Saturday in February 2014.

The observed parking demand for the survey day was calculated at 0.81 parking spaces per residential unit. The average visitor parking was calculated at 0.10 parking spaces per residential unit.

4.4.4 The Baxter (339 Elizabeth Street, Burlington)

The Baxter is a twelve storey condominium building. Built in 2006, the Baxter has 122 units with floor plans ranging from 1 bedrooms up to 2 bedrooms plus den. The Baxter amenities include fitness room, party room, billiards, BBQ area, hobby room and concierge services. The parking utilization survey was carried out on a Saturday in February 2014.

The observed parking demand for the survey day was calculated at 0.94 parking spaces per residential unit. No visitor parking rate was calculated for this location.

4.4.5 360 on Pearl (360 Pearl Street, Burlington)

360 on Pearl is a seventeen storey condominium building. Built in 2009, 360 on Pearl has 85 units with floor plans ranging from 1 bedrooms up to 2 bedrooms plus den. 360 on Pearl's amenities include fitness room, party room, billiards, rooftop terrace and theater. The parking utilization survey was carried out on a Saturday in February 2014.

The observed parking demand for the survey day was calculated at 0.75 parking spaces per residential unit. No visitor parking rate was calculated for this location.

4.4.6 Parking Utilization Survey Summary

The observed utilization data suggests that the apartment sites had a peak daily parking demand of 0.95 spaces per unit inclusive of resident and visitor parking as outlined in **Table 4.5**. The collected local survey data is noted to be greater than what ITE estimates for High-Rise Apartment in Urban Central Business Districts (0.45 spaces per unit) and less than what the City's Zoning By-Law requires (1.25 spaces per unit).

TABLE 4.5: OBSERVED DATA PEAK PARKING DEMAND

Data Set	Observed Parking/Unit	
	Residential	Visitor
Millcroft Place Survey 1	0.83	0.07
Appleby Woods Survey 1	0.93	0.05
Appleby Woods Survey 2	0.96	0.12
Strata Survey 1	0.81	0.10
The Baxter Survey 1	0.94	-
360 on Pearl Survey 1	0.75	-
Average Observed Rates	0.87	0.08

Parking Survey

Location: 5340 Lakeshore Road, Burlington

Survey Time: March 29th, 2017, 11:30 p.m.

Total Underground Residential Parking Supply:	60	spaces
Total Surface Residential Parking Supply:	3	spaces
Overall Residential Parking Supply:	63	spaces
Total number of Residential spaces occupied:	**45**	**spaces**
Total Visitor Parking Supply:	16	spaces
Total number of visitor spaces occupied:	**4**	**spaces**
Total number of dweling units occupied:	**42**	**units**
Residential Parking Rate:	1.07	residential spaces/dwelling unit
Visitor Parking Rate:	0.10	visitor spaces/dwelling unit

Appendix K

Occupant Parking Regression Analysis

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.940873666
R Square	0.885243256
Adjusted R Square	0.872492507
Standard Error	17.05117551
Observations	11

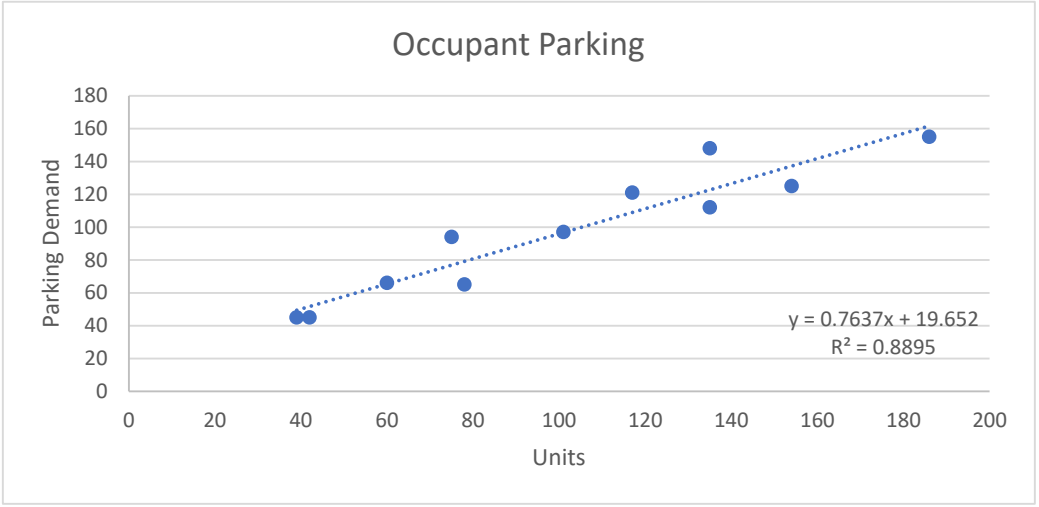
ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	20185.31672	20185.31672	69.42676335	1.5968E-05
Residual	9	2616.683275	290.7425862		
Total	10	22802			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-11.54300292	14.56445733	-0.792546035	0.448428813	-44.4900944	21.40408857	-44.4900944	21.40408857
X Variable 1	1.166174633	0.139958774	8.3322724	1.5968E-05	0.849565889	1.482783377	0.849565889	1.482783377

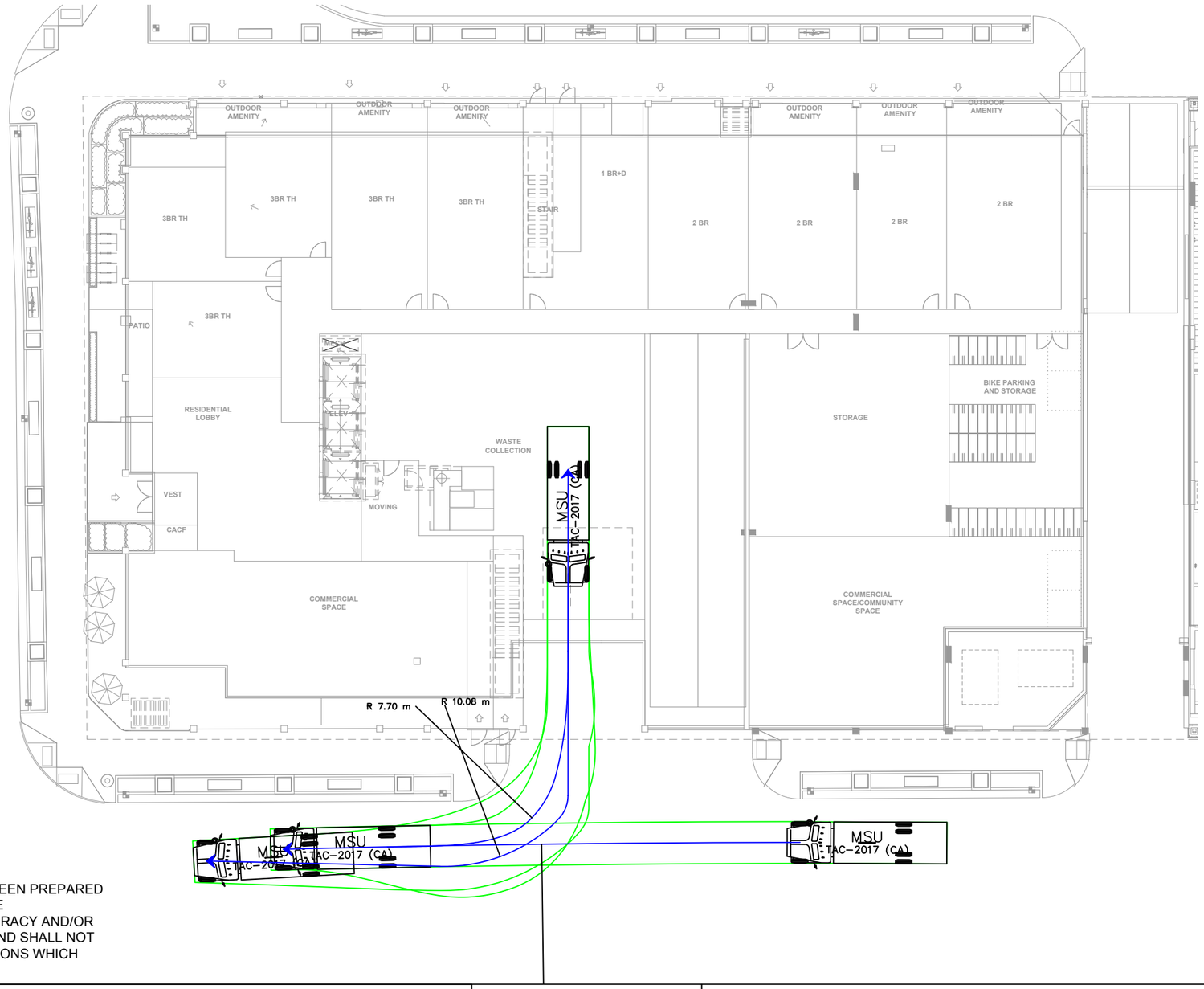
RESIDUAL OUTPUT

Observation	*Predicted Y*	*Residuals*
1	40.93485557	1.065144425
2	161.0508428	-26.05084279
3	129.5641277	-12.56412769
4	98.0774126	-23.0774126
5	65.42452287	-5.42452287
6	40.93485557	-1.934855575
7	64.25834824	13.74165176
8	101.5759365	-0.575936497
9	169.2140652	16.78593478
10	119.068556	15.93144401
11	131.896477	22.10352304



Appendix L

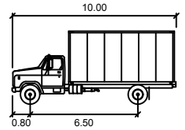
AutoTURN Plots



THIS AUTOTURN SWEPT PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

NO.	DATE	INITIAL	REVISION DETAIL

DESIGN VEHILCE:



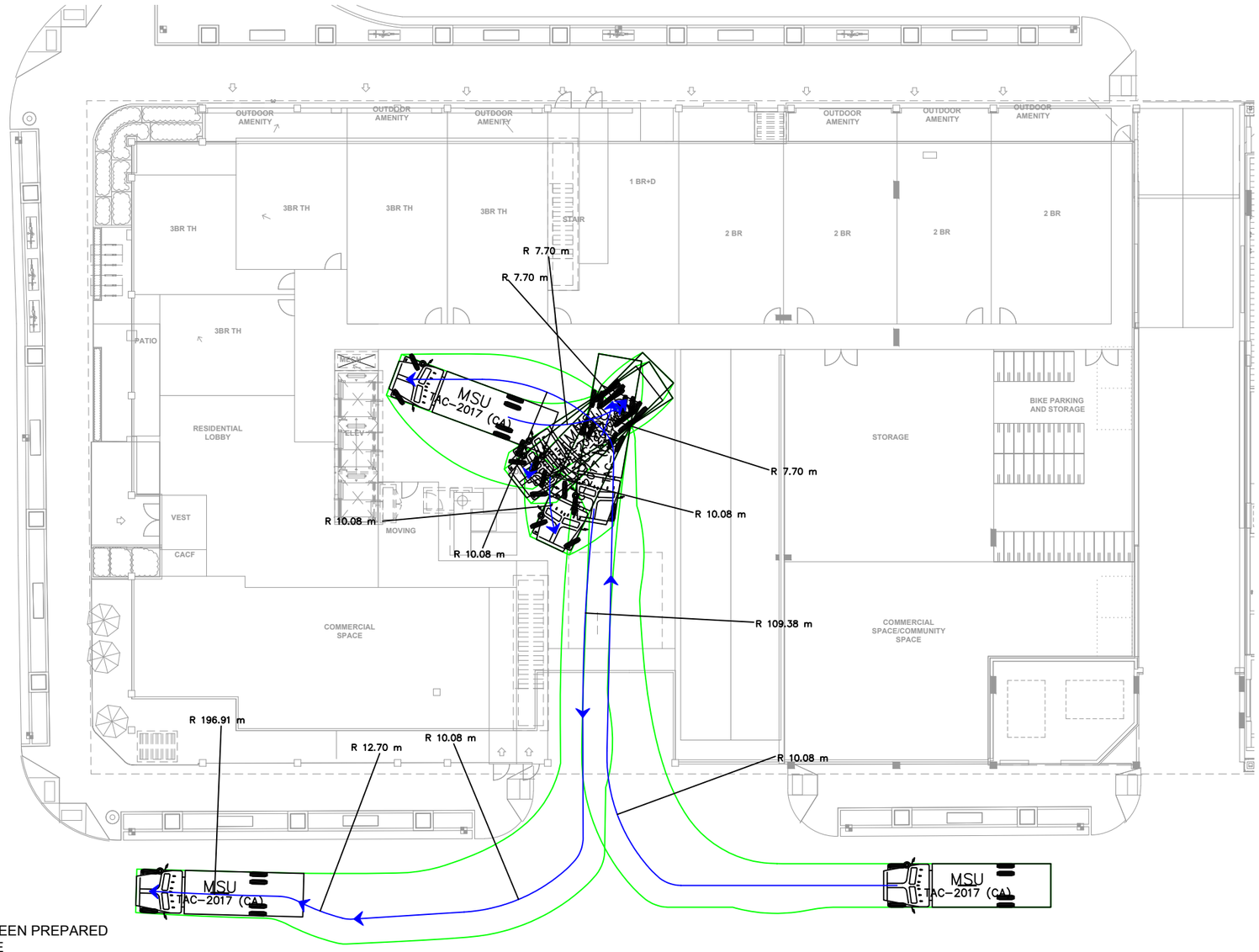
MSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.2

AUTOTURN ASSESSMENT
2030 CAROLINE STREET
BURINGTON, ON

paradigm

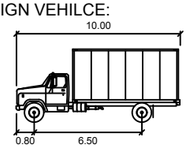
PROJECT NO.: 230499	DATE: JUNE 2024	SCALE: 1:300	DRAWING NO.: 01
DRAWN: LC	DESIGN: LC	CHECK: LC	



THIS AUTOTURN SWEPT PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

NO.	DATE	INITIAL	REVISION DETAIL

DESIGN VEHILCE:



MSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.2

AUTOTURN ASSESSMENT
2030 CAROLINE STREET
BURINGTON, ON

paradigm

PROJECT NO.: 230499	DATE: JUNE 2024	SCALE: 1:300	DRAWING NO.: 02
DRAWN: LC	DESIGN: LC	CHECK: LC	

Appendix M

Parking Utilization Surveys

Friday April 12th, 2024

Times: 8AM-12PM and 4PM-8PM

Lot 1 – 2030 Caroline Street **Total Number of Parking Spots: 28**

Included in the total count 2 parking spaces for Accessible and 5 parking spaces for Carriage

Time	Count
8:00	4
8:15	4
8:30	4
8:45	4
9:00	5
9:15	5
9:30	4
9:45	3
10:00	3
10:15	3
10:30	4
10:45	4
11:00	3
11:15	3
11:30	3
11:45	5
12:00	4

Time	Count
4:00	1
4:15	1
4:30	1
4:45	2
5:00	3
5:15	3
5:30	4
5:45	5
6:00	5
6:15	6
6:30	7
6:45	9
7:00	11
7:15	12
7:30	13
7:45	12
8:00	12

Friday April 12th, 2024

Times: 8AM-12PM and 4PM-8PM

Lot 2 – North side of Caroline Street East side of John Street

Total Number of Parking Spots: 165

Included in the total count – 3 parking spaces for reserved Joe Dogs Grill, 2 parking spaces EV and 7 parking spaces Accessible

Time	Count
8:00	27
8:15	32
8:30	32
8:45	39
9:00	47
9:15	54
9:30	59
9:45	60
10:00	63
10:15	61
10:30	63
10:45	63
11:00	63
11:15	64
11:30	64
11:45	64
12:00	66

Time	Count
4:00	45
4:15	46
4:30	46
4:45	41
5:00	41
5:15	44
5:30	41
5:45	40
6:00	39
6:15	37
6:30	49
6:45	41
7:00	43
7:15	47
7:30	44
7:45	47
8:00	48

Friday April 12th, 2024

Times: 8AM-12PM and 4PM-8PM

Road Parking – Caroline Street from John to Elizabeth

Total Number of Parking Spots: 0

Large Vehicle Loading Zone

Time	Count
8:00	-
8:15	-
8:30	-
8:45	-
9:00	-
9:15	-
9:30	-
9:45	-
10:00	-
10:15	-
10:30	-
10:45	-
11:00	-
11:15	-
11:30	-
11:45	-
12:00	-

Time	Count
4:00	-
4:15	-
4:30	-
4:45	-
5:00	-
5:15	-
5:30	-
5:45	-
6:00	-
6:15	-
6:30	-
6:45	-
7:00	-
7:15	-
7:45	-
8:00	-

Friday April 12th, 2024

Times: 8AM-12PM and 4PM-8PM

Road Parking – Elizabeth Street from Caroline to Maria

Total Number of Parking Spots:8

Parking Machines Covered with tarp which reads – Emergency Stopping Only

Time	Count
8:00	0
8:15	0
8:30	0
8:45	0
9:00	0
9:15	0
9:30	0
9:45	0
10:00	0
10:15	0
10:30	1
10:45	1
11:00	0
11:15	0
11:30	0
11:45	0
12:00	0

Time	Count
4:00	1
4:15	0
4:30	0
4:45	0
5:00	1
5:15	1
5:30	1
5:45	1
6:00	1
6:15	1
6:30	1
6:45	1
7:00	1
7:15	2
7:30	3
7:45	3
8:00	3

Friday April 12th, 2024

Times: 8AM-12PM and 4PM-8PM

Road Parking – John Street from Caroline to Maria

Total Number of Parking Spots: 11

Time	Count
8:00	0
8:15	0
8:30	1
8:45	3
9:00	1
9:15	3
9:30	1
9:45	2
10:00	6
10:15	5
10:30	6
10:45	5
11:00	7
11:15	5
11:30	6
11:45	7
12:00	8

Time	Count
4:00	6
4:15	5
4:30	3
4:45	3
5:00	6
5:15	2
5:30	1
5:45	2
6:00	3
6:15	3
6:30	5
6:45	9
7:00	10
7:15	10
7:30	10
7:45	10
8:00	10

Friday April 12th, 2024

Times: 8AM-12PM and 4PM-8PM

Road Parking – Maria Street from John to Elizabeth

Total Number of Parking Spots: 0

20 Minute Loading Area

Time	Count
8:00	-
8:15	-
8:30	-
8:45	-
9:00	-
9:15	-
9:30	-
9:45	-
10:00	-
10:15	-
10:30	-
10:45	-
11:00	-
11:15	-
11:30	-
11:45	-
12:00	-

Time	Count
4:00	-
4:15	-
4:30	-
4:45	-
5:00	-
5:15	-
5:30	-
5:45	-
6:00	-
6:15	-
6:30	-
6:45	-
7:00	-
7:15	-
7:30	-
7:45	-
8:00	-

Saturday April 13th 2024

Times: 10AM-2PM and 4PM-8PM

Lot 1 – 2030 Caroline Street **Total Number of Parking Spots: 28**

Included in the total count 2 parking spaces for Accessible and 5 parking spaces for Carriage

Time	Count
10:00	11
10:15	12
10:30	14
10:45	13
11:00	14
11:15	14
11:30	14
11:45	12
12:00	11
12:15	11
12:30	10
12:45	8
1:00	11
1:15	13
1:30	15
1:45	15
2:00	15

Time	Count
4:00	18
4:15	16
4:30	16
4:45	16
5:00	13
5:15	13
5:30	13
5:45	15
6:00	14
6:15	14
6:30	15
6:45	15
7:00	18
7:15	19
7:30	19
7:45	20
8:00	17

Saturday April 13th 2024

Times: 10AM-2PM and 4PM-8PM

Lot 2 – North side of Caroline Street East side of John Street

Total Number of Parking Spots: 165

Included in the total count – 3 parking spaces for reserved Joe Dogs Grill, 2 parking spaces EV and 7 parking spaces Accessible

Time	Count
10:00	25
10:15	25
10:30	27
10:45	27
11:00	28
11:15	30
11:30	28
11:45	30
12:00	32
12:15	31
12:30	34
12:45	35
1:00	35
1:15	35
1:30	35
1:45	35
2:00	35

Time	Count
4:00	47
4:15	48
4:30	55
4:45	68
5:00	68
5:15	71
5:30	69
5:45	71
6:00	65
6:15	64
6:30	68
6:45	71
7:00	76
7:15	74
7:30	73
7:45	
8:00	

Saturday April 13th 2024

Times: 10AM-2PM and 4PM-8PM

Road Parking – Caroline Street from John to Elizabeth

Total Number of Parking Spots: 0

Large Vehicle Loading Zone

Time	Count
10:00	-
10:15	-
10:30	-
10:45	-
11:00	-
11:15	-
11:30	-
11:45	-
12:00	-
12:15	-
12:30	-
12:45	-
1:00	-
1:15	-
1:30	-
1:45	-
2:00	-

Time	Count
4:00	-
4:15	-
4:30	-
4:45	-
5:00	-
5:15	-
5:30	-
5:45	-
6:00	-
6:15	-
6:30	-
6:45	-
7:00	-
7:15	-
7:45	-
8:00	-

Saturday April 13th 2024

Times: 10AM-2PM and 4PM-8PM

Road Parking – Elizabeth Street from Caroline to Maria

Total Number of Parking Spots:8

Parking Machines Covered with tarp which reads – Emergency Stopping Only

Time	Count
10:00	0
10:15	0
10:30	2
10:45	1
11:00	1
11:15	1
11:30	0
11:45	2
12:00	3
12:15	2
12:30	0
12:45	0
1:00	0
1:15	0
1:30	1
1:45	0
2:00	0

Time	Count
4:00	2
4:15	2
4:30	1
4:45	2
5:00	0
5:15	1
5:30	0
5:45	2
6:00	2
6:15	2
6:30	2
6:45	2
7:00	2
7:15	2
7:30	1
7:45	3
8:00	3

Saturday April 13th 2024

Times: 10AM-2PM and 4PM-8PM

Road Parking – Maria Street from John to Elizabeth

Total Number of Parking Spots: 0

20 Minute Loading Area

Time	Count
10:00	-
10:15	-
10:30	-
10:45	-
11:00	-
11:15	-
11:30	-
11:45	-
12:00	-
12:15	-
12:30	-
12:45	-
1:00	-
1:15	-
1:30	-
1:45	-
2:00	-

Time	Count
4:00	-
4:15	-
4:30	-
4:45	-
5:00	-
5:15	-
5:30	-
5:45	-
6:00	-
6:15	-
6:30	-
6:45	-
7:00	-
7:15	-
7:30	-
7:45	-
8:00	-

Saturday April 13th 2024

Times: 10AM-2PM and 4PM-8PM

Road Parking – John Street from Caroline to Maria

Total Number of Parking Spots: 11

Time	Count
10:00	5
10:15	9
10:30	8
10:45	9
11:00	5
11:15	7
11:30	4
11:45	2
12:00	6
12:15	7
12:30	5
12:45	6
1:00	10
1:15	10
1:30	9
1:45	7
2:00	7

Time	Count
4:00	3
4:15	6
4:30	6
4:45	4
5:00	8
5:15	9
5:30	9
5:45	10
6:00	10
6:15	10
6:30	9
6:45	10
7:00	11
7:15	10
7:30	11
7:45	10
8:00	11