Brantford Downtown Streetscaping EA Transportation & Traffic Analysis

Paradigm Transportation Solutions Limited

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Executive Summary

Content

The City of Brantford is undertaking a Class Environmental Assessment (EA) for streetscaping the Downtown to improve walkability, accessibility, and underground infrastructure to allow for development, enhance the infrastructure for all transportation modes, and increase pedestrian capacity. The goal of the streetscaping improvements is to create a Downtown that is attractive, vibrant and safe for users and provides the infrastructure needed to accommodate expected growth.

This supporting Transportation Study examines the proposed streetscaping alternatives from multi-modal, safety and traffic operations perspective.

The multi-modal study approach included:

- An examination of the existing road network, traffic, land use and travel characteristics along Colborne Street and Dalhousie Street to illustrate the transportation context for the corridors;
- A road safety performance assessment and recommended mitigation measures based on collision history, field investigation and predictive safety techniques;
- Forecast 2025, 2030 and 2051 traffic patterns and operational analyses to identify deficiencies in the existing road network;
- Traffic operations assessments for the improvement alternatives to determine the merits in; and
- Evaluation of the candidate solutions in terms of their ability to maintain satisfactory traffic operations while capitalizing on the walkability, pedestrian capacity and active transportation within the downtown.

Five alternatives were considered:

- **Alternative 1: Do-Nothing:** Current configurations along Colborne Street and Dalhousie Street; one-way operation with on-street parking permitted through various segments. Sidewalks are provided on both sides of the roadway with a reduced public realm. Additionally, there are no cycling facilities provided within the study area.
- **Alternative 2: Two Way (Bi-Directional Cycle)**: Consists of providing two-way traffic flow on Colborne Street and Dalhousie Street while providing a dedicated bi-directional cycling facility on one-side of the roadway. On-street parking will be dedicated

to one-side of the street providing for narrow travel lanes to reduce speed however pedestrian space is not any wider than existing.

- **Alternative 3: Two Way (Separated Cycle)**: Consists of providing two-way traffic flow on Colborne Street and Dalhousie Street while providing a dedicated cycling facility on both sides of the roadway. On-street parking will be dedicated to one-side of the street providing for narrow travel lanes to reduce speed however pedestrian space is not any wider than existing.
- **Alternative 4: One Way (Bi-Directional Cycle)**: Maintains one-way traffic flow on Colborne Street and Dalhousie Street while providing a dedicated bi-directional cycling facility on one side of the roadway. On-street parking will be dedicated to one side of the street, providing for narrow travel lanes to reduce speed; however, pedestrian space is not any wider than existing.
- **Alternative 5: One Way (Separated Single Cycle)**: Maintains one-way traffic flow on Colborne Street and Dalhousie Street while providing a dedicated cycling facility on one side of the roadway. On-street parking will be dedicated to one side of the street, providing narrow travel lanes to reduce speed and additional space, increasing pedestrian space.

A preliminary evaluation of the alternatives by the study team concluded that Do-Nothing would not be carried forward as it did not capitalize on the walkability, pedestrian capacity and active transportation within the downtown. As a result, the report primarily focused on Alternative 2-5.

Conclusions

Colborne Street and Dalhousie Street has frequently been discussed as a potential street to convert from one-way to two-way. Decisions regarding one-way versus two-way streets need to be context sensitive and value-based, having regard for the shared community vision, planned road functions, and competing interests for the valued and often constrained right-of-way (ROW) of any given street.

Operations

The 2051 forecast traffic conditions under the one-way and two-way scenarios indicate that the peak period level of service conditions at the downtown street intersections are generally satisfactory. This is particularly the case within the downtown area, where most intersections operate at a level of service A or B. The intersections projected to experience some congestion are generally at the centre of the downtown core (i.e., Clarence Street) under both the one-way and two-way scenarios.

A widening of Clarence Street would result in significant property impacts and would be constrained by the railway spur line on the east side (limiting widening options to the west side). The Veterans Memorial Parkway partial extension (to Murray Street) provides an opportunity for an alternative route out of downtown via Murray Street. A partial extension of the Veterans Memorial Parkway could be considered beyond 2051 to address potential long-term issues and should be protected for as an alternative to Clarence Street.

In addition, the two-way scenario is also expected to create some additional capacity constraints at the intersection of Colborne Steet and Brant Avenue given modifications to the east leg are required to achieve a straight alignment through the intersection.

In summary, the one-way scenario offers the least amount of delay and travel time as a result of limited conflicts for turning vehicles at intersections as there is no traffic travelling in the opposite direction to delay either a left turn or right turn movement.

Complete Street

As the primary intent of the preferred streetscaping alternative is to improve walkability and accessibility for all transportation modes, one of the main objectives in determining the preferred alternative is to create a complete street. Although it seems to be a commonly held view that converting the high-speed and high-capacity one-way downtown streets to two-way could be necessary for a downtown revitalization program, there are advantages to bringing together different types of activities within a relatively dense and diversified environment. There are also advantages to using multitudinous strategies to achieve an objective with several interrelated factors.

As the downtown streets are provided with a narrow right-of-way with limited opportunity to expand, there are many competing interests for space, including sidewalks, bus stops/shelters, landscaping, public art, bicycle parking, vendor boxes, streetlights, fire hydrants, on-street parking, and travel lanes. Given the intensity of use and the increase in intensity envisioned with the Streetscape investment, decisions regarding space allocation are anticipated to become more complex.

Balancing the competing interests for space is always the first challenge when designing complete streets. In downtown Brantford, this competition is fierce due to the volume of travel in all modes that must be accommodated within municipal street rights-of-way that are incredibly narrow. As a result, it is sensible to create street design solutions that can fit within the narrow right-of-way that covers most of downtown Brantford.

Pedestrian Safety

Pedestrian safety in downtown commercial streets is paramount because in most cases, a downtown motorist’s destination is some place to park the car, namely a garage, lot or on-street parking space; upon parking, the motorist leaves the vehicle as a pedestrian to access the final destination.

Both sides of the one-way to two-way debate accept the importance of pedestrian safety but there is not an agreement as to which way of travel is actually safer as pedestrian safety may depend on characteristics that can only be determined on a case-by-case basis. There are several benefits of two-way streets that positively affect pedestrian safety and pedestrian experience; a relatively new criterion for successful downtowns.

Preferred Arrangement

The foregoing assessment indicates there are valid arguments for both maintaining an existing one-way street network in Downtown Brantford, and conversely, converting one-way operation to two-way operation.

In downtown Brantford’s case, the primary one-way street network is considered somewhat unique given the connectivity the subject streets provide to critical elements of the region’s transportation infrastructure and bridge crossings of rivers. It is also worth noting that the downtown streets with the most mixed and street-oriented land use and high and sustained pedestrian activity are two-way streets. More importantly, the narrow ROW reality of downtown Brantford streets creates added pressure on the roads to operate as efficiently as possible for all modes. Since the vision for the downtown is to pursue avenues that can provide wider sidewalks and on-street cycling facilities, as well as basic functionality for vehicles and buses, this tends to balance the scales towards one-way operation, provided the narrow ROW can be re-arranged accordingly.

Preferred Alternative

As the one-way operation is seen as the beneficial arrangement in meeting the overall goals and intent of the Streetscaping alternative, Alternatives 4 and 5 were determined to meet this criteria for further consideration. A comparison of these alternative concluded that Alternative 5 is preferred over Alternative 4 as it is better suited towards improving road safety and enhancing the overall pedestrian realm.

To ensure that the response times of emergency vehicles are not impacted negatively by the proposed changes to Colborne Street and

Dalhousie Street, it is recommended that City of Brantford Transportation Services work with Brantford Fire Services to further refine the pre-emption along the Colborne Street and Dalhousie Street corridor. In addition, further consultation with Brantford Fire Services is recommended during detailed design.

To improve the potential safety hazards within the sub study-area, the implementation of a blanket 40 kilometres posted speed limit along Colborne Street and Dalhousie Street is preferred. Furthermore, improved sidewalks (i.e., wider with limited to no obstructions) and cycling facilities will need to be incorporated. Ultimately, the preferred design and streetscape design should support these recommendations.

Other improvements that may need to be considered in the final design could include bike signals, pedestrian only phases (reserved for intersections with high pedestrian volumes) and pedestrian leading green time to provide pedestrians with an advance opportunity to cross before vehicles are allowed to proceed right.

Additionally, the measures identified are further recommended for consideration:

- The intersection of Dalhousie Street and Bridge Street be modified to only one-way traffic in the northbound direction to reduce the number of potential conflicts with westbound through traffic.
- To mitigate the number of active transportation collisions along Colborne Street between the Market Street IPS and Clarence Street, an additional controlled crossing be considered.

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1 Introduction

The City of Brantford retained MTE Consultants Inc. to undertake a Municipal Class Environmental Assessment (EA) study for streetscaping the downtown core. The project's goal is, in part, to create an aesthetically beautiful environment boosting the image and awareness of the downtown revitalization efforts. The main objectives are to create a complete street that will enhance the walkability and pedestrian capacity downtown, to animate these streets and to become a place-making destination.

This Transportation and Traffic Analysis Report is a supporting technical report for the Class EA.

1.1 Study Purpose and Scope

Paradigm Transportation Solutions Limited (Paradigm) as a member of the MTE Consultants Inc. team has carried out a sub-area transportation network analysis in support of the Municipal Class EA Study. This Transportation and Traffic Analysis Report assesses existing traffic conditions and deficiencies and determines the transportation demands and the associated network improvements required for the horizon years of 2025, 2030 and 2051.

The detailed transportation and traffic analysis examines the streetscape implementation of Colborne Street and Dalhousie Street to improve active transportation, walkability, pedestrian capacity and to confirm the appropriate configuration of the improvements.

1.2 Study Area

The study area includes Colborne Street and Dalhousie Street from the junction, extending to Brant Avenue and Icomm Drive. It also captures the connecting north/south streets between this area including Brant Avenue, King Street, Queen Street, Market Street, Charlotte Street, and Clarence Street. **Figure 1.1** illustrates the study area.

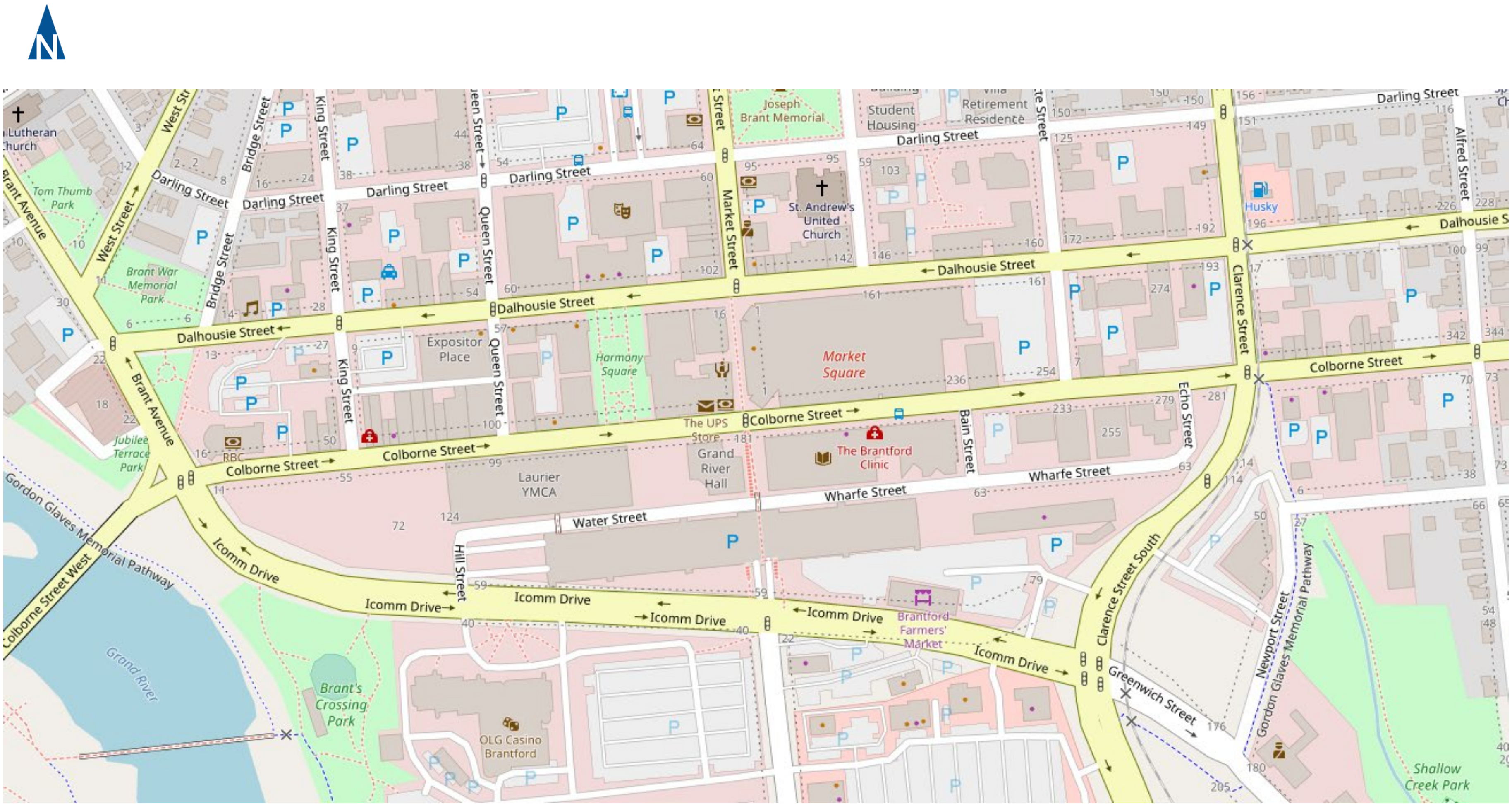

Image Source: Google (2020)

Study Area

Figure 1.1

1.3 Proposed Alternatives

As part of the downtown revitalization efforts, the City of Brantford's preferred alternative will capitalize on the walkability, pedestrian capacity and active transportation in the downtown. To realize this goal, several alternative cross-sections for both Colborne Street and Dalhousie Street have been developed:

- **Alternative 1: Do-Nothing:** Current configurations along Colborne Street and Dalhousie Street; one-way operation with on-street parking permitted through various segments. Sidewalks are provided on both sides of the roadway with a reduced public realm. Additionally, there are no cycling facilities provided within the study area.
- **Alternative 2: Two Way (Bi-Directional Cycle)**: Consists of providing two-way traffic flow on Colborne Street and Dalhousie Street while providing a dedicated bi-directional cycling facility on one-side of the roadway. On-street parking will be dedicated to one-side of the street providing for narrow travel lanes to reduce speed however pedestrian space is not any wider than existing.
- **Alternative 3: Two Way (Separated Cycle)**: Consists of providing two-way traffic flow on Colborne Street and Dalhousie Street while providing a dedicated cycling facility on both sides of the roadway. On-street parking will be dedicated to one-side of the street providing for narrow travel lanes to reduce speed however pedestrian space is not any wider than existing.
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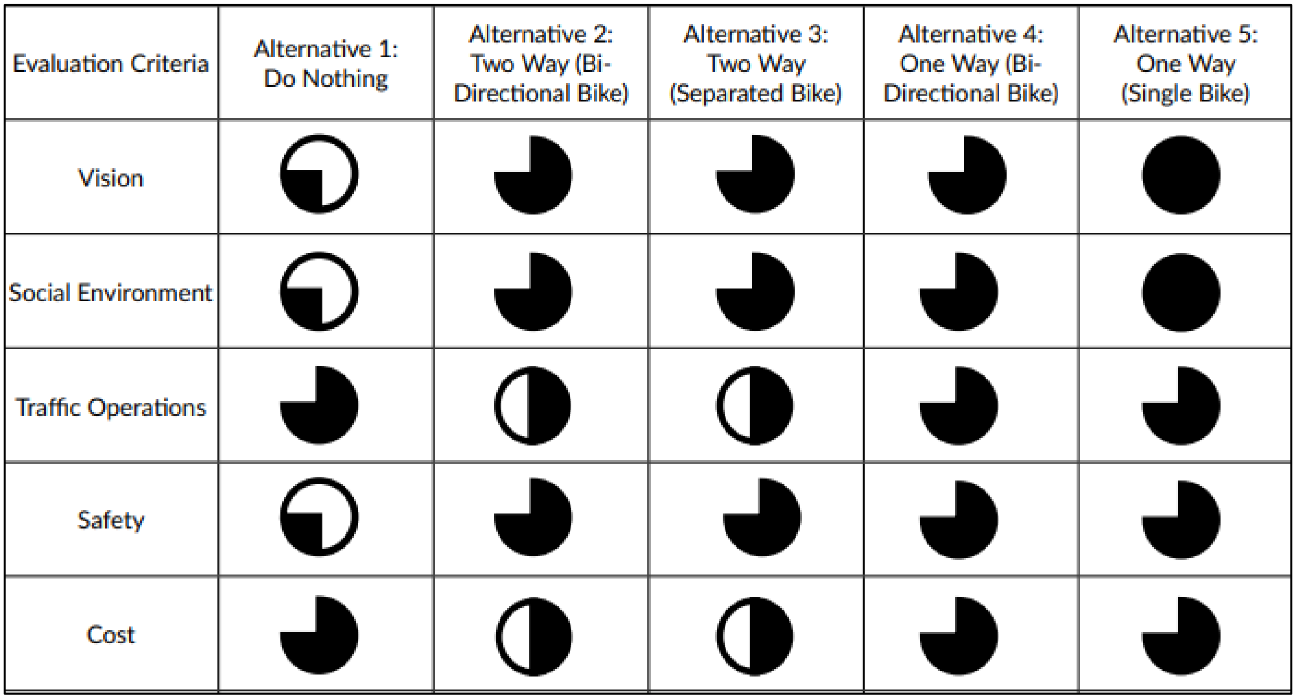
- **Alternative 5: One Way (Separated Single Cycle)**: Maintains one-way traffic flow on Colborne Street and Dalhousie Street while providing a dedicated cycling facility on one side of the roadway. On-street parking will be dedicated to one side of the street, providing narrow travel lanes to reduce speed and gain additional space to increase the pedestrian realm.

The study team concluded that Alternative 1: Do-Nothing, did not meet a significant number of the criteria and through the EA screening process would not be carried forward. **Figure 1.2** illustrates this process.



Evaluation Criteria	Alternative 1: Do Nothing	Alternative 2: Two Way (Bi-Directional Bike)	Alternative 3: Two Way (Separated Bike)	Alternative 4: One Way (Bi-Directional Bike)	Alternative 5: One Way (Single Bike)
Vision	◔	◕	◕	◕	●
Social Environment	◔	◕	◕	◕	●
Traffic Operations	◕	◑	◑	◕	◕
Safety	◔	◕	◕	◕	◕
Cost	◕	◑	◑	◕	◕

Preliminary Alternative Evaluation

Figure 1.2

2 Existing Inventory

2.1 Study Area Network

Colborne Street is a one-way street providing traffic flow in the easterly direction through the Downtown. This roadway forms the southerly section of the designated arterial road through the Downtown area. It has a three lane-cross section within the study area with turning lanes provided at strategic locations. The roadway has a posted speed limit of 50 kilometres per hour. Parking is permitted on both sides of the road through various segments of the corridor, contained mainly to on-street parking bays.

Dalhousie Street is a one-way street providing traffic flow in the westerly direction through the Downtown. This roadway forms the northern section of the designated arterial road through the Downtown area. It has a three lane-cross section within the study area with turning lanes provided at strategic locations. The roadway has a posted speed limit of 50 kilometres per hour. Parking is permitted on both sides of the road through various segments of the corridor, contained mainly to on-street parking bays.

Within the study area, the following collector and local roads intersect Colborne Street and Dalhousie Street and form the basis for the transportation network analysis:

- **Brant Avenue** is a north-south, four-lane, minor arterial roadway with an urban cross-section. The maximum posted speed limit is 50 km/h. South of Colborne Street West, Brant Avenue operates south with a four-lane, undivided cross-section, with two travel lanes per direction. Parking is not permitted on either side of the road.
- **King Street** is a north-south, minor arterial that operates with a two-lane cross-section. The posted maximum speed limit is 50 km/h. Parking is permitted on both sides of the road between Colborne Street and Darling Street.
- **Queen Street** is a north-south, minor arterial that operates with a two-lane cross-section. The posted maximum speed limit is 50 km/h. Parking is permitted on both sides of the road between Dalhousie Street and Darling Street.
- **Market Street** is a north-south, major collector that operates with a two-lane cross-section. The posted maximum speed limit is 50 km/h. Parking is permitted on both sides of the road within the study area.

- **Charlotte Street** is a north-south, local roadway that operates with a two-lane cross-section. The posted maximum speed limit is 50 km/h. Parking is permitted on both sides of the road between Colborne Street and Dalhousie Street and limited to the west side north of Dalhousie Street.
- **Clarence Street** is a major arterial that operates with a four-lane cross-section. The posted maximum speed limit is 50 km/h. Parking is prohibited on both sides of the road.

Table 2.1 provides a summary of major road characteristics within the study rea.

TABLE 2.1: ROAD CHARACTERISTICS WITH STUDY AREA

Road	Speed Limit	Classification	Cross-Section	Land Uses Serviced
Colborne Street	50	Major Arterial	3-Lanes	Core Commercial
Dalhousie Street	50	Major Arterial	3-Lanes	Core Commercial
Brant Avenue	50	Major Arterial	4-Lanes	Core Commercial
King Street	50	Minor Arterial	2-Lanes	Core Commercial
Queen Street	50	Minor Arterial	2-Lanes	Core Commercial
Market Street	50	Major Collector	2-Lanes	Core Commercial
Charlotte Street	50	Local	2-Lanes	Core Commercial
Clarence Street	50	Major Arterial	4-Lanes	Core Commercial

2.3 Traffic Demand

Turning movement counts (TMC) quantify the volume, and type of vehicles travelling through an intersection. The TMC data is typically collected during peak travel periods to capture peak traffic volumes and patterns.

In March 2020, the Provincial and Federal governments enacted measures to reduce the spread of COVID-19. Provincial measures included the closure of non-essential businesses and schools. Federal measures included the closure of the International Border to the United States of America, except for essential travel.

As a result of the COVID-19 pandemic, the ability to collect new traffic count data was not feasible at the commencement of the study given the irregular traffic volumes that would be present. However, there are a number of tools and methods we can rely on to develop reasonable traffic demand projections for the study area roadways based on historical count data available. **Table 2.2** summarizes the historical traffic date of each the study area intersections. **Appendix A** includes the traffic data.

TABLE 2.2: SUMMARY OF TRAFFIC DATA

Intersection	Date
Dalhousie Street at Brant Avenue	December 2012 June 2008
Dalhousie Street at King Street	February 2014 November 2007
Dalhousie Street at Queen Street	July 2018 November 2007
Dalhousie Street at Market Street	August 2014
Dalhousie Street at Charlotte Street	March 2006
Dalhousie Street at Clarence Street	November 2007
Colborne Street at Brant Avenue	June 2008
Colborne Street at King Street	November 2007
Colborne Street at Queen Street	October 2015
Colborne Street at Charlotte Street	November 2007
Colborne Street at Market Street (walkway)	June 2012 June 2005
Colborne Street at Clarence Street	November 2018 November 2007
Colborne Street at Dalhousie Street	March 2015

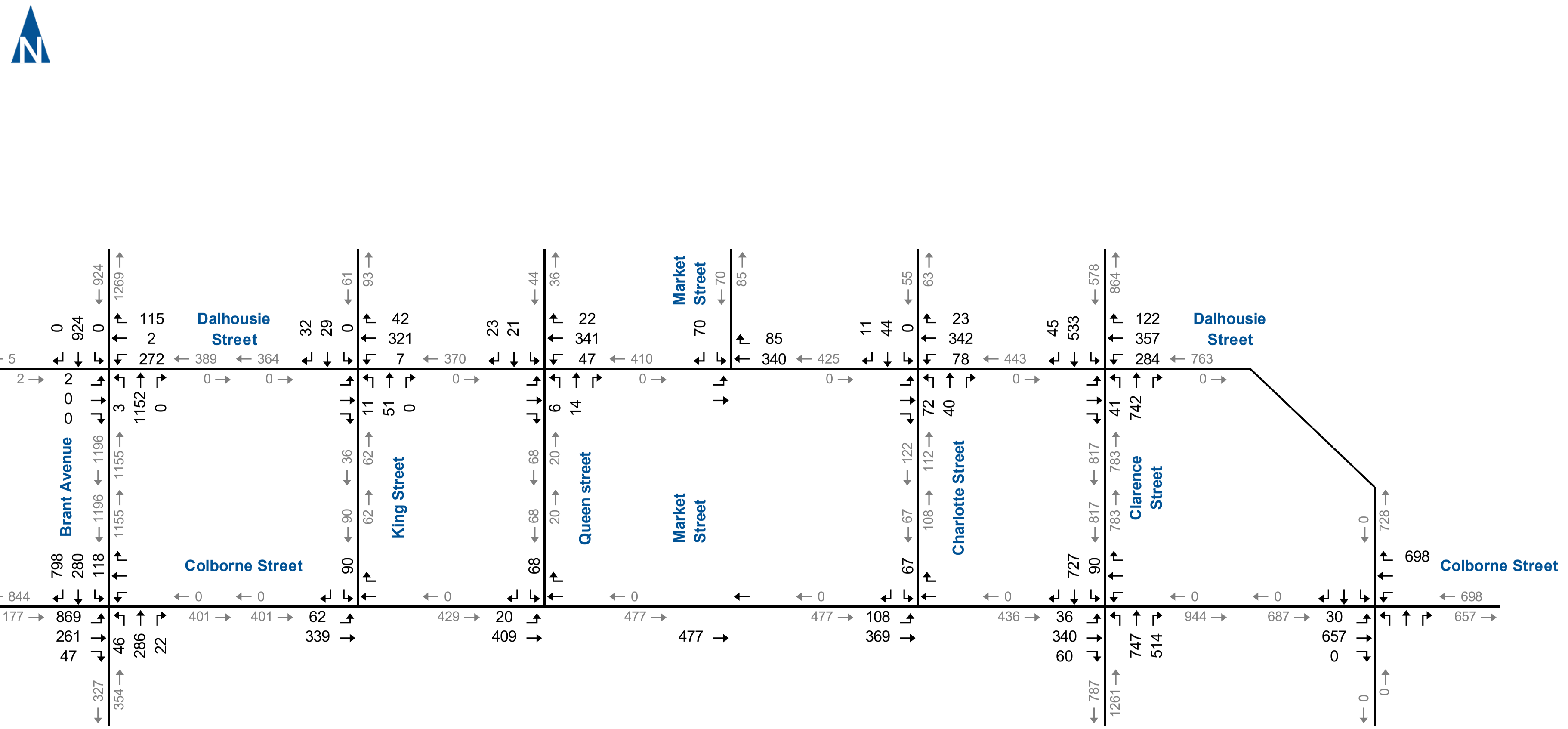
Reasonable demand projections can also be produced through the use of historical data. As the corridors of Colborne Street and Dalhousie Street have a number of intersections within historical count data, a regression analysis has been completed to determine the growth level. Based on the historical volume comparison, the following is noted:

- No significant growth is occurring along Colborne Street and Dalhousie Street, actually a decrease is occurring. Growth if any, is occurring for the minor approaches (north/south movements) however is marginal and likely be representative of 1% per annum.
- Significant growth is occurring along Brant Avenue and likely be representative of 3% per annum.

As the analysis for this study has a primary focus on major signalized intersections, it is noted that unsignalized intersections, driveways, etc., in between major signalized intersections would account for discrepancies between traffic volumes. In addition, the data for each intersection may have been collected at different times and dates, which would also account for discrepancies between the adjacent volumes.

As a result of these discrepancies, volume balancing has been undertaken to ensure there were no irregularities between the upstream and downstream volumes along the respective corridors. Exception to this is segments that contained a driveway/intersection that would be a primary origin/destination for users within the defined study area (i.e., public parking lot/garage).

Figure 2.2 illustrates the intersection turning movement volumes within the study area for the weekday peak hours.



Adjusted Base Year
AM Peak Hour Traffic Volumes

Downtown Brantford Streetscape Class EA – Transportation Study
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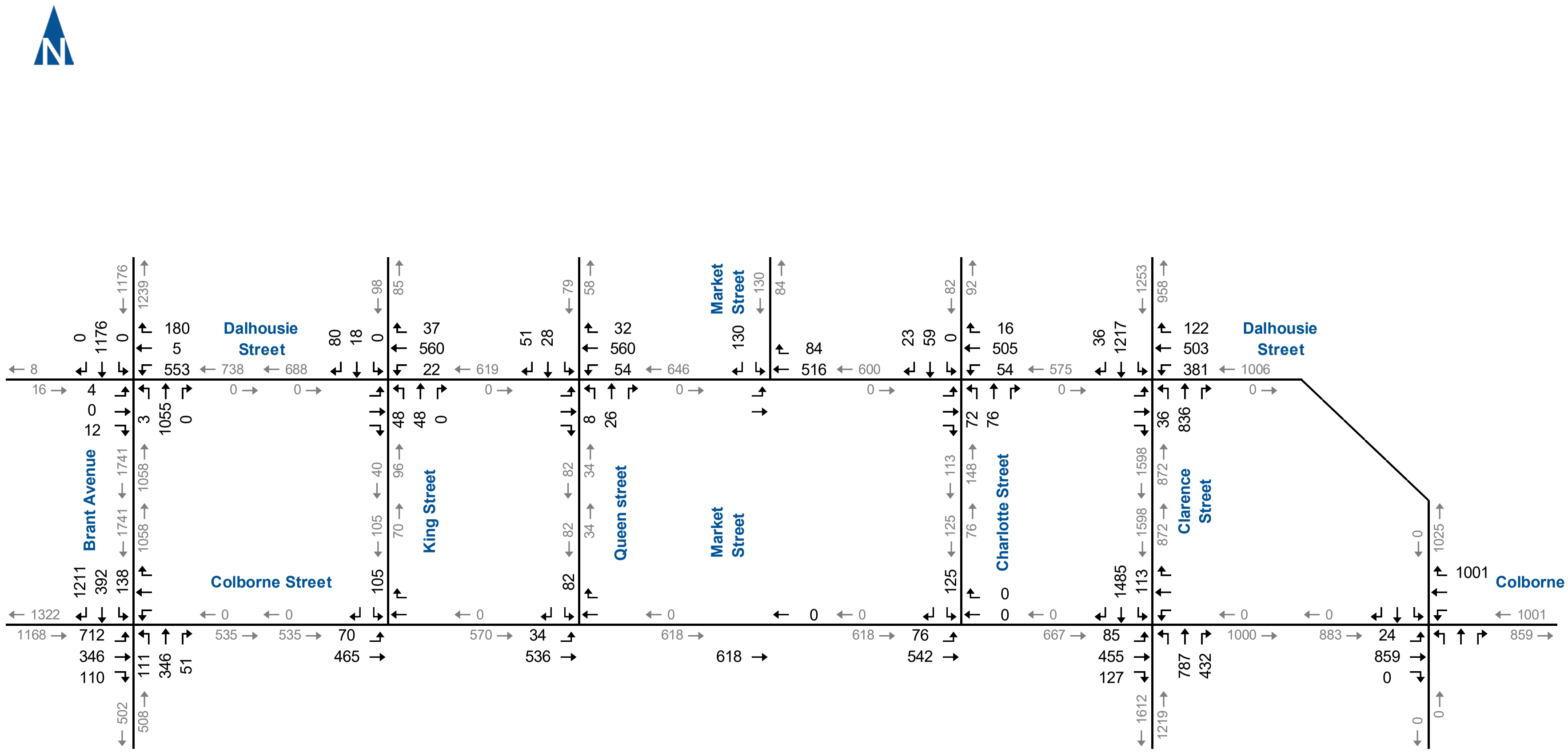
Figure 2.2A



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Adjusted Base Year
PM Peak Hour Traffic Volumes

Figure 2.2B

Figure 2.3 illustrate a summary of the peak hour traffic volumes along Colborne Street and Dalhousie Street by major road segments relative to the estimated roadway capacity for the weekday peak hours. It is noted that the roadway capacity as provided in the City's EMME model has been utilized.

Peak hour peak direction traffic volumes on Colborne Street are approximately 400 to 670 vehicles per hour (veh/hr) between Brant Avenue and Charlotte Street. Segments to the east of Clarence Street are noted to be 1,000 veh/hr. Daily traffic volumes along Colborne Street within the study area reaches about 10,000 vehicles per day which is at the lower end of typical flow characteristic of a major arterial as per the Transportation Association of Canada (TAC) guidelines[1].

Peak hour peak direction traffic volumes on Dalhousie Street are approximately 400 to 800 vehicles per hour (veh/hr) between Brant Avenue and Charlotte Street. Segments to the east of Clarence Street are noted to be 1,000 veh/hr. Daily traffic volumes along Colborne Street within the study area reaches about 10,000 vehicles per day which is at the lower end of typical flow characteristic of a major arterial as per the Transportation Association of Canada (TAC) guidelines.

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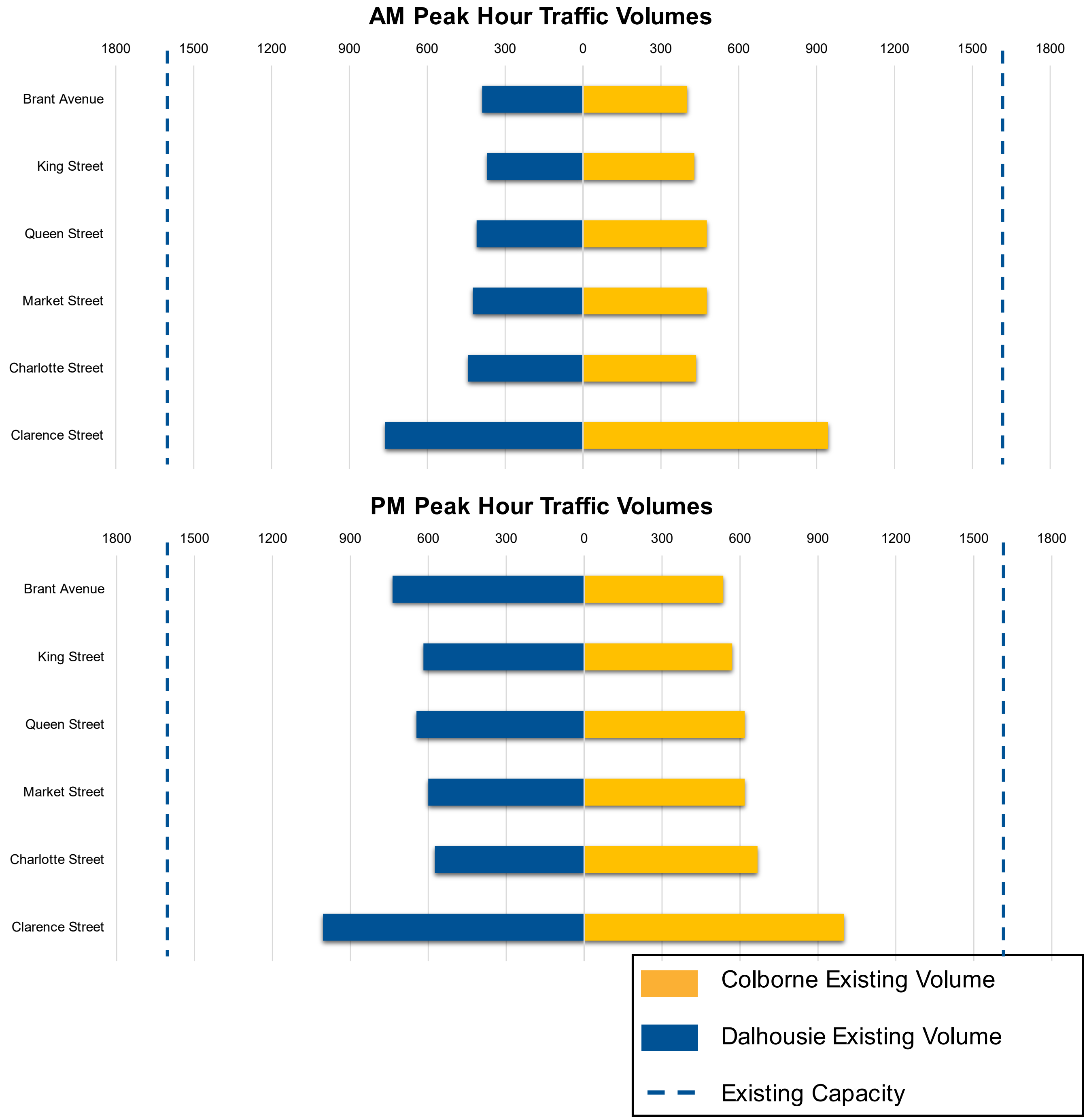
[1] Transportation Association of Canada, Geometric Design Guide for Canadian Road, Table 1.3.4.2, September 1999.



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Base Year Capacity Comparison

Figure 2.3

2.4 Transit

The City of Brantford has a well-developed public transit service operated by Brantford Transit. This service provides conventional public transit services throughout the urban area of Brantford.

The central focus of the City of Brantford transit services is the off-street “transit hub” on the north side of Darling Street and west of Market Street. This terminal provides a downtown route terminus for the various bus routes, with an off-street stop for each route and sheltered passenger waiting areas.

Almost all of the public transit services connect to the downtown transit terminal, operating along the streets within the downtown area. The primary streets used are Colborne Street, Dalhousie Street, Market Street, Clarence Street, Darling Street, Wellington Street, and Brant Avenue. Buses typically operate every 30 minutes on weekdays, with service every 30 minutes during the day on Saturdays and every 60 minutes during evening and Sunday periods.

Figure 2.4 provides an overview of the bus routes and bus stops within the downtown area.

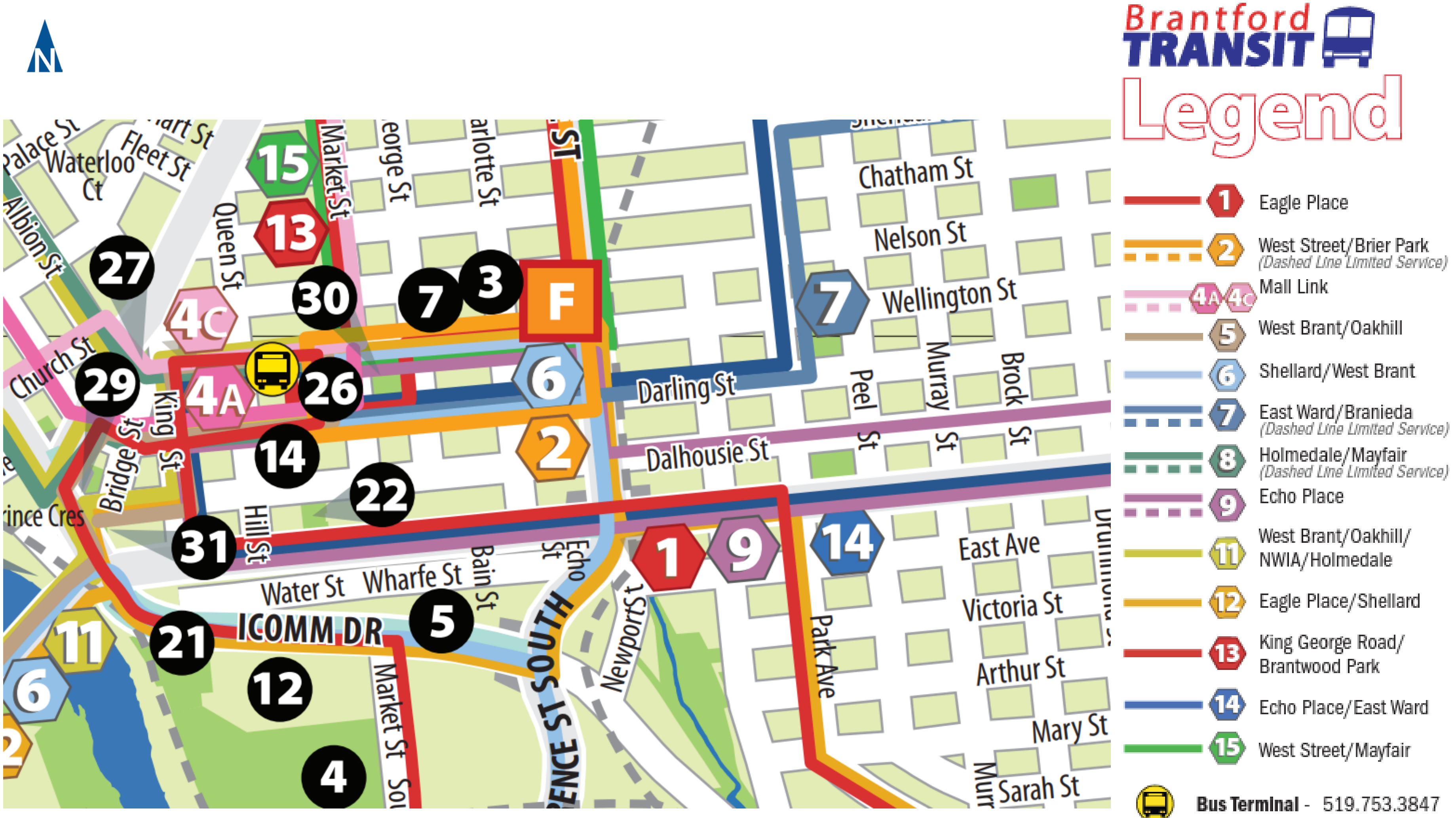

Image Source: Brantford.ca/transit

Existing Transit Network

Figure 2.4

2.5 Active Transportation

2.5.1 Pedestrians

Along the corridor, pedestrians use sidewalks that are provided on both sides of the study area roadways. During the site visit, Paradigm performed spot measurements along each sidewalk corridor. Average sidewalk widths varied between 3.0 metres on the majority of the sidewalks with increased width of up to 5.0 metres at the western limits of the study area along Colborne Street and Dalhousie Street.

All signalized intersections include pedestrian push buttons, pedestrian signal heads, and delineated crosswalks. However, the channelized southbound right-turn movement on Brant Avenue at Colborne Street West consists of an uncontrolled pedestrian crossing.

There is generally a high level of pedestrian activity within the downtown area. The relative levels of pedestrian activity at each intersection are illustrated in **Figure 2.5**.

The highest pedestrian volumes were observed centrally within the study area along Queen Street and Market Street with Colborne Street and Dalhousie Street. Intersections towards the east and west of the downtown have notably lower pedestrian volumes.

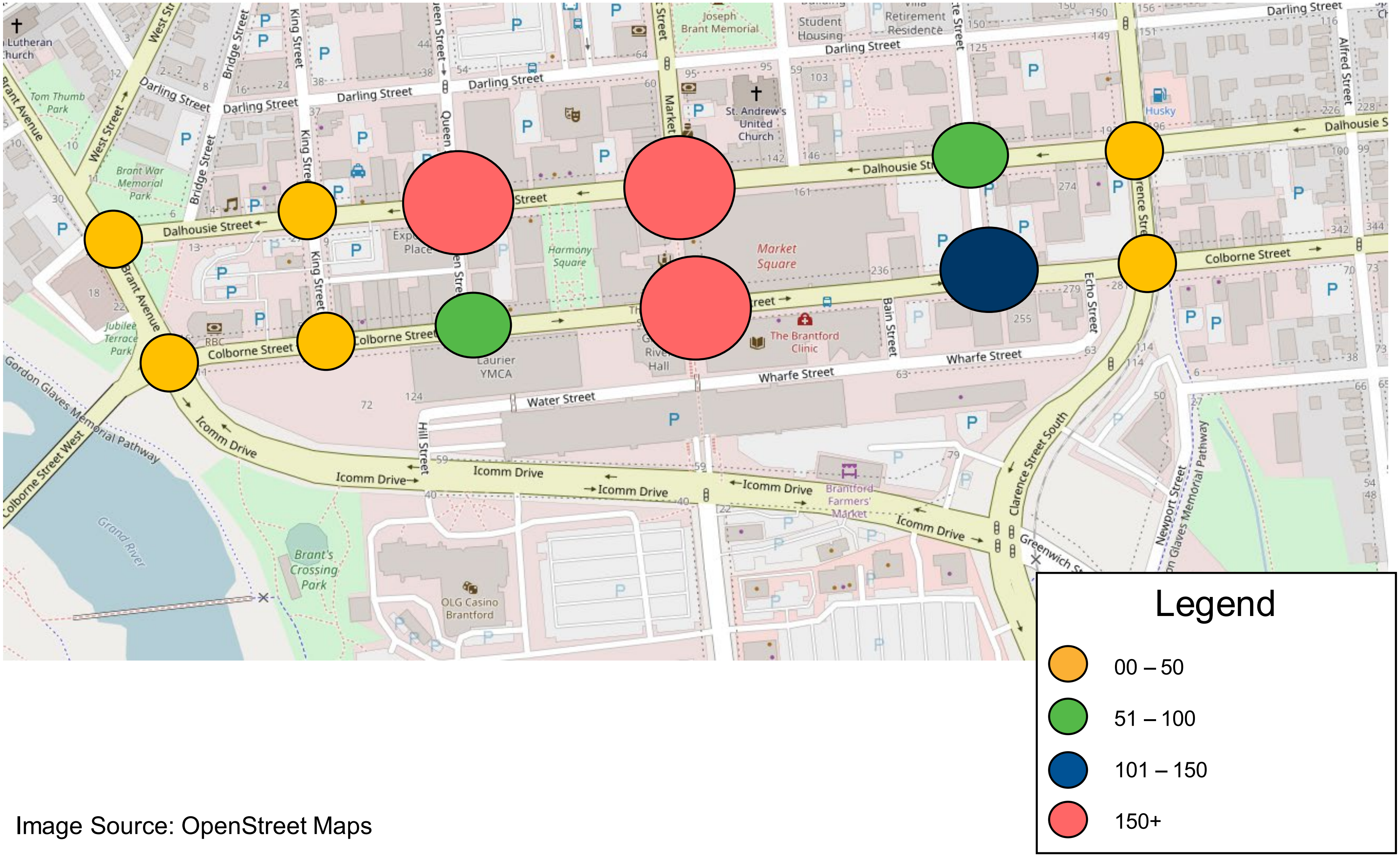

Image Source: OpenStreet Maps

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Pedestrian Volumes AM Peak Hour

Figure 2.5A

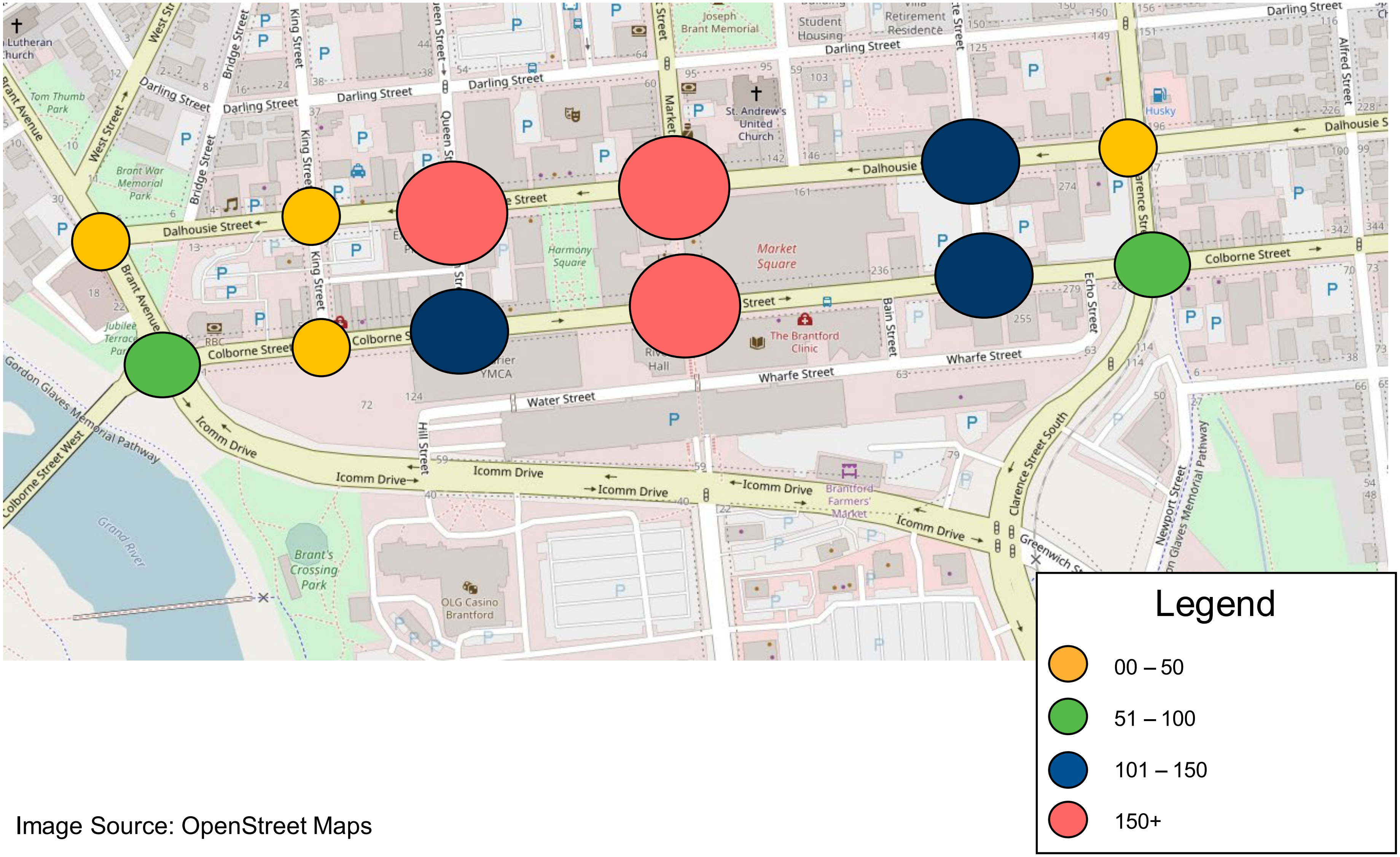

Image Source: OpenStreet Maps

Pedestrian Volumes PM Peak Hour

Figure 2.5B

2.5.2 Cycling

There are no existing cycling facilities along Colborne Street and Dalhousie Street. The Brantford Transportation Master Plan (TMP)[2] identifies these corridors as possible candidates for on-road or in-boulevard facilities. **Figure 2.6** illustrates the proposed cycling connectivity network as outlined in the TMP.

The City's traffic counts and/or Synchro network did not provide cycling data for the intersections within the sub-area. Given limited data, estimates of cycling demand were developed based on the Transportation Tomorrow Survey (TTS). The TTS survey randomly selects households in the Greater Golden Horseshoe (GGH) and is an important data source for transportation planning and is supported by the City of Brantford.

Unlike other data sources, such as regular traffic counts, which measure the change in magnitude of travel demand, the TTS provides information on the characteristics of these changes. As a transportation time series database, the TTS enables analysis on how factors such as flexible work hour programs, relocation of manufacturing employment, and aging population influence how people travel, how often, and the purpose of their trips. TTS data from year 2016[3] (most recent survey) was available for Brantford. This data is comprised of modes of transportation originating in Brantford to destination within and external to Brantford.

Daily cycling trips were reviewed for the entire City to produce a reasonable estimate of the cycling demand. Data from TTS is outlined in **Table 2.3**. The TTS data is provided in **Appendix A**.

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[2] City of Brantford, 2020 Transportation Master Plan Update – 2051 Addendum, Dillion, September 2021

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

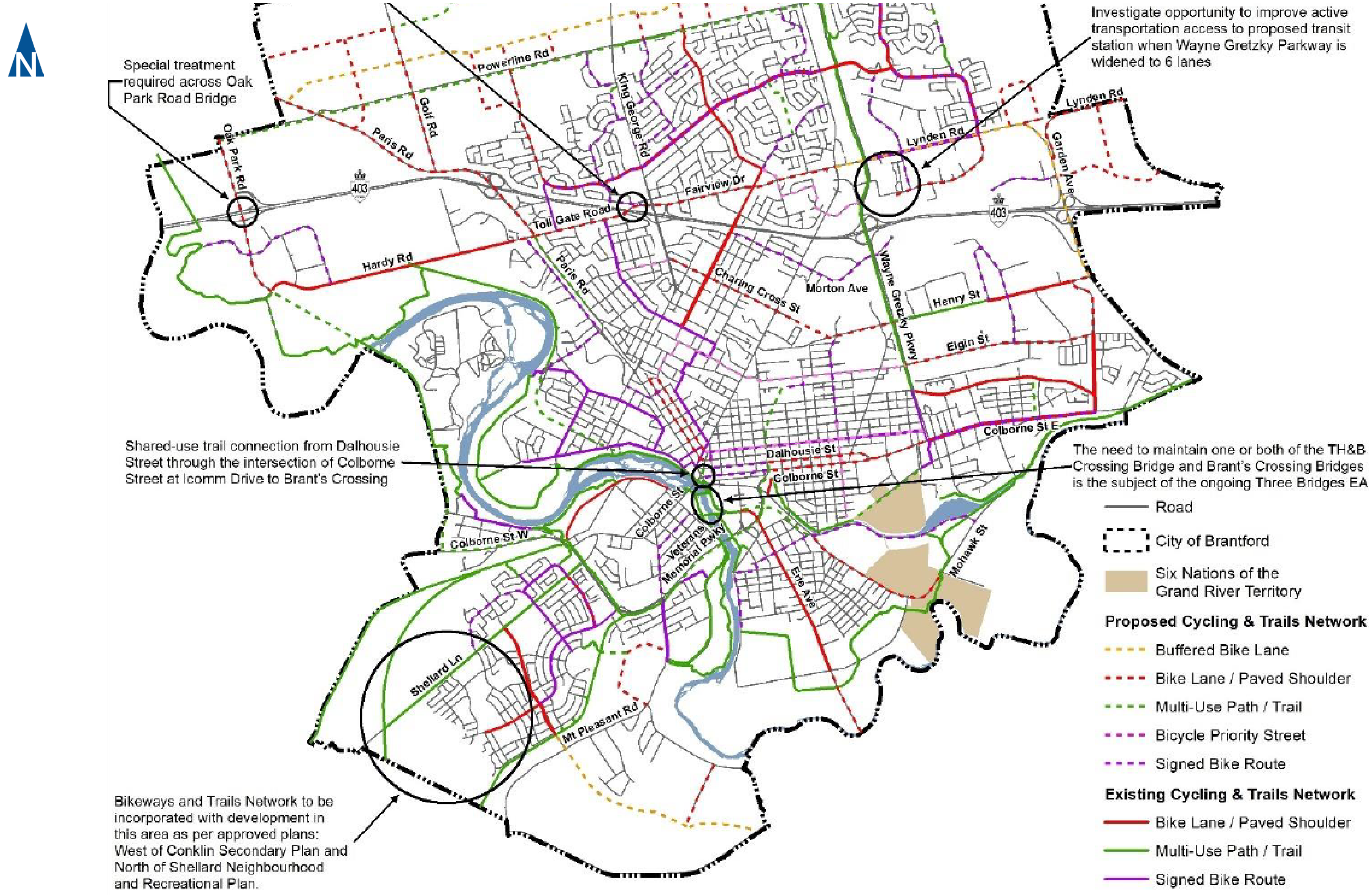
TABLE 2.3: 2016 TTS DATA (TRIP MODE)

City of Brantford – Mode Split (All Trips) 2016	
Mode	**%**
Transit (excluding GO rail)	2.3%
Cycle	0.6%
Auto Driver	74.6%
GO Rail only	0.1%
Joint GO rail and local transit	0.0%
Motorcycle	0.1%
Other	0.3%
Auto Passenger	14.1%
School bus	2.3%
Taxi Passenger	0.3%
Paid Rideshare	0.1%
Walk	5.0%
Total	**100.0%**

Utilizing the TTS data, an estimate of the number of cyclists that could occur along the study area roadways can be developed based on the annual average daily traffic (AADT) volumes. The projected number of daily cyclists along the study area roadways is outlined in **Table 2.4**. Based on the data, Colborne Street and Dalhousie Street could see on average 40 cyclists per day.

TABLE 2.4: 2020 ESTIMATED CYCLING DEMAND

Roadway	Segment		2020 Estimates	
			AADT	Daily Cyclists
Dalhousie Street	Brant Avenue	King Street	7,500	45
	King Street	Queen Street	6,190	37
	Queen Street	Market Street	6,460	39
	Market Street	Charlotte Street	6,000	36
	Charlotte Street	Clarence Street	5,750	35
	Clarence Street	Colborne Street	10,000	60
Colborne Street	Brant Avenue	King Street	5,350	32
	King Street	Queen Street	5,700	34
	Queen Street	Market Street	6,180	37
	Market Street	Charlotte Street	6,180	37
	Charlotte Street	Clarence Street	6,670	40
	Clarence Street	Colborne Street	10,000	60



Proposed Cycling Network

Figure 2.6

2.6 Traffic Operations

The quality of intersection operations at signalized and unsignalized intersections is evaluated in terms of level of service (LOS) and volume to capacity (v/c) as defined by the Highway Capacity Manual (HCM). LOS is evaluated based on the average control delay per vehicle and includes deceleration delay, queue move-up delay, stopped delay and final acceleration delay.

For signalized intersections, LOS ranges from LOS A (<10 seconds of average delay) to LOS F (>80 seconds of average delay). For unsignalized intersections, the LOS ranges from LOS A (<10 seconds of average delay) to LOS F (>50 seconds of average delay). Capacity is evaluated in terms of the ratio of demand flow to capacity with an at-capacity condition represented by a v/c ratio of 1.00 (i.e. volume demand equals capacity).

The traffic operations in the study area have been evaluated using Synchro 10 with the following parameters:

- Existing lane configurations;
- Signal timing as provided by the City (and included in **Appendix A** for reference);
- Heavy vehicles percentages and pedestrian volumes as extracted from the turning movement counts; and
- Synchro default values for all other inputs.

Synchro implements the methodology of the Highway Capacity Manual (HCM). The intersection analysis considers three different measures of performance:

- The level of service (LOS), based on the average delay for each turning movement, measured in seconds (s);
- The volume-to-capacity (v/c) ratio for each movement; and
- The 95th percentile queue length, in metres (m).

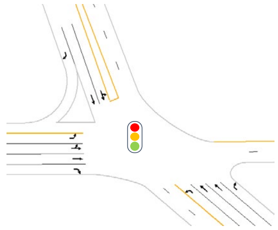
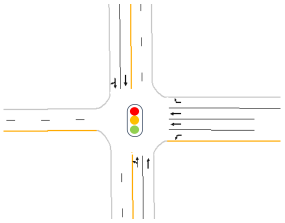
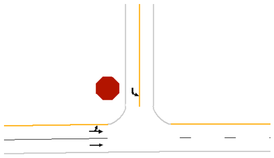
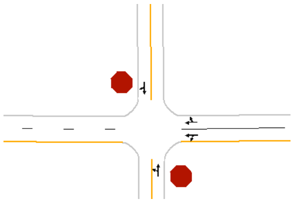
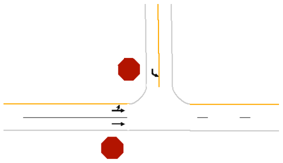
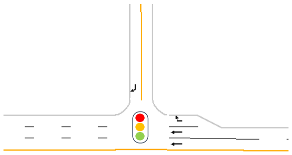
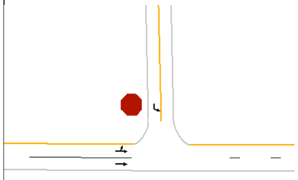
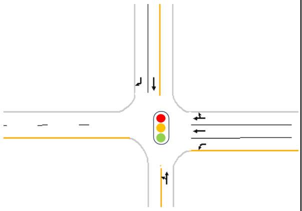
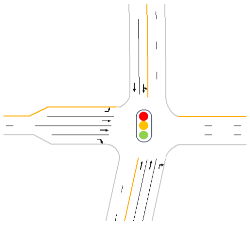
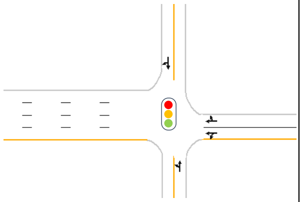
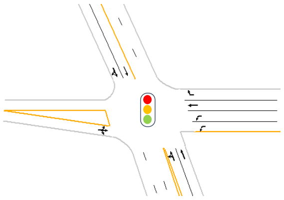
Table 2.5 and Figure 2.7 summarize and note the following

- The Colborne Street corridor generally operates with less than 40 seconds of delay at signalized intersection and less than 5 seconds of delay for unsignalized intersections.

- The Dalhousie Street corridor generally operates with less than 30 seconds of delay for signalized intersections and less than 5 seconds of delay for unsignalized intersections.
- The secondary corridor of Brant Avenue generally operates with less 25 seconds of delay while the Clarence Street corridor operations with just over a minute of delay.
- Overall, the intersections analyzed within the sub-area are operating with acceptable levels of service.

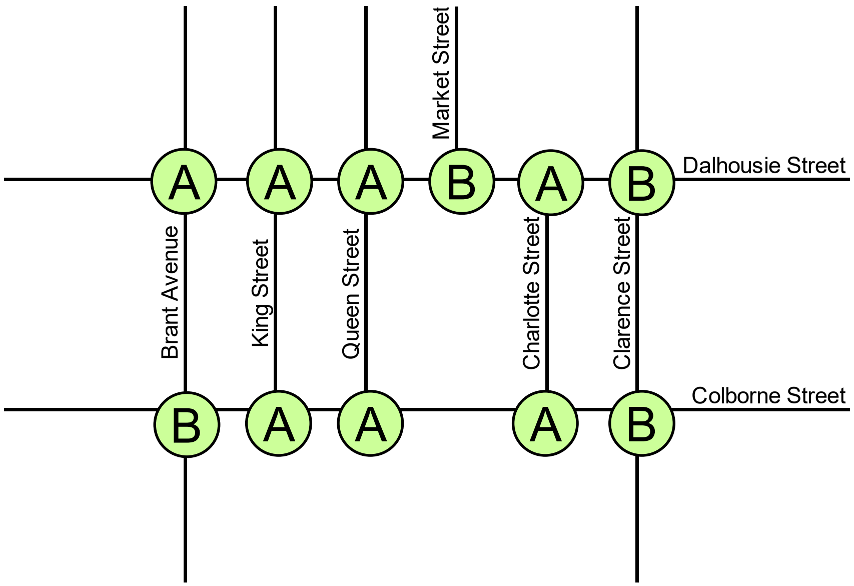
.**Appendix B** contains the detailed Synchro reports.

TABLE 2.5: BASE YEAR TRAFFIC OPERATIONS

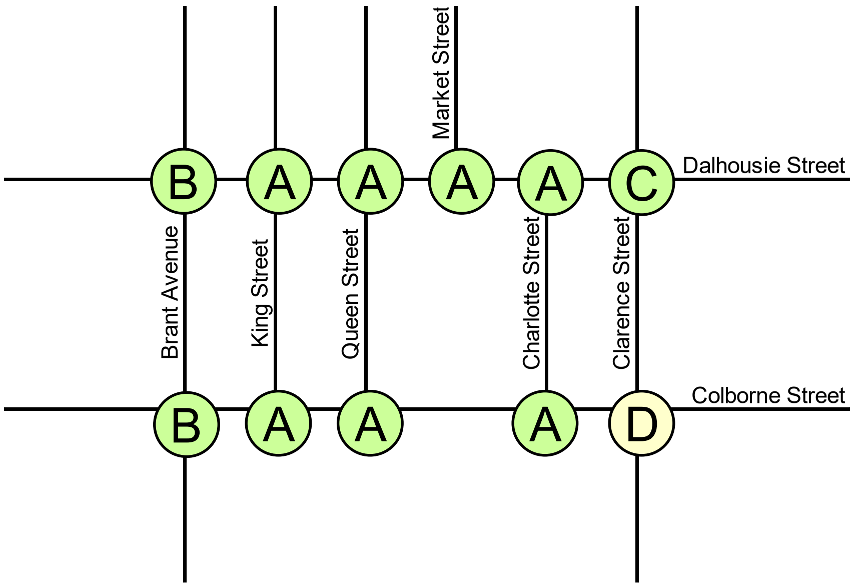
Intersection	Lane Configuration	LOS		Critical Movements	Intersection	Lane Configuration	LOS		Critical Movements
		AM	PM	LOS - V/C - Delay			AM	PM	LOS - V/C - Delay
1 - Colborne Street at Brant Avenue		B	B		8 - Dalhousie Street at Clarence Street		B	C	
2 - Colborne Street at King Street		A	A		9 - Dalhousie Street at Charlotte Street		A	A	
3 - Colborne Street at Queen Street		A	A		10 - Dalhousie Street at Market Street		B	A	
5 - Colborne Street at Charlotte Street		A	A		11 - Dalhousie Street at Queen Street		A	A	
5 - Colborne Street at Clarence Street		B	D	SBLTR PM LOS E 1.06 56.3	12 - Dalhousie Street at King Street		A	A	
					13 - Dalhousie Street at Brant Avenue		A	B	

LOS (Delay s)	DESCRIPTION	LOS (Delay s)	DESCRIPTION
A (<10)	Little to no delay	D (35 – 55)	Frequent queuing and delay
B (10-20)	Minimal delay	E (55 – 80)	Increased queuing and delay
C (20–35)	Some queuing and delay	F (>80)	Significant queuing and delay

Weekday AM Peak Hour



Weekday PM Peak Hour



Adjusted Base Year
Weekday Peak Hour LOS

Figure 2.7

3 Road Safety

3.1 Collision Data

The City of Brantford provided collision information for the period of January 1, 2017, to December 31, 2019 (inclusive) at the following locations:

Intersections

- Colborne Street at Brant Avenue;
- Colborne Street at King Street;
- Colborne Street at Queen Street;
- Colborne Street at Charlotte Street;
- Colborne Street at Clarence Street;
- Dalhousie Street at Clarence Street;
- Dalhousie Street at Charlotte Street;
- Dalhousie Street at Market Street;
- Dalhousie Street at Queen Street;
- Dalhousie Street at King Street; and
- Dalhousie Street at Brant Avenue.

Mid-Block Locations

- Colborne Street between Brant Avenue and King Street;
- Colborne Street between King Street and Queen Street;
- Colborne Street between Queen Street and Market Street;
- Colborne Street between Market Street and Charlotte Street;
- Colborne Street between Charlotte Street and Clarence Street;
- Dalhousie Street between Clarence Street and Charlotte Street;
- Dalhousie Street between Charlotte Street and Market Street;
- Dalhousie Street between Market Street and Queen Street;
- Dalhousie Street between Queen Street and King Street; and
- Dalhousie Street between King Street and Brant Avenue.

The data was provided in tabulated form, and included the following information: date and time, weather, impact type, presence of injuries, and road surface condition. Additional information for each driver was provided as follows: direction of travel, vehicle maneuver, vehicle type, and driver action. **Appendix C** contains the raw collision reports.

The collision reports have been reviewed as is. No modifications or adjustments have been made to correct any duplicate entries, or entries for which the collision record appears incorrect (i.e. rear end collision between a northbound and westbound driver).

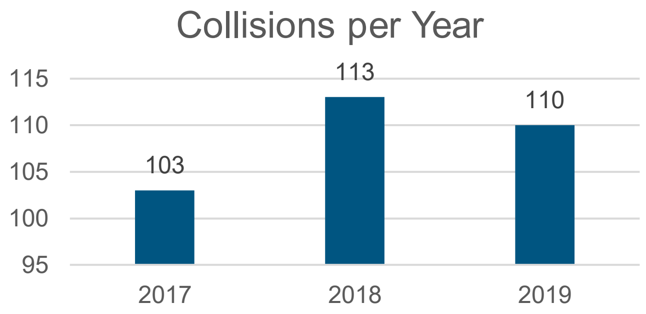
3.1.1 All Collisions

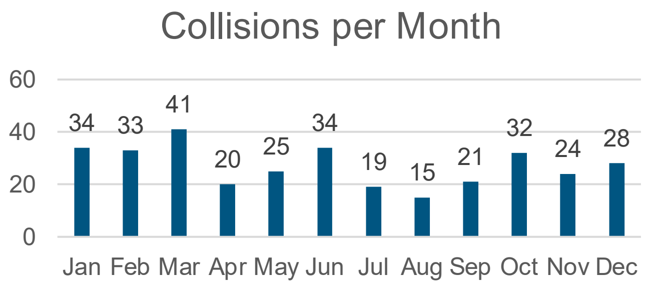
Figure 3.1 shows a summary of all collisions within the study area.

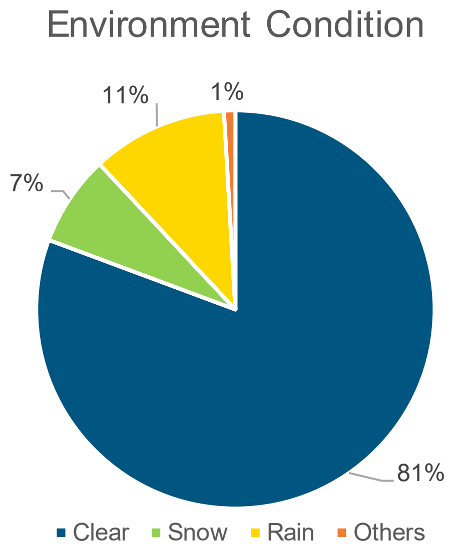
The collision history indicates that environmental conditions were not contributing, as nearly 81% of collisions occurred under a “clear” environment. Accordingly, the data suggest that road surface and environmental conditions do not contribute to a higher frequency of collisions.

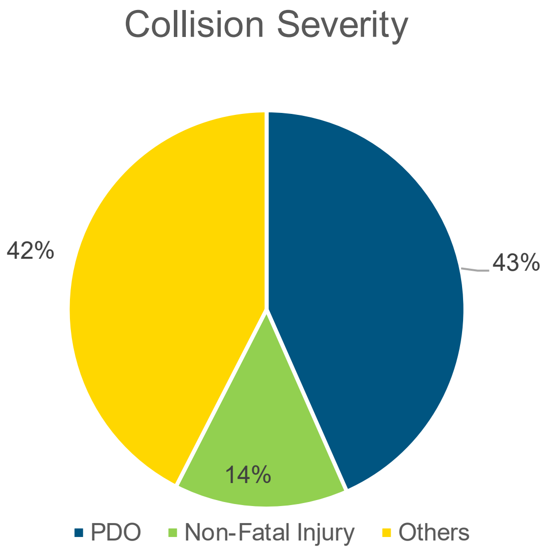
There was one fatality during the periods represented by the data while 43% of all collisions resulted in property damage only and a few (14%) caused non-fatal injuries. The fatal collision occurred at a midblock location in 2019 along Colborne Street between Bain Street and Charlotte Street and is discussed further in **Sub-Section 3.1.3**.

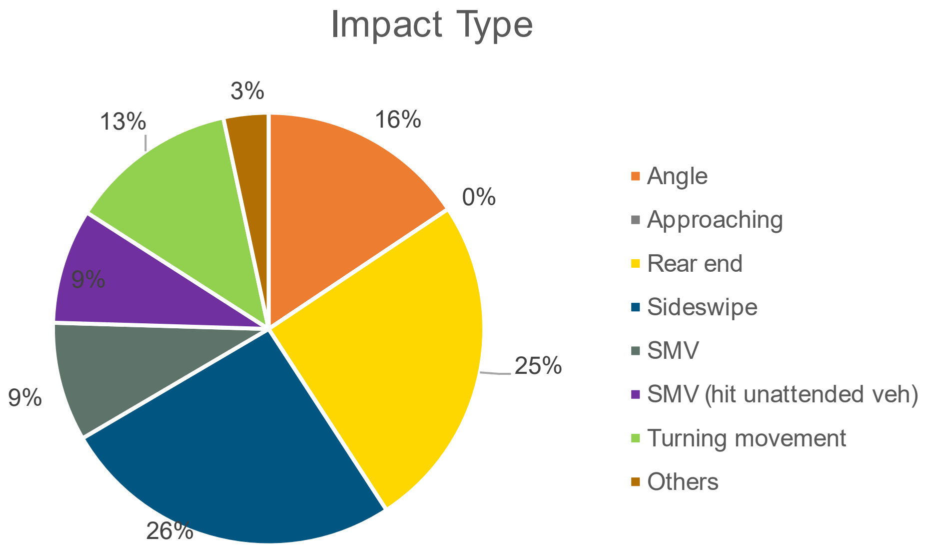
The most common impact types were sideswipe (26%) and rear end (25%). Other type of collisions included turning movements (13%) and angle (16%).


Collisions per Year


Collisions per Month


Environment Condition


Collision Severity


Impact Type

All Collisions
Analysis Summary (2017-2019)

Figure 3.1

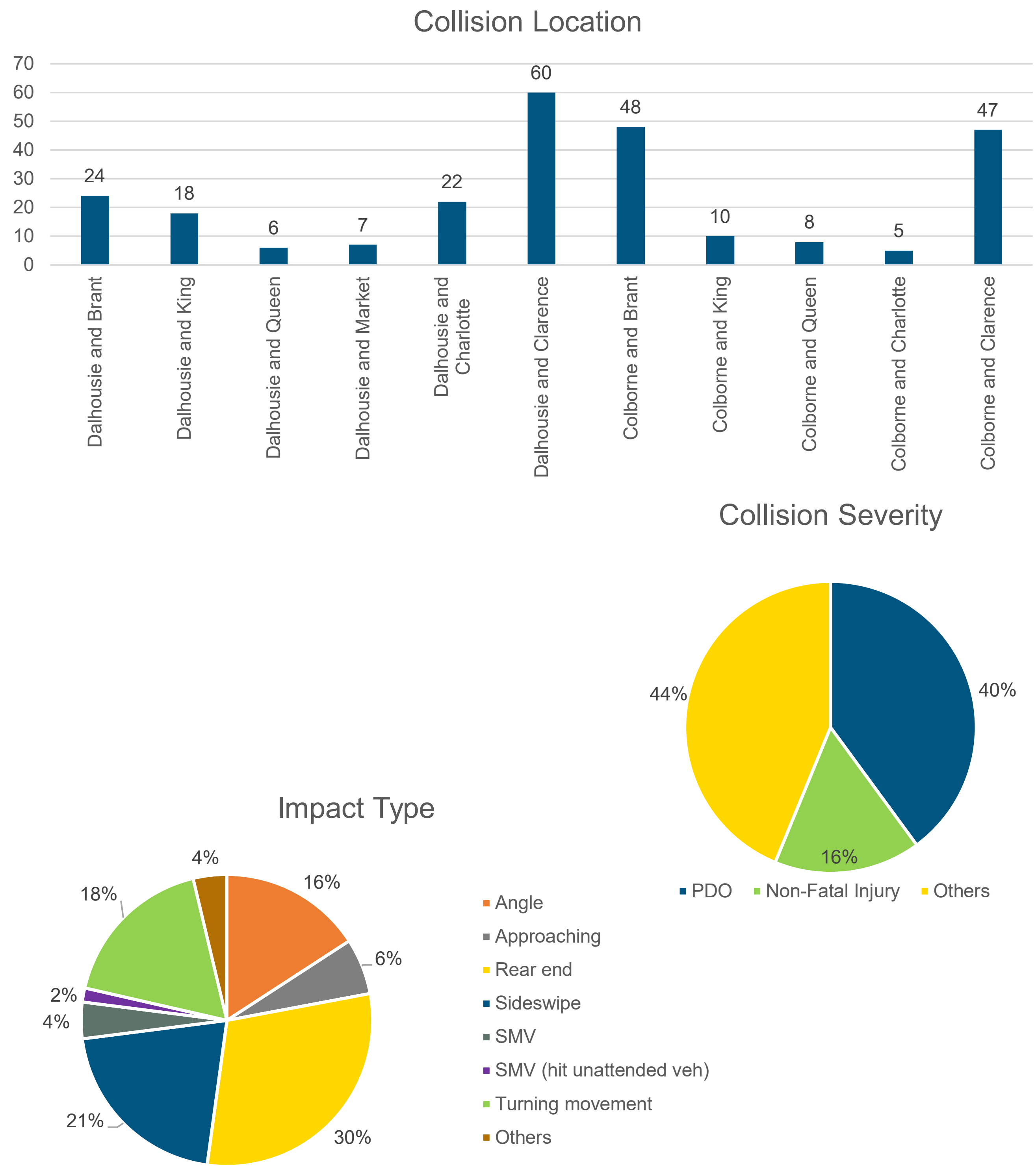
3.1.2 Intersections

Figure 3.2 shows a summary of all intersection collisions.

Collision history indicates that the unsignalized intersections within the study area accounted for 18% of the total collisions while the signalized intersection of Dalhousie Street and Clarence Street alone resulted in 24% of all intersection collisions.

There were no fatalities during the periods represented by the data and 40% of all collisions resulted in property damage only and a few (16%) caused non-fatal injuries.

The most common impact types were rear-end (30%) and sideswipe (21%). Other type of collisions included turning movements (18%) and angle (16%).



paradigm
TRANSPORTATION SOLUTIONS LIMITED

Intersection Collisions Analysis Summary (2017-2019)

Figure 3.2

3.1.3 Midblock Segments

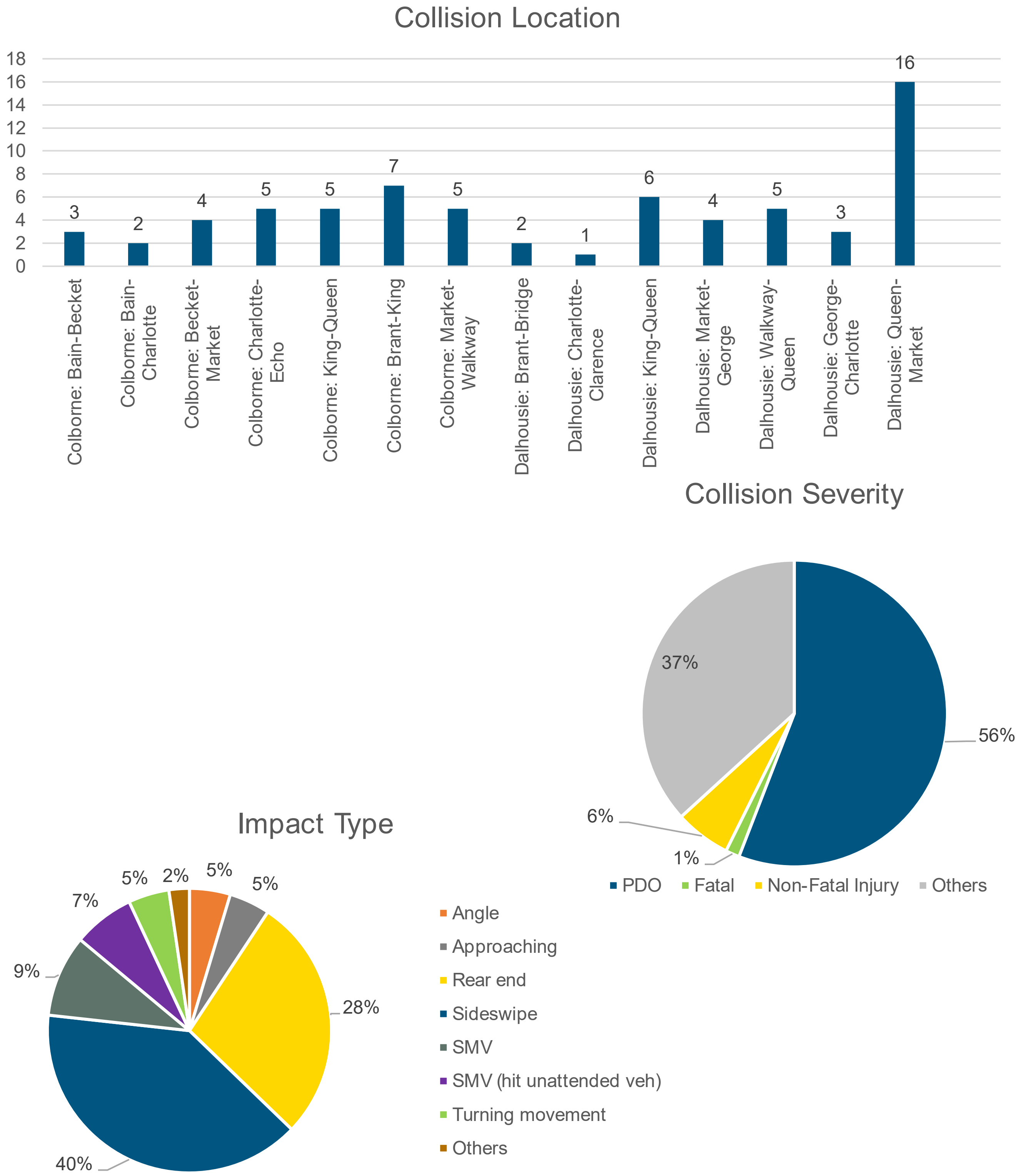
Figure 3.3 shows a summary of all midblock collisions.

Collision history indicates that the Dalhousie Street midblock segment from Queen Street to Market Street accounted for 24% of all midblock segment collisions followed by the Colborne Street midblock segment from Brant Avenue to King Street (10%).

There was one fatal collision that occurred at a midblock location in 2019 along Colborne Street between Bain Street and Charlotte Street that occurred under clear and dry conditions. This collision involved a cyclist that failed to yield the right of way and was sideswiped by a truck travelling in the eastward direction.

The remainder of the collisions can be summarized as 56% of all collisions resulted in property damage only and a few (6%) caused non-fatal injuries.

The most common impact types were sideswipe (40%) and rear-end (28%).



Midblock Collisions Analysis Summary (2017-2019)

Figure 3.3

3.1.4 Active Transportation Collisions

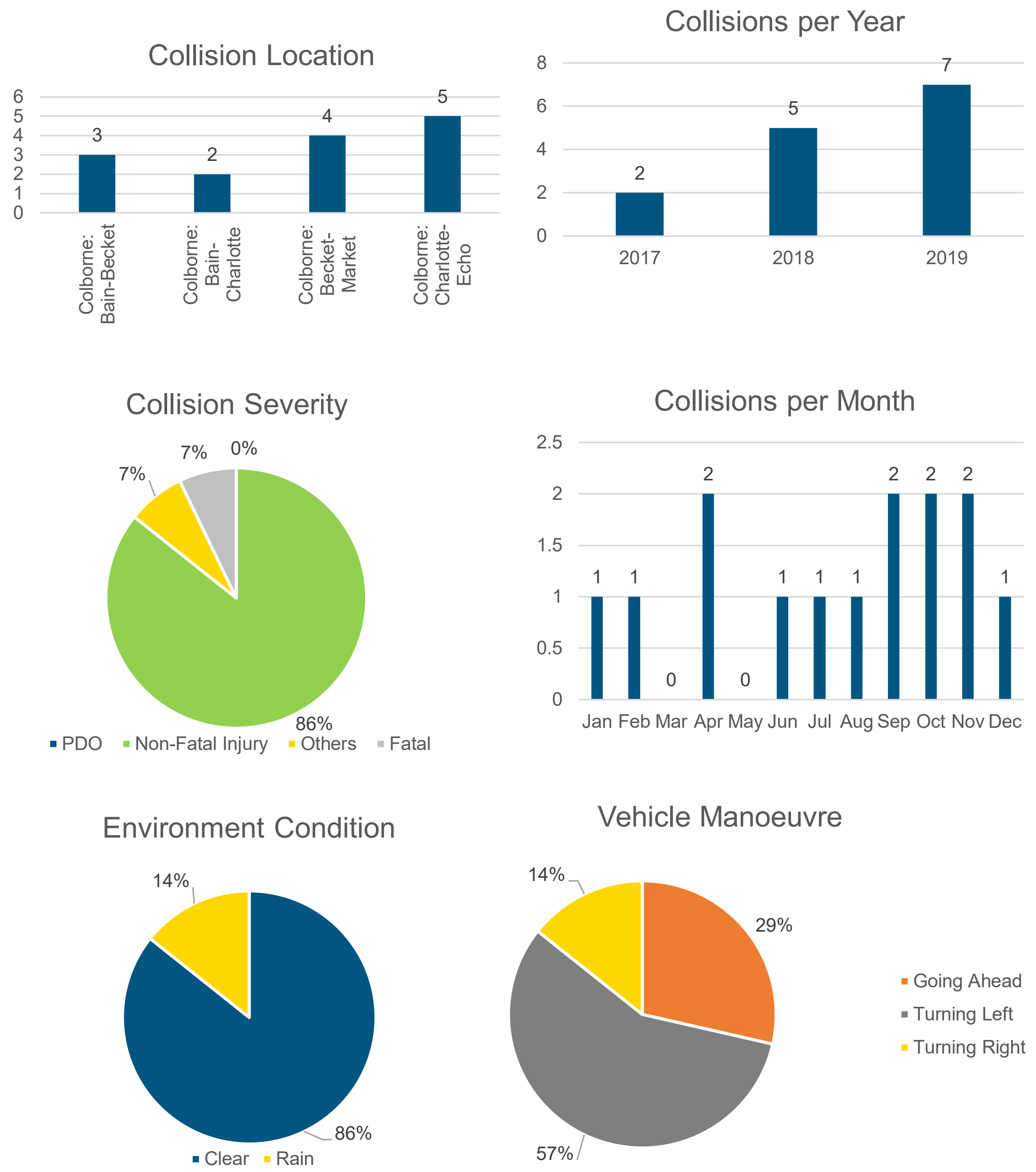
Figure 3.4 shows a summary of all active transportation collisions. From 2017 to 2019 there were a total of 14 collisions (12 pedestrians and 2 cyclist).

Collision history indicates that the midblock section of Colborne Street between Charlotte Street and Echo Street accounted 35% of all collisions involving a pedestrian or cyclists. The collision history further notes that out of the 14 collisions involving a pedestrian or cyclist, 7 of these collisions occurred in 2019, 5 occurred in 2018 and 2 occurred in 2017.

Environmental conditions were not a contributing factor as nearly 86% of all collisions occurred in a clear environment. Accordingly, the data does not imply that road surface and environmental conditions have contributed to the higher frequency of collisions.

A cycling fatality occurred in 2019 along Colborne Street between Bain and Charlotte Street where the cyclists was sideswiped by a motor vehicle. There were no fatalities involving pedestrians during the periods represented by the data and 86% of all collisions resulted in non-fatal injuries. All collisions involving a pedestrian occurred along sections of Colborne Street without a controlled crossing present.

The most common vehicle manoeuvre contributing to active transportation collisions were turning left (57%) and going ahead (29%). Other type of collisions included turning right (14%).



Active Transportation Collisions Analysis Summary (2017-2019)

Figure 3.4

3.2 Site Assessment

A site visit was conducted in May 2021. The site visit was conducted both by driving and walking through the area, assessing the following roadways and intersections:

Intersections

- Colborne Street at Brant Avenue;
- Colborne Street at King Street;
- Colborne Street at Queen Street;
- Colborne Street at Charlotte Street;
- Colborne Street at Clarence Street;
- Dalhousie Street at Clarence Street;
- Dalhousie Street at Charlotte Street;
- Dalhousie Street at Market Street;
- Dalhousie Street at Queen Street;
- Dalhousie Street at King Street; and
- Dalhousie Street at Brant Avenue.

Roadways

- Colborne Street between Brant Avenue and King Street;
- Colborne Street between King Street and Queen Street;
- Colborne Street between Queen Street and Market Street;
- Colborne Street between Market Street and Charlotte Street;
- Colborne Street between Charlotte Street and Clarence Street;
- Dalhousie Street between Clarence Street and Charlotte Street;
- Dalhousie Street between Charlotte Street and Market Street;
- Dalhousie Street between Market Street and Queen Street;
- Dalhousie Street between Queen Street and King Street; and
- Dalhousie Street between King Street and Brant Avenue.

3.2.1 Colborne Street

Colborne Street intersects with several roadways in the sub study area. Two (2) of the intersections are signalized (Brant Avenue and Clarence Street), while four (4) have side street stop-control, allowing both right and left turns onto Colborne Street, and free flow on Colborne Street (King Street, Bain Street, Charlotte Street and Echo Street). The intersection of Colborne Street and Queen Street is controlled by an all-way stop and a intermediate Pedestrian Signal (IPS) is provided at the Market Street Walkway. Intersections are spaced relatively close together between 45-200 metres with the exception of Echo Street which is located within the functional area of the Colborne Street and Clarence Street intersection.

No cycling facilities are provided, forcing cyclists to share the use of the traffic lanes with motorized vehicles. Some sections of sidewalks provide a clear path of travel for pedestrians, while other sections are obstructed by trees or street furniture or are in need of repairs. All signalized intersections provide pedestrian signals and countdowns, as well as ladder crosswalk pavement markings.

The existing configuration along Colborne Street between Clarence Street and the Market Street IPS provides for a limited number of locations that permit pedestrians to cross Colborne Street as this distance spans approximately 385 metres. One of the most vital strategies to prevent collisions involving pedestrians is to ensure they cross the street at the safest location and to ensure that the locations where pedestrians are likely to cross are as safe as possible.

As all active transportation collisions that have been recorded have occurred within this segment of roadway along Colborne Street, an additional controlled pedestrian crossing is recommended. A typical guideline is to facilitate adequate pedestrian crossings is to maintain at least 200 metres between controlled crossings[4].

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[4] Ministry of Transportation, Ontario. Ontario Traffic Manual Book 15: Pedestrian Crossing Treatments, 2016

3.2.2 Echo Street

Echo Street is located approximately 45 metres west of the Colborne Street and Clarence Street signalized intersection and is considered to be within the functional area. As Colborne Street operates with one-way traffic in the eastbound direction, conflicts are reduced. In the event Colborne Street is converted to two-way operation, this would increase the risk of conflicts for northbound vehicles with through traffic on Colborne Street. The spacing of the intersection is also problematic under the two-way scenario as northbound left turning traffic from Echo Street onto Colborne Street would likely have visibility concerns exiting onto Colborne Street as a result of queueing from the signalized intersection with Clarence Street.

3.2.3 Dalhousie Street

Dalhousie Street intersects with several roadways in the sub study area. Five (5) of the intersections are signalized (Brant Avenue, King Street, Queen Street, Market Street, and Clarence Street), while three (3) have side street stop-control, allowing both right and left turns onto Dalhousie Street, and free flow on Dalhousie Street (Bridge Street, George Street and Charlotte Street), Bain Street, Charlotte Street and Echo Street). The south leg of Dalhousie Street and Market Street is restricted to active transportation modes only. Intersections are spaced closely together, with distances between intersections varying between 65 - 200 metres.

No cycling facilities are provided, forcing cyclists to share the use of the traffic lanes with motorized vehicles. Some sections of sidewalks provide a clear path of travel for pedestrians, while other sections are obstructed by trees or street furniture or are in need of repairs. All signalized intersections provide pedestrian signals and countdowns, as well as ladder crosswalk pavement markings.

3.2.4 Bridge Street

The Bridge Street intersection is very close to the intersection with Dalhousie Street and Brant Avenue creating a number of conflicts for southbound right turning vehicles as a result of the westbound queue created from the signalized intersection upstream. This was noted to be primarily problematic for vehicles from Bridge Street that wanted to travel southbound along Brant Avenue. As Dalhousie Street operates with one-way traffic in the westbound direction, a potential mitigation solution could entail limiting Bridge Street to one-way operation in the northbound direction.

In the event Dalhousie Street is converted to two-way operation, the spacing of the intersection is problematic as eastbound left turning traffic from Dalhousie Street onto Bridge Street would likely encounter queuing from the signalized intersection of Dalhousie Street with Brant Avenue that could impact the operations.

3.2.5 Brant Avenue

A review of the lane configuration on Brant Avenue between Dalhousie Street and Colborne Street indicates the curb lane becomes a right-turn lane. The centre lane remains a through lane, and a shared left/through lane is introduced approaching Colborne Street. Overhead lane configuration signs are installed 40 metres north of Dalhousie Street, directing motorists to the correct lane depending on their desired route (e.g., south via Icomm Drive or west via Colborne Street). Overhead signs are also provided on Dalhousie Street, with dedicated signs for the two left-turn lanes provided on the westbound approach.

Driver confusion or inattentiveness is likely a key contributor to increased sideswipe and rear end collisions at this location. This is exacerbated by the intersection spacing between Brant Avenue/Dalhousie Street and Brant Avenue/Icomm Drive/Colborne Street.

Based on field observations, the intersection does not include tracking pavement markings for the dual eastbound left turn movement. Ontario Traffic Manual (OTM) *Book 12*[5] notes that "*a dual LTL [left turn lane] shall require pavement marked 'tracking' lines for guidance of turning vehicles*" (pg. 156). Consideration could also be given to modifying the existing shared eastbound left-turn/through lane to an exclusive left-turn lane, or exclusive through lane. This would seek to eliminate slip around maneuvers from through volumes who may be stuck behind a left-turning vehicle when waiting for a pedestrian to cross the north approach of the intersection.

The intersection also includes an uncontrolled pedestrian crossing of the southbound channelized right-turn movement. The collision history does not identify any collisions relating to the uncontrolled crossing; however, this can present a conflict between vehicles and pedestrians. The conflict is exacerbated by the high volume of right-turning traffic (approximately 1,200 vehicles in the PM peak hour, or one every three seconds) at this intersection. This volume of traffic

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[5] Ministry of Transportation, Ontario. Ontario Traffic Manual Book 12: Traffic Signals. March 2012.

provides very limited crossing opportunities for pedestrians. Removal of the channelization or conversion to a “smart channel” design may reduce conflicts between vehicles and pedestrians.

However, given the large volumes of southbound right turning vehicles, removal of the channelization would likely have an impact on operations along Brant Avenue. Instead, the installation of a Pedestrian Crossover (PXO) would provide for a controlled crossing opportunity for pedestrians while still maintaining capacity to serve the high volume of southbound right turns.

3.2.6 Queen Street

Queen Street is noted be narrow in width with a sidewalk provided on both sides of the road and no cycling facilities. Provisions to upgrade active transportation facilities does not appear to be feasible. Additionally, there are a number of driveway providing access to parking facilities off of Queen Street adjacent to a number of buildings with what appears as zero setback lot lines that have poor visibility for outbound vehicles at these driveways.

3.3 Mitigation

To improve the potential safety hazards within the sub study-area, the implementation of a blanket 40 kilometres posted speed limit along Colborne Street and Dalhousie Street is preferred. Furthermore, improved sidewalks (i.e., wider with limited to no obstructions) and cycling facilities will need to be incorporated. Ultimately, the preferred design and streetscape design should support these recommendations.

Other improvements that may need to be considered in the final design could include bike signals, pedestrian-only phases (reserved for intersections with high pedestrian volumes) and pedestrian-leading green time to provide pedestrians with an advanced opportunity to cross before vehicles are allowed to proceed right. Additionally, the measures identified above are further recommended for consideration:

- The intersection of Dalhousie Street and Bridge Street be modified to only one-way traffic in the northbound direction to reduce the number of potential conflicts with westbound through traffic.
- The intersection of Colborne Street and Echo Street be modified to right in/out operations under the two-way traffic scenario to reduce the number of potential conflicts and operational issues at the downstream signalized intersection at Clarence Street.

- To mitigate the number of active transportation collisions along Colborne Street between the Market Street IPS and Clarence Street, an additional controlled crossing be considered to improve the crossing opportunities for pedestrians. In terms of improvements for cyclists, a protected bike lane is recommended for Colborne Street and Dalhousie Street to protect cyclists from passing traffic.

3.4 Review of Alternatives

Table 3.1 reviews the proposed alternatives from a road safety perspective. The criteria are compared to the Do-Nothing scenario and indicate:

- **Alternative 1:** Least favorite as sidewalks have obstructions, no provisions for bikes.
- **Alternative 2:** This alternative is in-line with the overall vision as it provides dedicated cycling facility provides high level of cyclist safety as bike lanes are fully protected. Maintains parking on one side of the street that is separated and provides narrow the travel lanes to reduce speeds. Pedestrian space however is not any wider than the existing.
- **Alternative 3:** This alternative is in-line with the overall vision as it provides dedicated cycling facility provides high level of cyclist safety as bike lanes are fully protected. Maintains parking on one side of the street that is separated and provides narrow the travel lanes to reduce speeds. Pedestrian space however is not any wider than the existing.
- **Alternative 4:** This alternative is in-line with the overall vision as it provides dedicated cycling facility provides high level of cyclist safety as bike lanes are fully protected. Maintains parking on one side of the street that is separated and provides narrow the travel lanes to reduce speeds. Pedestrian space however is not any wider than the existing.
- **Alternative 5:** This alternative is in-line with the overall vision as it provides dedicated cycling facility provides high level of cyclist safety as bike lanes are fully protected. Maintains parking on one side of the street that is separated and provides narrow the travel lanes to reduce speeds. Pedestrian space is also expanded.

TABLE 3.1: ROAD SAFETY REVIEW OF ALTERNATIVES

Alternative	Impacts
1 (Do-Nothing)	No bike facilities provided and no increased pedestrian space.
	Higher risks of conflicts at intersections between bikes and right-turning vehicles since no separate bike facilities.
2 (Two-Way Bi-Directional Cycle) 3 (Two-Way Separated Cycle) 4 (One-Way Bi-Directional Cycle)	No Increased pedestrian space.
	Separated pedestrian and bike facilities. Ensure enough space is kept for pedestrians with the furnshied zone (i.e. do not limit sidewalk and obstruct pedestrian clear path)
	Separated bi-drectional cycle tracks, lower conflicts for bike/vehicles
	Careful with treatment of bikes at intersections – mixed with vehicles or bike crossings (bike signals allowed in Ontario, could be considered)
	Overall best option for bikes since they have designated facilities
5 (One Way Separated Single Cycle)	Increased pedestrian space.
	Separated pedestrian and bike facilities. Ensure enough space is kept for pedestrians with the furnshied zone (i.e. do not limit sidewalk and obstruct pedestrian clear path)
	Separated bi-drectional cycle tracks, lower conflicts for bike/vehicles
	Careful with treatment of bikes at intersections – mixed with vehicles or bike crossings (bike signals allowed in Ontario, could be considered)
	Overall best option for pedestrians as increased space is achieved, parking and bikes are seperated.

4 Future Demand

The following section documents the future conditions in the sub-area including population and employment forecasts and the traffic forecasting methodology, and future traffic volumes for three analysis scenarios, and a level of service analysis resulting in a preferred scenario. At the outset of this study, City staff determined the study would need to include projections for years 2025, 2030 and 2051.

4.1 Future Population and Employment Growth

Because of the direct relationship between land use and transportation demand, the City of Brantford's Transportation Master Plan Update (TMPU) growth projections are documented as a critical input in assessing future transportation conditions. While many other factors can influence transportation demand, the City's projections (or any potential variations) provide the strongest indicator of areas which may have changing transportation needs.

The City of Brantford is expected to see rapid growth between 2016 and 2051. **Table 4.1** shows that the City of Branford population is expected to increase by 62% (approximately 63,300 additional people) and employment by 78%, adding 35,100 jobs by the year 2051.

TABLE 4.1: POPULATION AND EMPLOYMENT ASSUMPTIONS

Measure	2016	2031	2051
Population	101,700	139,000	165,000
Employment	44,900	67,000	80,000

Forecasts based on 2020 TMPU Addendum

Based on current growth and growth anticipated in the expanded urban boundary, the following trends to the 2051 horizon year are noted:

- High employment growth in the Oak Park Road & Hardy Road (Northwest Industrial Park) and Henry Street/Wayne Gretzky (Braneida Industrial Park) areas;
- High employment growth in the expansion lands east of Garden Avenue at Highway 403 and north of Powerline Road just east of Paris Road;
- High population growth in the southern zones surrounding Shellard Lane, Mt Pleasant Road and Erie Avenue;

- High population growth in the northern expansion zones (north of Powerline Road) from Balmoral Drive in the west to Coulbeck Road in the east;
- High population and employment growth along the King George Road corridor; and
- High population and employment growth in the downtown core.

Intensification within downtown Brantford will increase the densities and transform the area into an urban area that will focus on contributing to a modal shift away from the single occupancy vehicle as the distance to many amenities will decrease, making them more bikeable and walkable. In contrast, transit service will increase as higher densities support higher service frequency.

4.2 Balanced Needs Approach

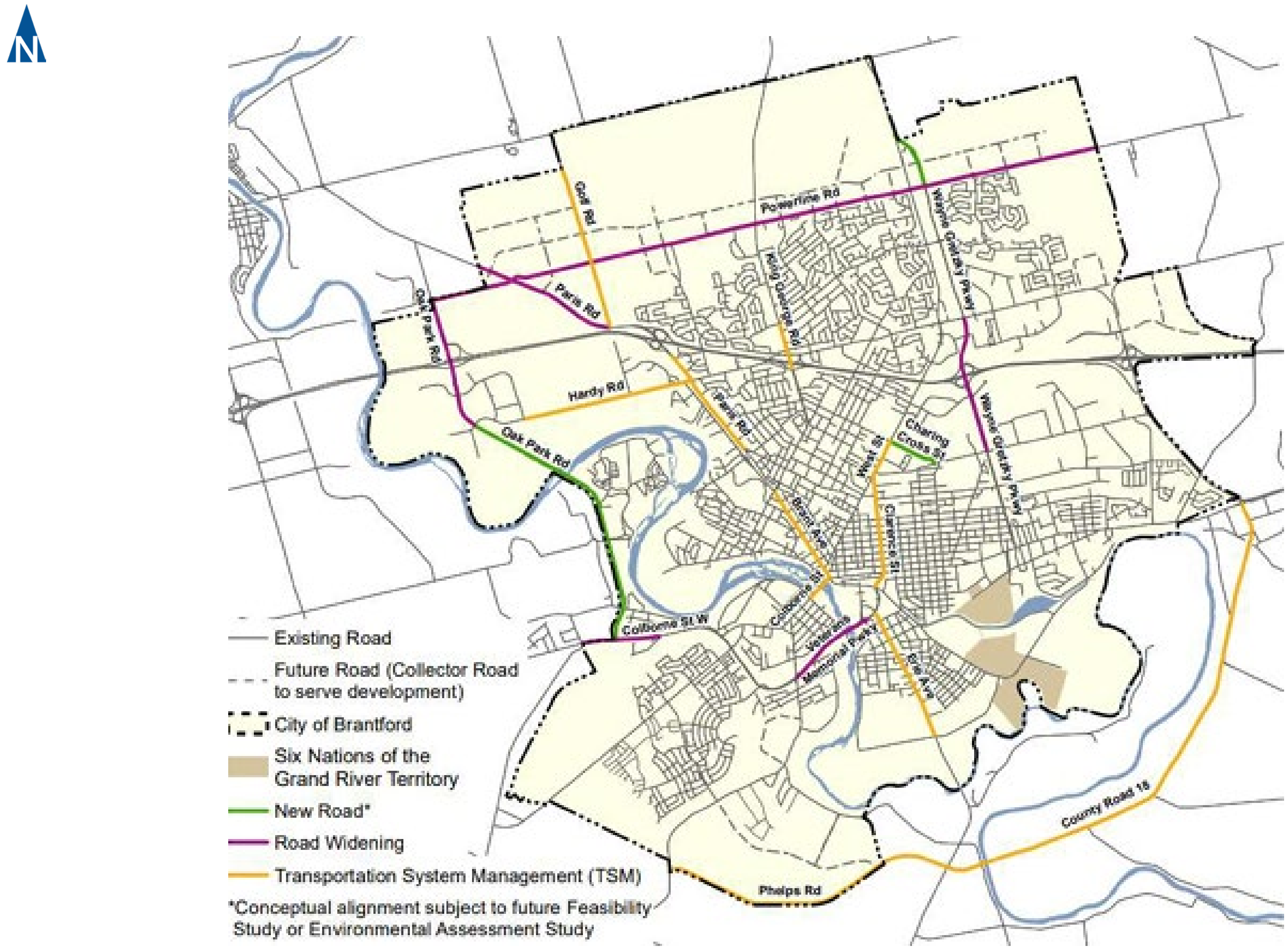
Brantford's population and employment growth is forecast to continue until 2051 at a rate of approximately 2% per year. These increases will call for a focus on the development of an efficient and effective transit system if mobility within the community and between Brantford and adjacent municipalities is to support the City's economy and residents' quality of life.

Brantford's forecasted growth will significantly alter the local travel demands within the city and by 2051 Brantford is forecast to generate more than 85,900 AM peak period person trips on an average weekday. That's an increase of nearly 72% over 2016 person trips. With population and employment growth, there will be an increase in demand on the road network where some corridors will likely experience or approach capacity constraints.

The TMPU's preferred solution to address the forecast growth of the City to 2051 is a combined solution that involves:

- Transit service improvement/enhancements to promote increased transit use;
- The provision of active mode infrastructure to promote increased cycling and walking; and
- Network infrastructure improvements to address the capacity constraints in the network.

With that said, capacity/operational issues under the 2051 horizon are expected to remain along the Lorne Bridge as well as along Clarence Street. **Figure 4.1** illustrates the 2051 recommended roadway plan.



2051 Recommended Roadway Network

Figure 4.1

Table 4.2 indicates that with the proposed TMPU-identified combined solution approach, an increased transit, walking and cycling mode share is targeted for 2051.

TABLE 4.2: MODAL SPLIT ASSUMPTIONS

Mode	2016	2051	Difference
Auto Driver	70.8%	67.5%	-3.3%
Auto Passenger	14.6%	12.5%	-2.1%
Transit	2.8%	5.8%	3.0%
Cycle/Walk	7.8%	9.9%	2.1%
Other	4.0%	4.3%	0.3%

The population and employment forecasts along with the target mode share were used in the EMME model to develop transportation scenarios.

4.3 Traffic Forecasting Methodology

To forecast 2025, 2030 and 2051 demand based on the population and employment scenarios outlined, the City's model forecasts from the 2016 model and the 2051 recommended plan models are utilized to determine compound annual growth rates for each segment within the sub-area. **Appendix D** illustrates the model forecasts.

As it is recognized that data from regional models is not as necessarily accurate for individual movements; but rather, the model projects overall travel characteristics along transportation corridors, separate rates have been calculated for each segment within the sub-area and have been applied to the adjusted base year traffic volumes.

Table 4.3 summarizes the applied growth rates for the one-way scenario. The model generated traffic growth rates reflect planned population and employment growth previously identified and includes transit service improvement, active mode infrastructure, and network infrastructure improvements. Each of these factors impacts upon travel patterns and traffic volumes within the sub-area and in some instances, results in reduced vehicle demand.

TABLE 4.3: ONE-WAY COMPOUND ANNUAL GROWTH RATES

2020 - 2051 Compound Annual Growth Rates				
Colborne Street	AM Peak Hour		PM Peak Hour	
	EB	WB	EB	WB
Brant to King Street	1.6%	-	0.4%	-
King Street to Queen Street	1.0%	-	1.0%	-
Queen Street to Charlotte Street	1.3%	-	0.6%	-
Charlotte Street to Clarence Street	1.5%	-	0.5%	-
Clarence Street to Dalhousie Junction	2.7%	-	0.9%	-
Dalhousie Street	AM Peak Hour		PM Peak Hour	
	EB	WB	EB	WB
Brant to King Street	-	0.8%	-	0.7%
King Street to Queen Street	-	0.7%	-	0.2%
Queen Street to Market Street	-	0.6%	-	0.2%
Market Street to Charlotte Street	-	0.4%	-	0.2%
Charlotte Street to Clarence Street	-	0.7%	-	0.2%
Clarence Street to Colborne Street Junction	-	1.0%	-	1.0%

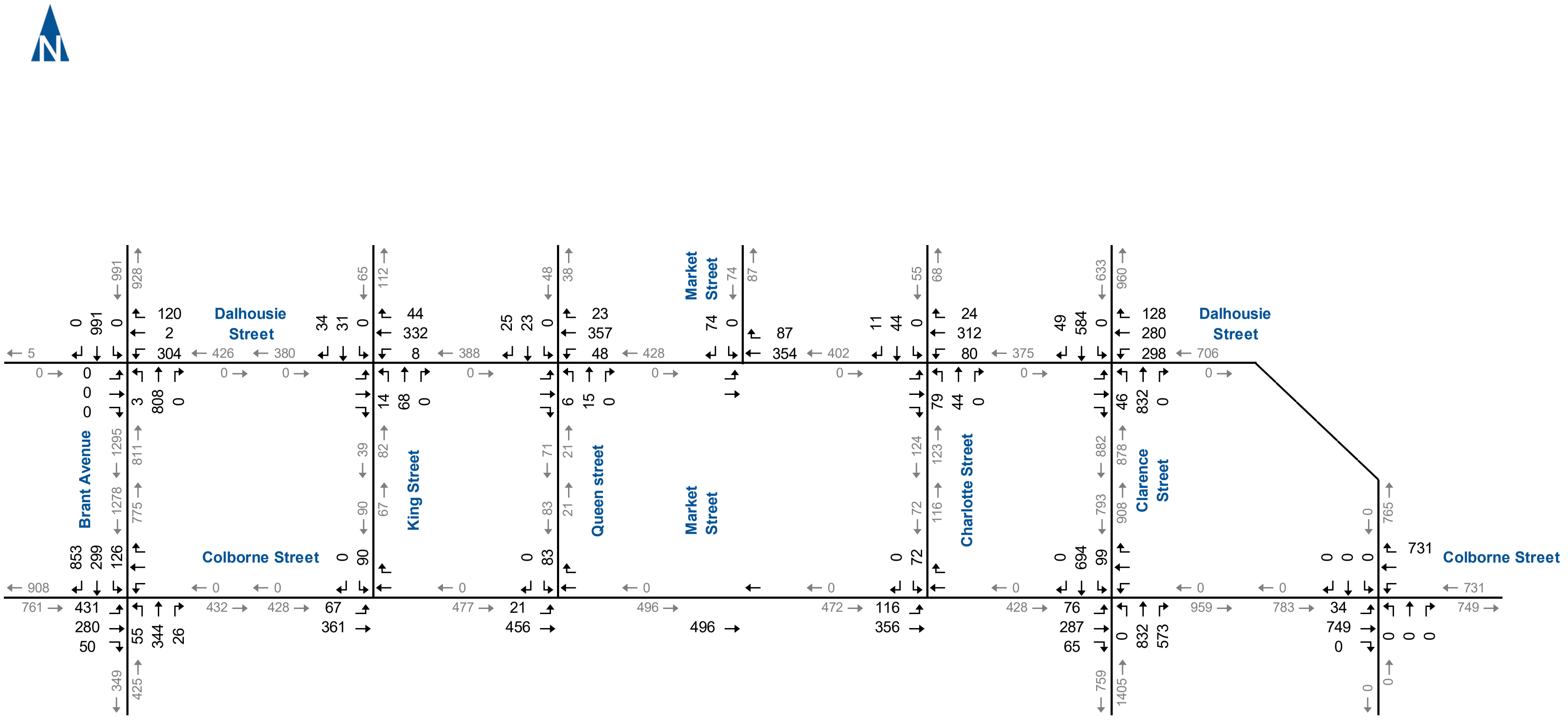
4.4 One-Way Traffic Volumes

Based on the forecast methodology outlined in the previous section, the future traffic volumes within the sub-area were calculated at the intersection turning movement level of detail for the entire corridor for the weekday peak hour traffic scenarios. Traffic volume forecasts at each intersection are illustrated in **Figures 4.2 – 4.4**. Note that intersection traffic volumes are only summarized at major intersections within the sub-area.

It is noted that changing factors such as fuel prices, electric cars, car sharing, socio-demographic changes, lower auto-ownership levels, and intensification resulting in increased density and better proximity/accessibility to destinations all impact travel patterns, modes and rates of travel to some degree. However, it is difficult to quantify these changes without a model calibrated to consider such factors. As such, the results presented within this report can be considered conservative because many of the above-stated factors generally result in reduced peak period automobile travel.

Forecast peak hour traffic volumes by major road segments compared to existing traffic volumes to the 2051 traffic volumes for the one-way scenario are summarized in **Figure 4.5.**

The projections indicate that volumes are expected to be within the available capacity under the one-way scenario. It should be noted, however, the assumed capacity is considered “ideal”. In reality, the ideal capacity is rarely achieved in the field as a result of numerous non-recurring factors, including collisions/lane closures, friction in the shoulder lane from bus activity, turning movements to/from mid-block driveways, the presence of parked cars within a travel lane, etc.



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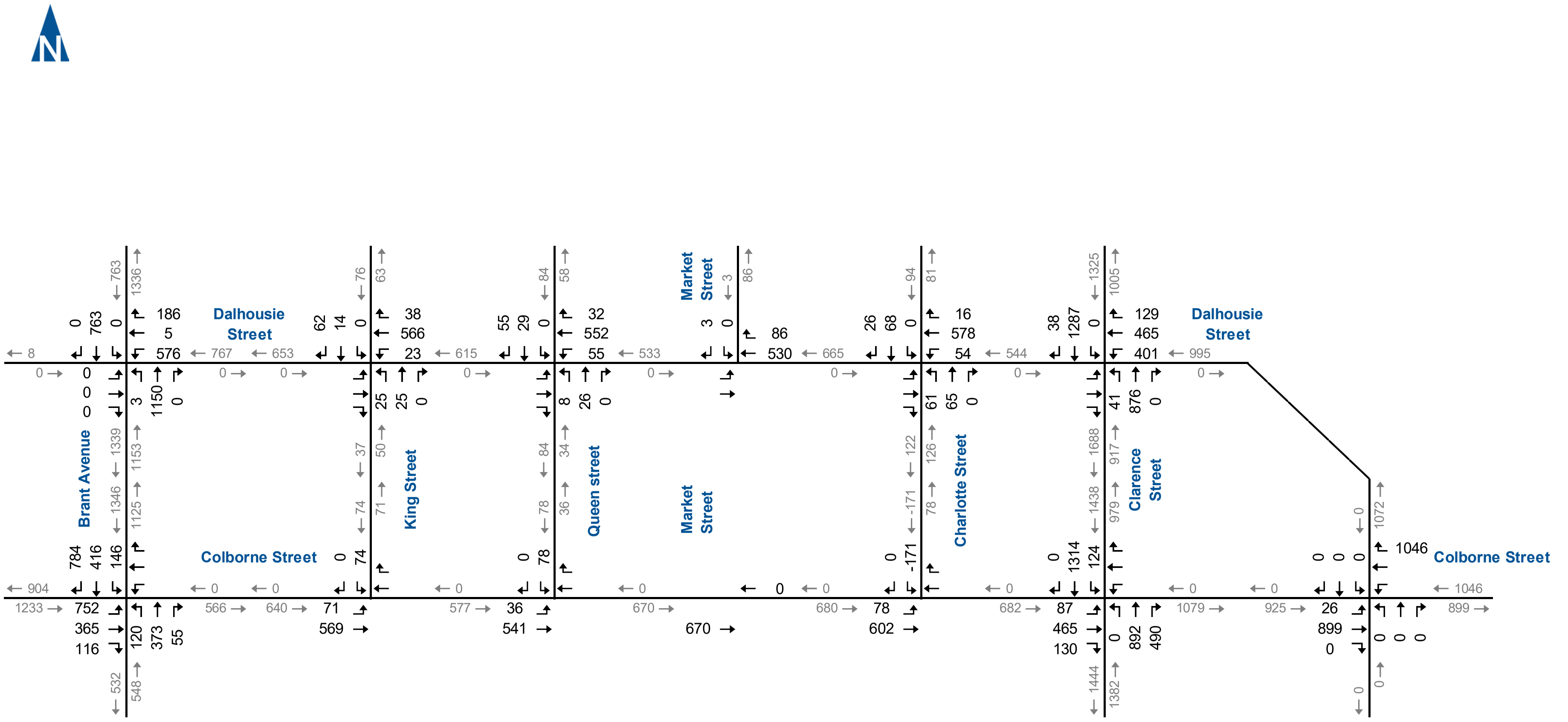
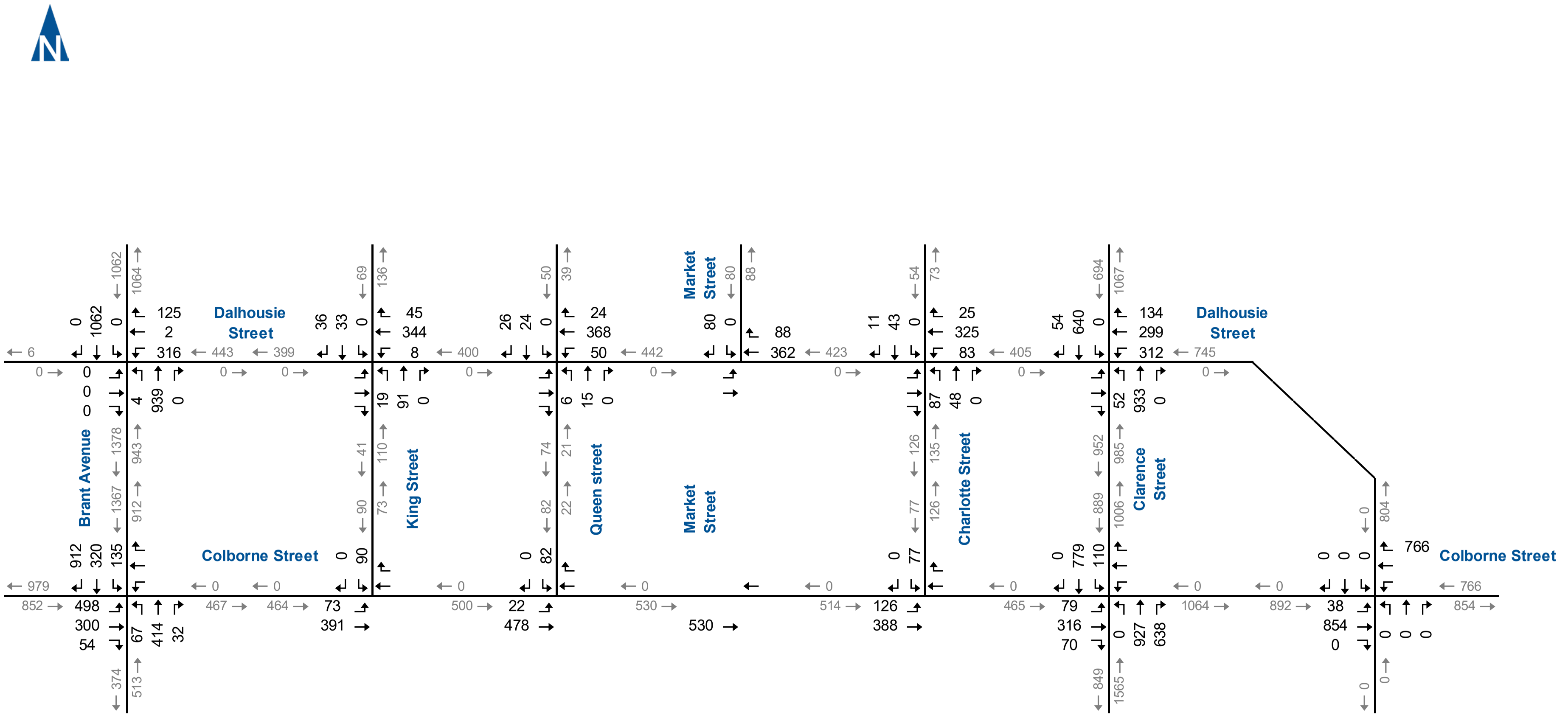
2025 AM Peak Hour Traffic Volumes

Figure 4.2A



2025 PM Peak Hour Traffic Volumes

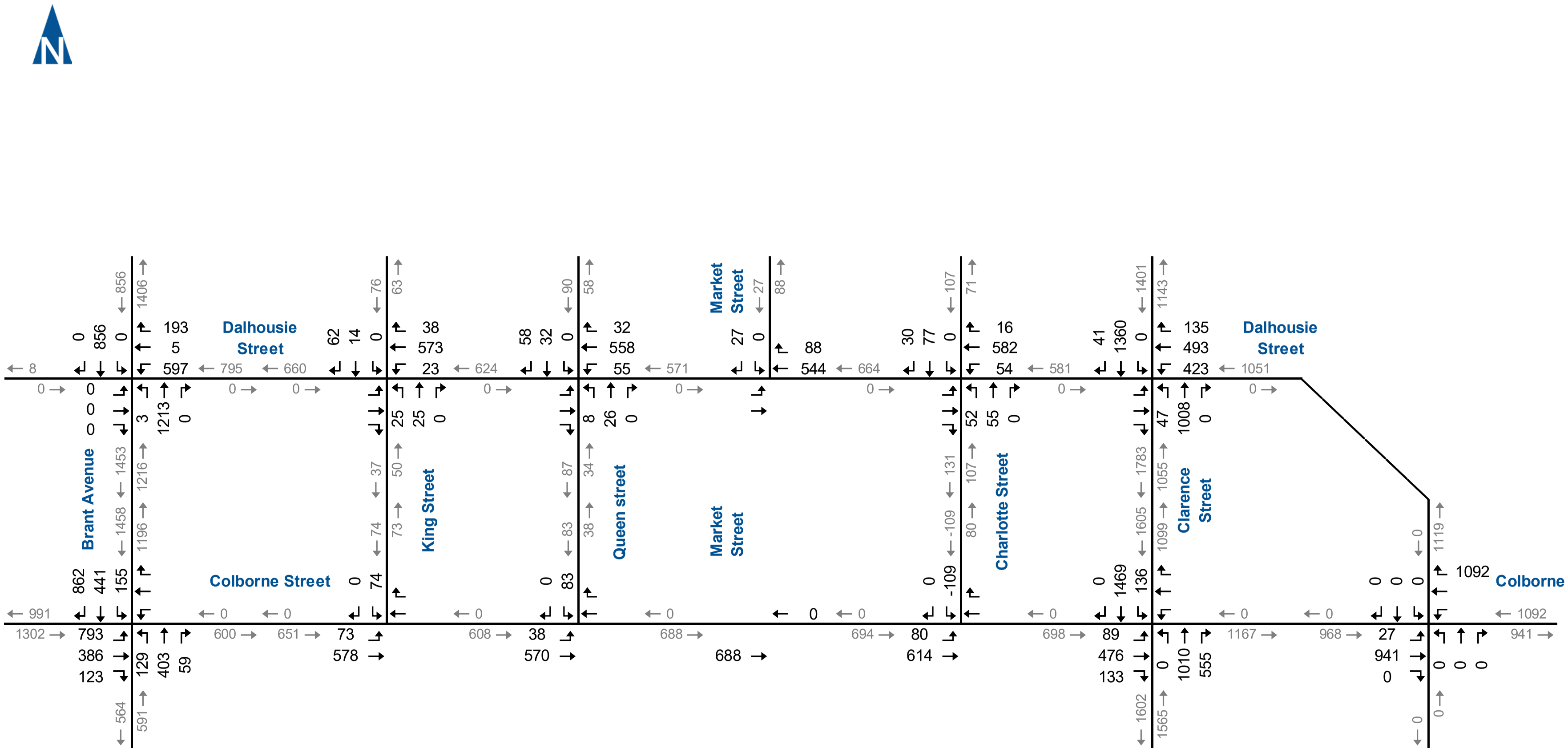
Figure 4.2B



2030 AM Peak Hour Traffic Volumes

Downtown Brantford Streetscape Class EA – Transportation Study
190449

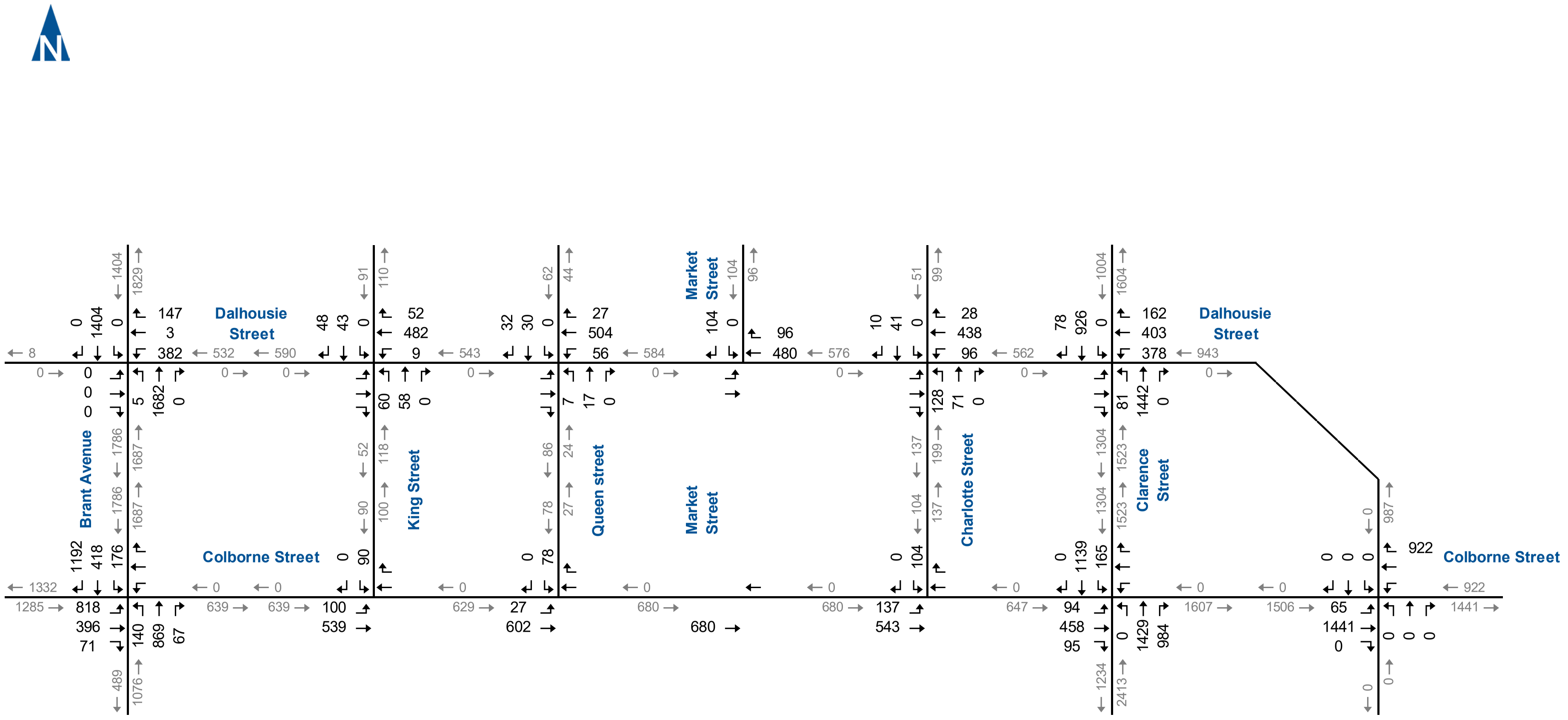
Figure 4.3A



2030 PM Peak Hour Traffic Volumes

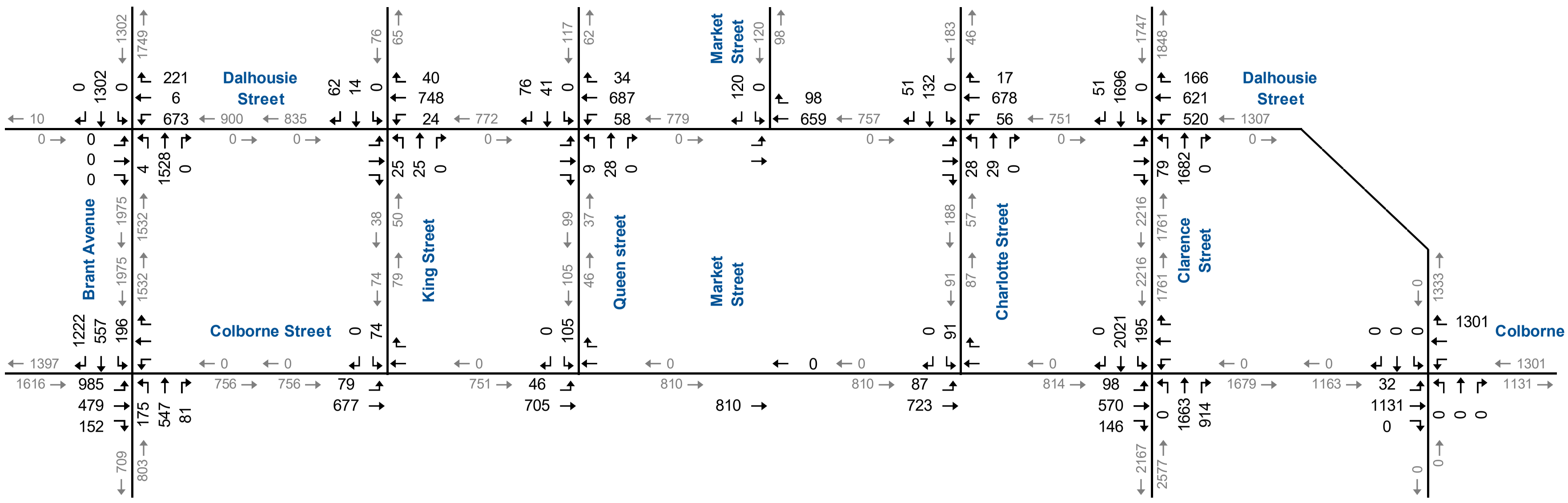
Downtown Brantford Streetscape Class EA – Transportation Study
190449

Figure 4.3B



2051 AM Peak Hour Traffic Volumes

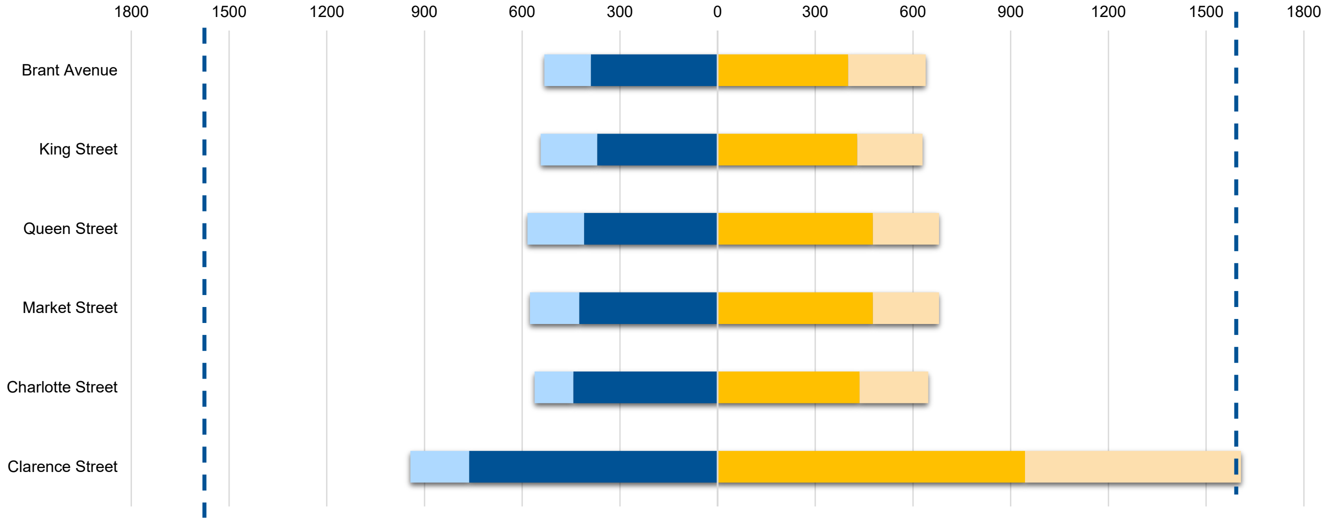
Figure 4.4A



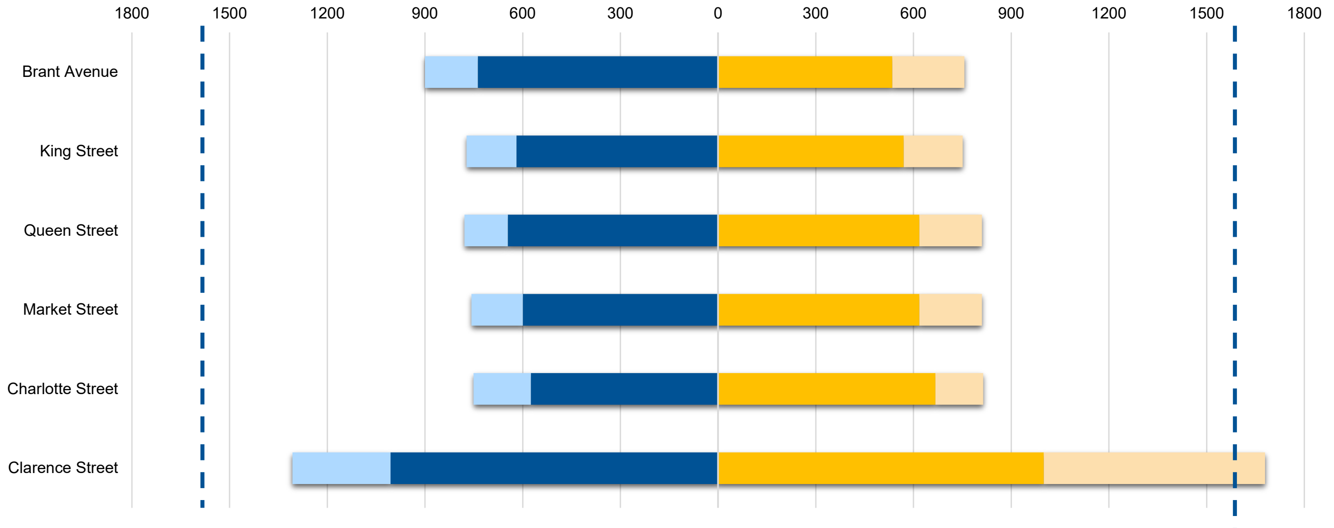
2051 PM Peak Hour Traffic Volumes

Figure 4.4B

AM Peak Hour Traffic Volumes



PM Peak Hour Traffic Volumes



🟧	Colborne Existing Volume	🟨	Colborne Future Volume
🟦	Dalhousie Existing Volume	🟦	Dalhousie Future Volume
– –	Existing/Future Capacity		

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2051
Capacity Comparison (One-Way)

Figure 4.5

4.5 Two-Way Traffic Volumes

One of the determinants of how future traffic patterns will change with growth and different street configuration options is trip distribution (origin-destination) data. To develop the reassignment under a two-way scenario, a refinement to the City's travel forecasting model analysis zones and network was carried out to create a sub-area model of the downtown network to assist with the distribution.

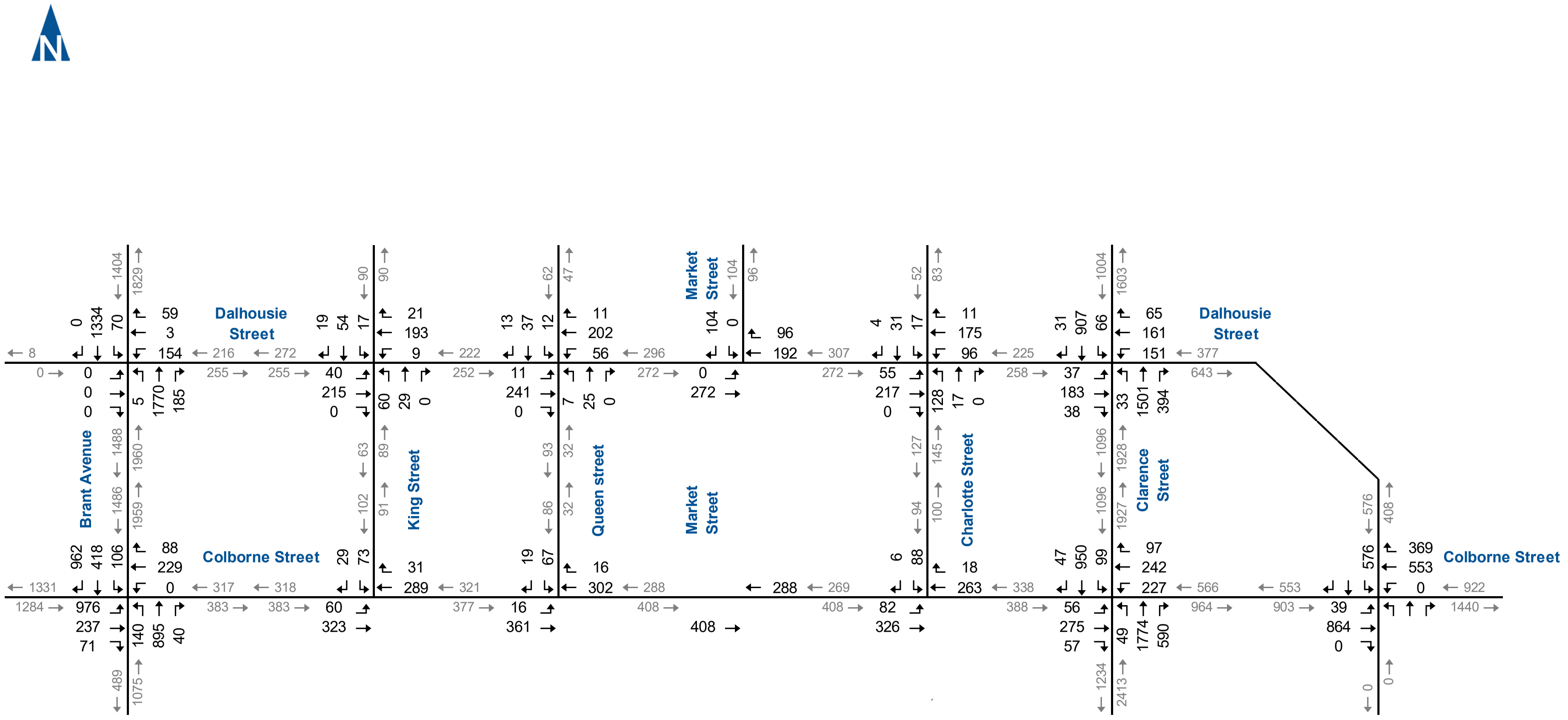
The one-way traffic in the downtown area was than reassigned to a two-way system based on the trip origin and destination information as projected in the analysis zones. Travel routes were then developed in and out of the downtown area based on the most direct route to these zones which indicates 60% of through traffic would favour Colborne Street whereas 40% of through would favour Dalhousie Street.

The reassignment was than compared with the roadside interview origin-destination data collected as part of the previously completed EA "Conversion of Colborne Street and Dalhousie Street to Two-way Traffic Operation" completed in 2010 which indicates similar trends.

Based on the forecast methodology, the future traffic volumes within the sub-area under the two-way scenario were calculated. Traffic volume forecasts at each intersection are illustrated in **Figures 4.6.**

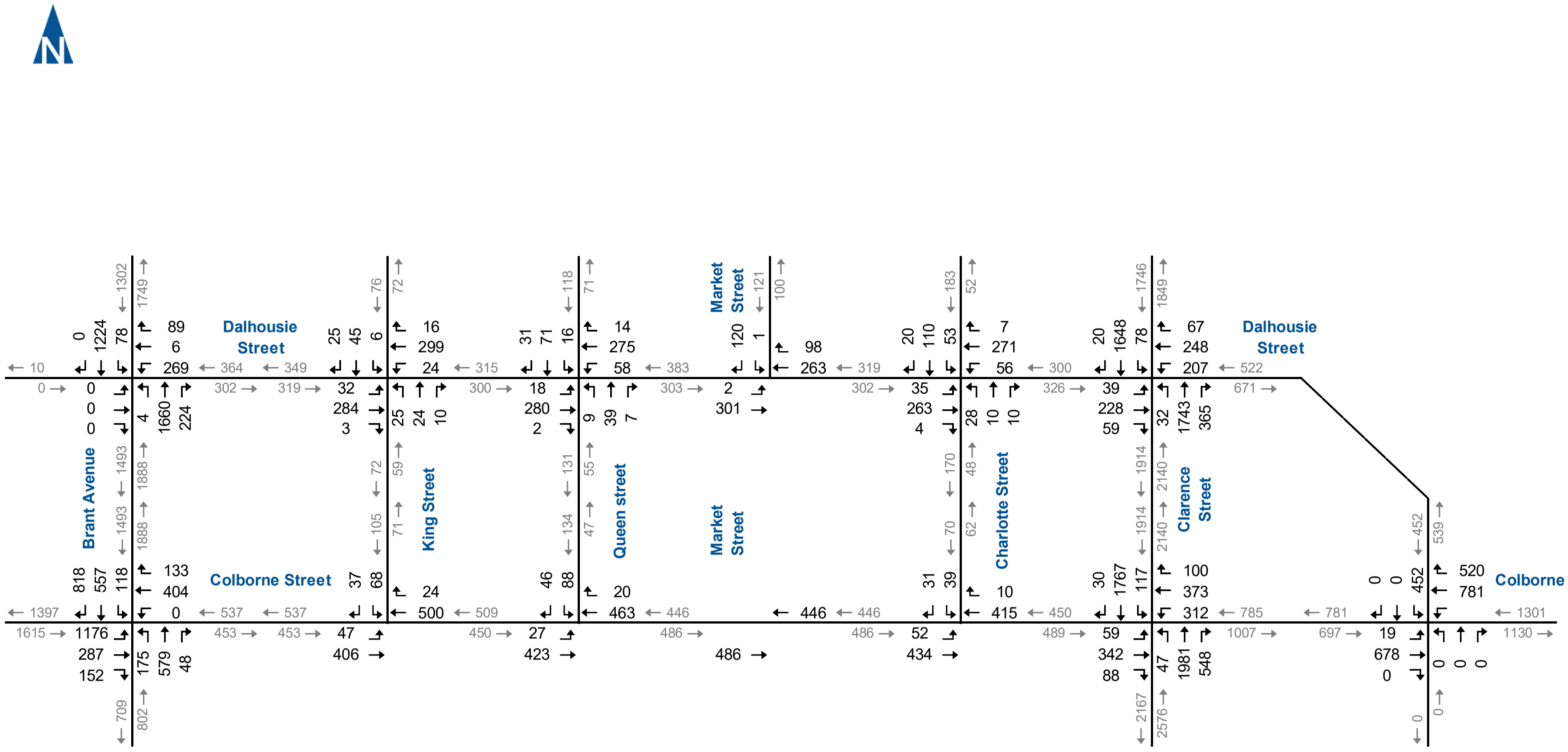
Forecast peak hour traffic volumes by major road segments for the 2051 traffic volumes for the two-way scenario are summarized in **Figure 4.7.**

Traffic volumes are anticipated to increase moderately along Dalhousie Street and significantly along Colborne Street which is projected to exceed the capacity of a single through lane approach at the eastern limit of the study area. It should be noted, however, the assumed capacity is considered "ideal". In reality, the ideal capacity is rarely achieved in the field as a result of numerous non-recurring factors, including collisions/lane closures, friction in the shoulder lane from bus activity, turning movements to/from mid-block driveways, the presence of parked cars within a travel lane, etc.



2051 AM Peak Hour Traffic Volumes (Two-Way)

Figure 4.6A



2051 PM Peak Hour Traffic Volumes (Two-Way)

Figure 4.6B

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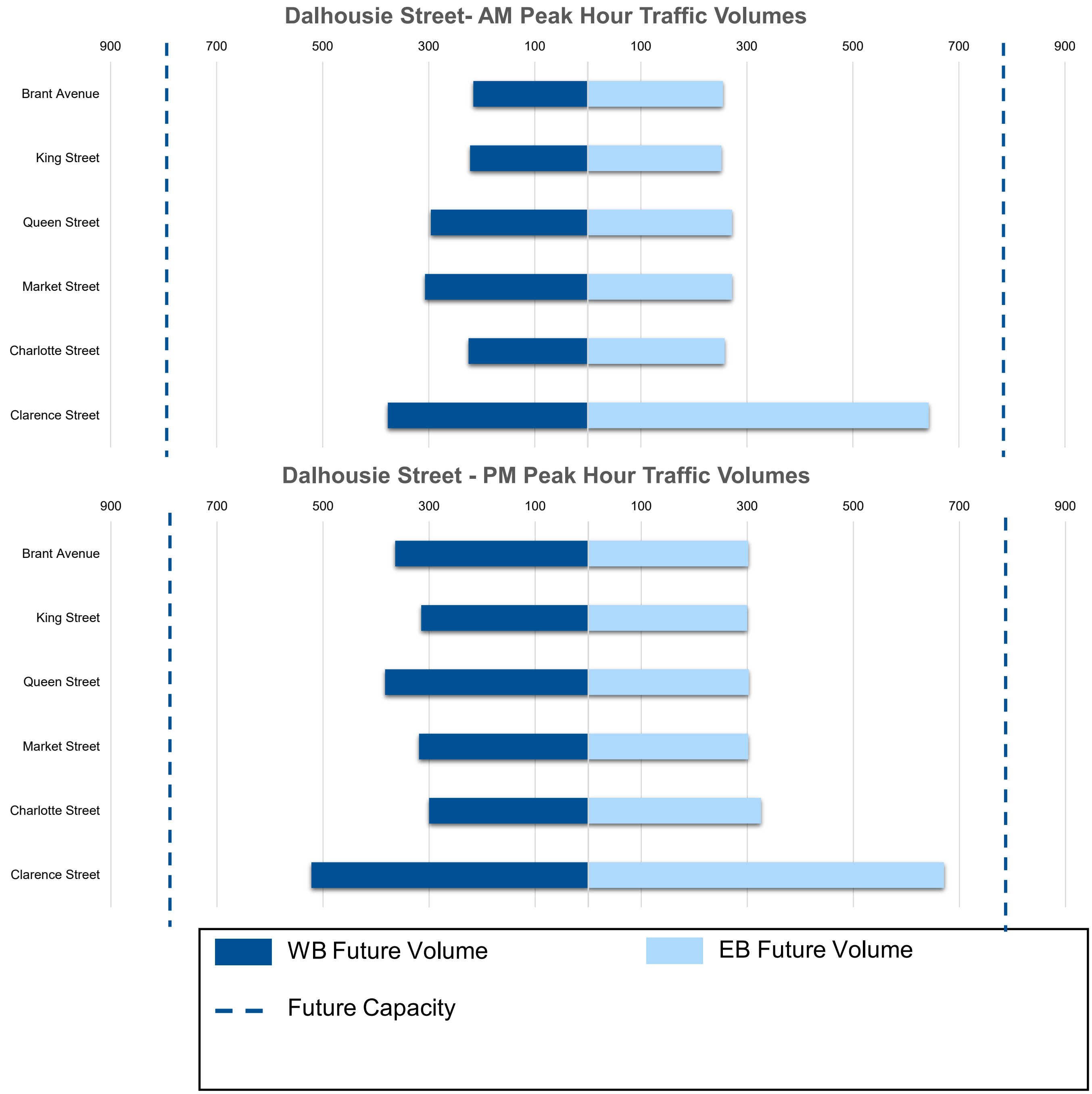

2051 Dalhousie Street Capacity Comparison (Two-Way)

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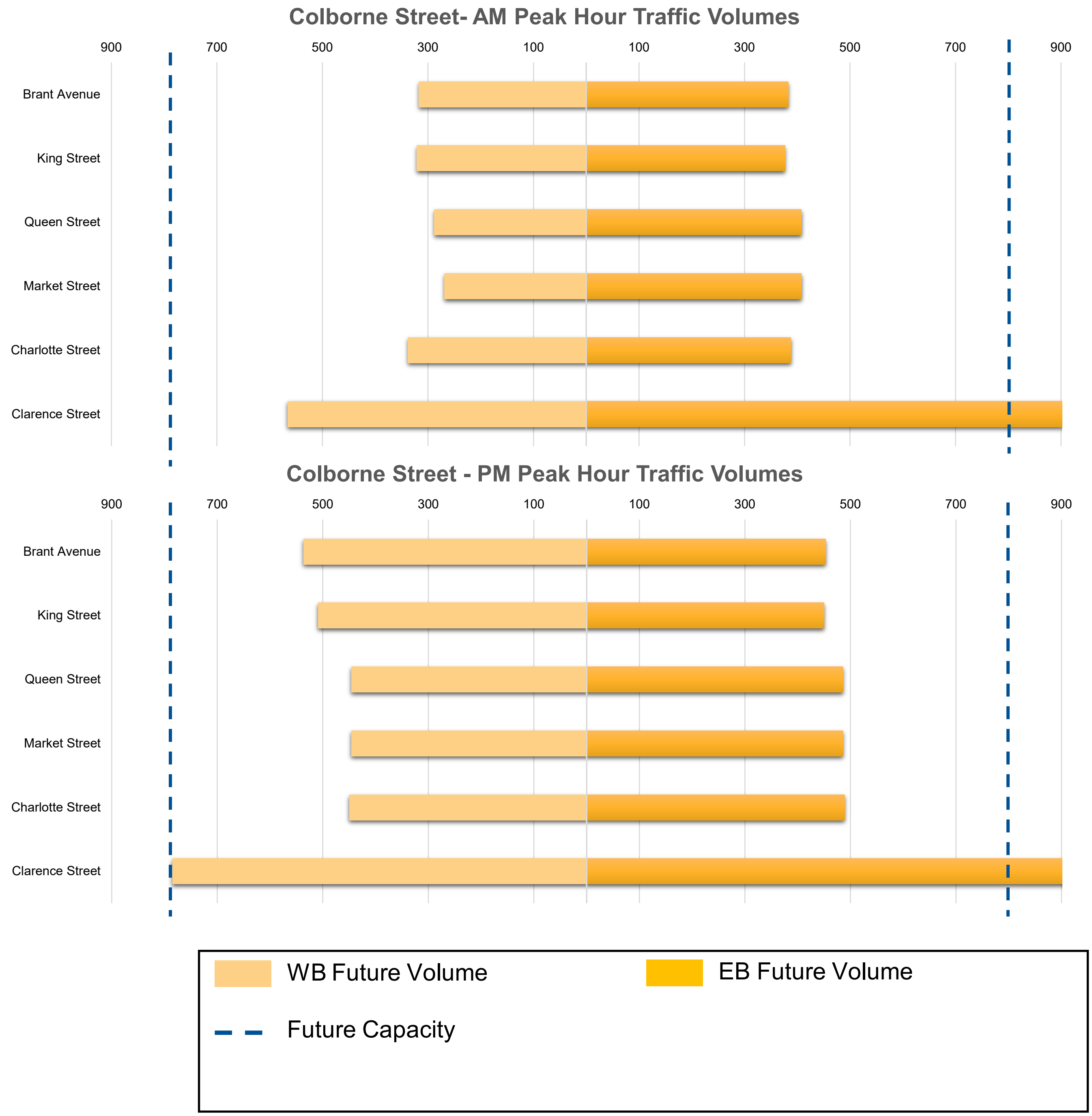
Figure 4.7A



2051 Colborne Street Capacity Comparison (Two-Way)

Figure 4.7B

5 Future Operations

Future intersection Level of Service (LOS) was assessed based on the methodology described in **Section 2.6**. The following analyses summarize lane configuration assumptions, forecast AM and PM LOS, critical movements, v/c ratio, and total delay for critical movements for the 2051 operations under one-way and two-way scenarios, respectively.

The future traffic conditions assessments are based on intersection capacity as link capacity is dictated by the downstream intersection. Critical movement delays represent a worst-case scenario and are subject to the limitations of the Synchro model assumptions and traffic and signal timing inputs. Much of the City of Brantford’s traffic signal system can adjust timings to meet changing traffic conditions.

5.1 One-Way Traffic Volumes (2051)

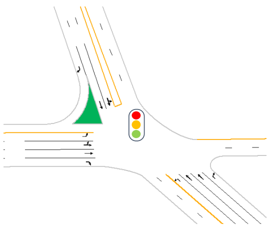
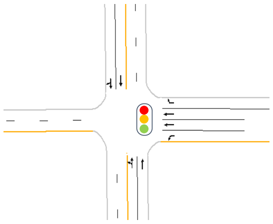
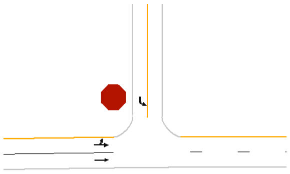
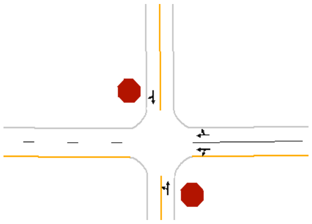
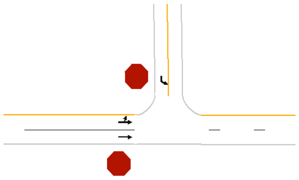
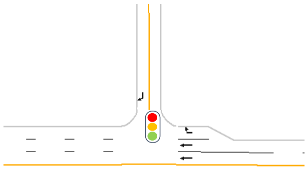
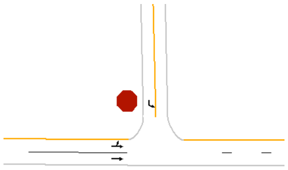
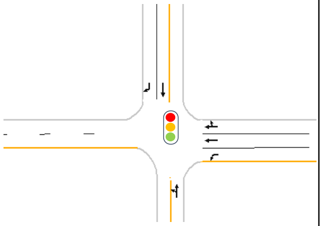
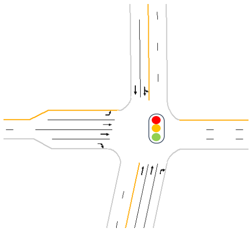
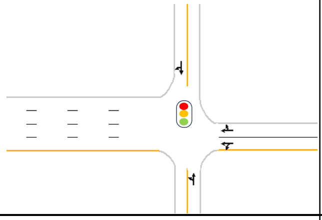
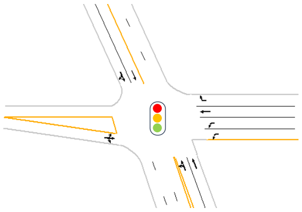
Table 5.1 summarizes the lane configuration assumptions, the AM and PM LOS, the critical movements v/c ratio, and the total delay for the 2051 one-way operational analysis. **Figure 5.1** graphically displays the results and note:

- Overall, the intersections analyzed within the sub-area are operating with satisfactorily levels of service. In both the AM and PM peak hours, intersection LOS A-C is anticipated.

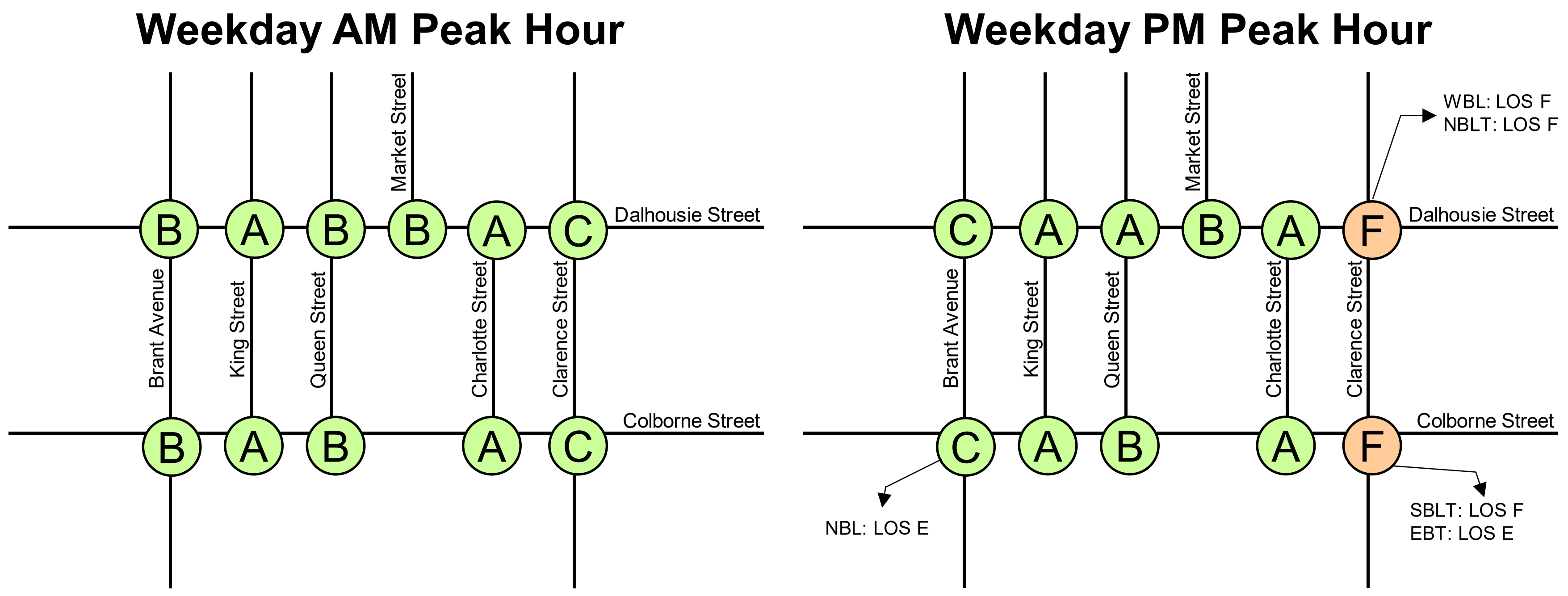
  Localized congestion is projected to occur along the Clarence Street Corridor during the PM Peak hour and is likely a result of the left turn movements along Clarence Street being shared with the through movement. As the majority of trips on Clarence Street are travelling from north-central Brantford (i.e., north of Highway 403) to the south side of the river via West Street. A widening of Clarence Street to provide for separate left turn lanes would improve operations. Alternatively, the Veterans Memorial Parkway partial extension (to Murray Street) provides an opportunity for an alternative route out of downtown via Murray Street. A partial extension of the Veterans Memorial Parkway could be considered beyond 2051 to address potential long-term issues and should be protected for as an alternative to Clarence Street.

Appendix D contain the supporting detailed Synchro.

TABLE 5.1: 2051 (ONE-WAY) TRAFFIC OPERATIONS

Intersection	Lane Configuration	LOS		Critical Movements	Intersection	Lane Configuration	LOS		Critical Movements
		AM	PM	LOS - V/C - Delay			AM	PM	LOS - V/C - Delay
1 - Colborne Street at Brant Avenue		B	C	NBL PM E 0.91 57.8	8 - Dalhousie Street at Clarence Street		C	F	NBTL PM F 1.53 246.9 WBL PM F 1.25 173.1
2 - Colborne Street at King Street		A	A		9 - Dalhousie Street at Charlotte Street		A	A	
3 - Colborne Street at Queen Street		B	B		10 - Dalhousie Street at Market Street		B	B	
5 - Colborne Street at Charlotte Street		A	A		11 - Dalhousie Street at Queen Street		B	A	
5 - Colborne Street at Clarence Street		C	F	SBLT PM F 1.79 366.2 EBT PM E 0.83 56.0	12 - Dalhousie Street at King Street		A	A	
					13 - Dalhousie Street at Brant Avenue		B	C	

LOS (Delay s)	DESCRIPTION	LOS (Delay s)	DESCRIPTION
A (<10)	Little to no delay	D (35 – 55)	Frequent queuing and delay
B (10-20)	Minimal delay	E (55 – 80)	Increased queuing and delay
C (20–35)	Some queuing and delay	F (>80)	Significant queuing and delay



**2051 (One-Way)
Weekday Peak Hour LOS**

5.2 Two-Way Traffic Volumes (2051)

5.2.1 Lane Configuration Assumptions

The two-way alternative is based on a minimal provision of left turn lanes at unsignalized intersection in an effort to minimize the need to eliminate on-street parking and to maximize the pedestrian realm. The conversion of Colborne Street and Dalhousie Street to two-way operation is based on the existing roadway geometrics and makes use of lanes already present on the roadway with only re-stripping of the lane markings to include a lane in the opposite direction.

The basic cross-section of this alternative would result in most sections of Colborne Street having one eastbound travel lane and one westbound travel lane with additional eastbound turning lanes at some major intersections. Dalhousie Street would have primarily one travel lane in each direction west of Clarence Street and two westbound and one eastbound travel lane east of Clarence Street, with turning lanes at key intersections.

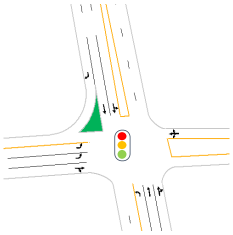
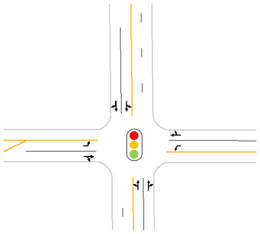
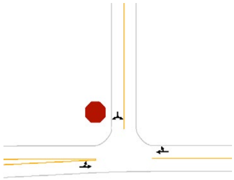
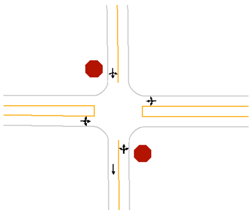
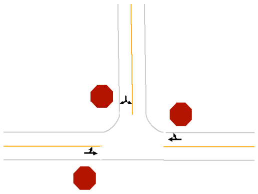
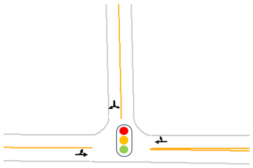
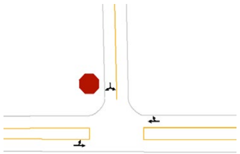
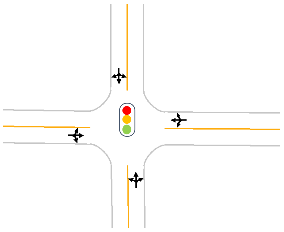
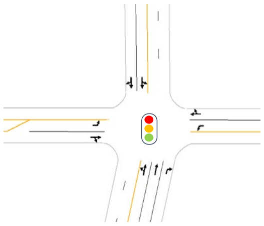
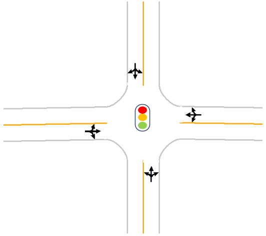
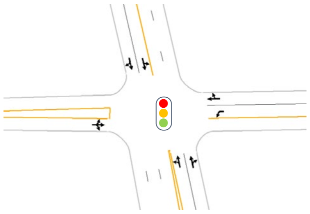
With respect to the intersection of Colborne Street and Brant Avenue, conversion of this intersection to two-way operation would likely result in a skewed alignment for westbound traffic flow through the intersection. There would likely be property impacts to achieve an acceptable east-west alignment of Colborne Street if the current configuration for the east leg is maintained. Alternatively, to maintain a relatively straight alignment through the intersection, consideration to eliminate the channelized southbound right turn lane and narrowing of the east leg to a shared through/right turn lane while maintaining dual eastbound left turn lanes is expected to be required. While this modification would have somewhat of an impact on operations, removal of the channelization and narrowing the crossing distance is seen as beneficial to improve pedestrian crossings at this intersection.

5.2.2 Operational Assessment

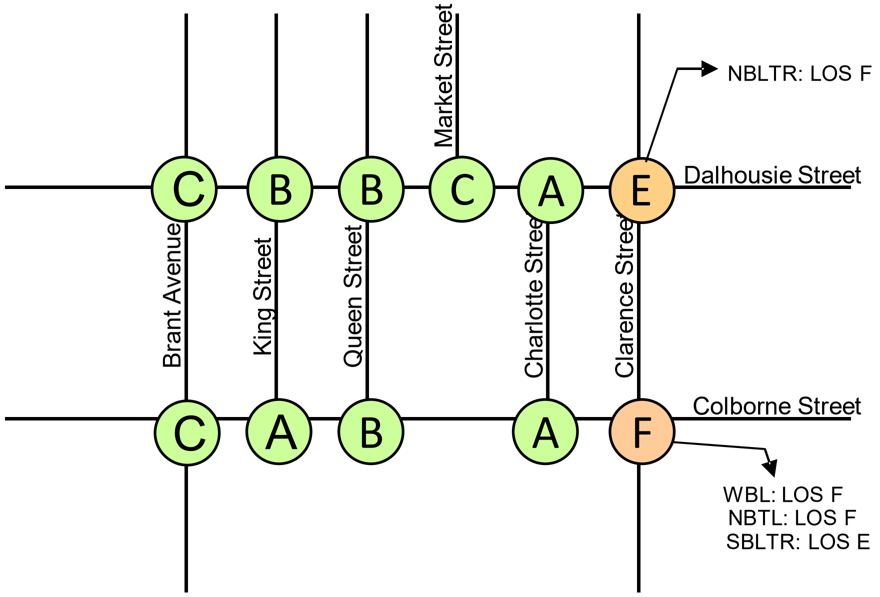
Table 5.2 summarizes the lane configuration assumptions, the AM and PM LOS, the critical movements v/c ratio, and the total delay for the 2051 two-way operational analysis. **Figure 5.2** graphically display the results and note:

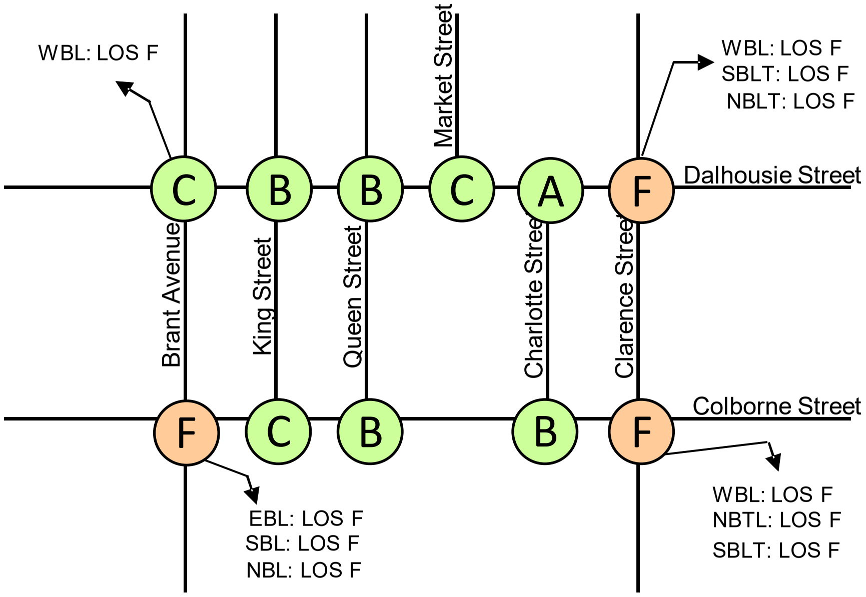
- Similar to the one-way scenario, the Clarence Street corridor is projected to operate with high levels of delay not only for the weekday PM peak hour but also for the Weekday AM peak hour. In addition, an increased delay is projected at the Colborne Street and Brant Avenue intersection for several movements during the Weekday PM peak hour. This results from increased vehicle demand, given the reduction in lane capacity that is expected to be required to achieve an appropriate alignment to facilitate two-way operation at the intersection.

TABLE 5.2: 2051 (TWO-WAY) TRAFFIC OPERATIONS

Intersection	Lane Configuration	LOS		Critical Movements	Intersection	Lane Configuration	LOS		Critical Movements
		AM	PM	LOS - V/C - Delay			AM	PM	LOS - V/C - Delay
1 - Colborne Street at Brant Avenue		C	F	EBL PM F 1.59 294.7 NBL PM F 1.29 220.1 SBLT PM F 1.33 207.3	8 - Dalhousie Street at Clarence Street		E	F	NBLTR AM F 1.21 104.2 WBL PM F 1.01 94.6 NBLT PM F 1.76 349.2 SBLT PM F 1.77 371.9
2 - Colborne Street at King Street		A	C		9 - Dalhousie Street at Charlotte Street		A	A	
3 - Colborne Street at Queen Street		B	B		10 - Dalhousie Street at Market Street		C	C	
5 - Colborne Street at Charlotte Street		A	B		11 - Dalhousie Street at Queen Street		B	B	
5 - Colborne Street at Clarence Street		F	F	WBL AM F 1.15 139.4 NBTL AM F 1.64 316.8 SBLT AM F 1.28 149.1 WBL PM F 1.82 416.9 NBTL PM F 2.22 577.6 SBLT PM F 2.38 643.0	12 - Dalhousie Street at King Street		B	B	
					13 - Dalhousie Street at Brant Avenue		C	C	WBL PM F 1.02 94.4

LOS (Delay s)	DESCRIPTION	LOS (Delay s)	DESCRIPTION
A (<10)	Little to no delay	D (35 – 55)	Frequent queuing and delay
B (10-20)	Minimal delay	E (55 – 80)	Increased queuing and delay
C (20–35)	Some queuing and delay	F (>80)	Significant queuing and delay


Weekday AM Peak Hour


Weekday PM Peak Hour

2051 (Two-Way) Weekday Peak Hour LOS

Figure 5.2

6 One-Way vs Two-Way

Decisions regarding one-way versus two-way streets need to be context sensitive and value-based, having regard for the shared community vision, planned road functions, and competing interests for the valued and often constrained right-of-way (ROW) of any given street.

6.1 Advantages and Disadvantages

6.1.1 Two-Way Streets

- Decreased vehicle distances travelled: By eliminating indirect routes, the distances that vehicles are required to travel to reach a destination may be slightly lower (i.e., eliminate driving around the block).
  - Counterpoint: Similar behaviour can occur as drivers search for on-street parking spaces immediately adjacent to their destination; major parking facilities often provide multiple access/egress points efficiently serving a one-way street network.
- Slower travel speeds: With the additional friction resulting from two-way traffic operation, mid-block speeds are typically lower on two-way streets.
  - Counterpoint: Intersections are the critical points within the corridor, and any resulting congestion at intersections could adversely impact transit service reliability and the ability of emergency vehicles to respond to calls.
- Improved pedestrian (and cyclist) safety: With the foregoing lower travel speeds, pedestrians on the sidewalk (and cyclists within the travelled asphalt) may be considered safer.
  - Counterpoint: Appropriately designed sidewalks and on-road cycling facilities on one-way streets can help to enhance the pedestrian and cycling environment.

6.1.2 One-Way Streets

From a transportation planning perspective, the advantages of one-way streets are:

- Narrow street cross-section: A street can accommodate relatively high traffic volumes with only two travel lanes, given that turning movements can happen from one lane or the other. By comparison, a two-way street will need a wider, three (3) lane cross-section to accommodate a turning lane (otherwise traffic would come to standstill waiting for a single vehicle to turn). This wider cross-section would occur at intersections where pedestrian crosswalks would therefore be lengthened in the two-way scenario.
- Improved signal coordination: Coordination of traffic signals is more easily attained within an area such as downtown environments where signals by necessity are closely spaced (i.e., short blocks). This results in improved traffic and bus transit flow with fewer stops, less idling, and lower emissions. Note that signal timing parameters (i.e., offsets) can be used to regulate travel speeds.
  - Counterpoint: Higher travel speeds for vehicles are the result of coordinated traffic signals, which is not considered conducive to a welcoming pedestrian environment and safe cycling.
- Increased capacity: The capacity of one-way streets can be approximately 10% to 20% greater than that of two-way streets. Increased capacity can translate into fewer lanes and fewer through streets within a one-way grid system, or alternatively, the option to reprogram any surplus capacity/ space for other purposes (i.e., dedicated parking lanes, bicycle lanes, wider sidewalks).
  - Counterpoint: None.
- Reduced congestion and delay: Congestion and delay is reduced for all modes, including pedestrians, vehicles and transit. Delay is often reduced as the cycle length can be much shorter with one-way streets. The extra phases to accommodate left-turn movements are unnecessary with one- way streets.
  - Counterpoint: The one-way system forces drivers to follow out of direction routes, and this recirculation results in an increase in traffic volume on a given segment or intersection within a one-way system.

- Improved pedestrian safety at intersections: The pedestrian has fewer directions to be concerned about at intersections involving one-way streets, and drivers have fewer potential conflicts to process (and can give more attention to pedestrian safety). Safety studies conducted from the 1930's to the 1970's of before and after conditions (as cities switched from two-way to one-way) consistently found that one-way streets had 10% to 20% lower accident rates than when previously two-way, and pedestrian accidents dropped by 30% to 60%.
  - Counterpoint: At intersections of two-streets that are each two-way, pedestrians have an expectation of potential vehicular conflicts with their path as they cross the intersection. These expectations can be different at the intersection of one-way streets, which may create a less safe pedestrian environment.

6.2 Operations

The analyses of the traffic conditions found that the peak period level of service conditions at the downtown street intersections are generally at satisfactory levels. This is particularly the case within the downtown area where most intersections operate at level of service A or B.

The intersections projected to experience some congestion are generally at the centre of the downtown core (i.e., Clarence Street) under both the one-way and two-way scenarios.

A widening of Clarence Street would result in significant property impacts and would be constrained by the railway spur line on the east side (limiting widening options to the west side). The Veterans Memorial Parkway partial extension (to Murray Street) provides an opportunity for an alternative route out of downtown via Murray Street. A partial extension of the Veterans Memorial Parkway could be considered beyond 2051 to address potential long-term issues and should be protected for as an alternative to Clarence Street.

In addition, the two-way scenario is also expected to create some additional capacity constraints at the intersection of Colborne Steet and Brant Avenue given modifications to the east leg are required to achieve a straight alignment through the intersection.

Overall, the one-way street traffic operations have fewer turning movement conflicts at intersections and the traffic control along a one-way street can be coordinated to maintain smooth, uninterrupted flow of traffic through a number of intersections. In summary, the one-way scenario offers the least amount of delay and travel time as a result of limited conflicts for turning vehicles at intersections as there is no traffic travelling in the opposite direction to delay either a left turn or right turn movement.

6.3 Balanced Network

The primary intent of the preferred streetscaping alternative is to improve walkability and accessibility for all transportation modes. One of the main objectives of the preferred alternative is to create a complete street that will capitalize on the walkability and pedestrian capacity of downtown, animate these streets and become a place-making destination. As the vision for each street needs to be considered, a review of the options and what opportunities a one-way vs two-way system provides in perspective of this vision.

Although it seems to be a commonly held view that converting the high-speed and high-capacity one-way downtown streets to two-way could be necessary for a downtown revitalization program, there are advantages to bringing together different types of activities within a relatively dense and diversified environment. There are also advantages to using multitudinous strategies to achieve an objective with several interrelated factors.

As the downtown streets are provided with a narrow right-of-way with limited opportunity to expand, there are many competing interests for space, including sidewalks, bus stops/shelters, landscaping, public art, bicycle parking, vendor boxes, streetlights, fire hydrants, on-street parking, and travel lanes. Given the intensity of use and the increase in intensity that is envisioned with the Streetscape investment, decisions regarding the allocation of space are anticipated to become more complex

There is considerable literature available on the opportunities and constraints of converting existing one-way streets to two-way operation, and depending on one’s perspective, convincing arguments can be made for the merits of each system. The real question as applied to Brantford is how the narrow rights-of-way best can be utilized to function as complete street. The following considerations are appropriate for downtown Brantford streets:

- One-way streets generally promote efficient vehicle travel by accommodating heavy traffic volumes and improved opportunity for traffic signal coordination between intersections. They offer an opportunity to reallocate more space towards sidewalks and/or cycling facilities, allowing for development of complete streets.

- Benefits associated with one-way streets include decreased congestion, associated reduction in air pollution, reduced time delays for all modes, reduced pedestrian/cyclist conflicts with turning vehicles, increased safety at intersection crossings.

- Two-way streets generally promote increased accessibility to local destinations, desirable slower traffic speeds, and more comfortable street environment for pedestrians and cyclists. They benefit street-oriented land uses at grade level, provide scenic views from both directions and tend to calm down traffic speeds.

- The potential conversion to two-way operation of Colborne Street and Dalhousie Street would place considerable additional pressure on Clarence Street and Brant Avenue to accommodate the diverted traffic.

Balancing the competing interests for space is always the first challenge when designing complete streets. In downtown Brantford, this competition is fierce due to the volume of travel in all modes that must be accommodated within municipal street rights-of-way that are incredibly narrow. As a result, it is sensible to create street design solutions that can fit within the narrow right-of-way that covers most of downtown Brantford.

6.4 Pedestrian Safety

Perhaps the greatest consideration between one-way and two-way conversions is pedestrian safety. The speed and pattern of vehicular traffic on the street significantly impact the level of protection afforded to non-vehicular street users. This group of users can be pedestrians, bicyclists, and other non-motorists.

Pedestrian safety in downtown commercial streets is paramount because in most cases, a downtown motorist’s destination is some place to park the car, namely a garage, lot or on-street parking space; upon parking, the motorist leaves the vehicle as a pedestrian to access the final destination.

Both sides of the one-way to two-way debate accept the importance of pedestrian safety but there is not an agreement as to which way of travel is actually safer as pedestrian safety may depend on characteristics that can only be determined on a case-by-case basis. There are several benefits of two-way streets that positively affect pedestrian safety and pedestrian experience; a relatively new criterion for successful downtowns.

6.5 Experience from Other Cities

There are many cities in Canada and the United States that have been converting their one-way streets to two-way. The rationale for such conversions has tended to focus on creating a pedestrian friendly environment, calming traffic, attracting new neighbourhood businesses, and reducing the navigation confusion for visitors. Below are two somewhat recent examples of one-way conversions in Ontario, although there is no quantitative evidence of traffic impacts that could be identified and/or provided.

- Hamilton, ON: Hamilton is infamous for having mainly one-way streets throughout its downtown core. Conversion back to two-way streets began in 2002, including John Street and James Street (considered two main north-south arterial roads). The conversion featured sidewalks, on-street parking (on both sides), two travel lanes, but no dedicated cycling lane.
- St. Catharines, ON: The one-way commercial spine of downtown St. Catharines opened up a portion of the street to two-way traffic in 2010. The converted street features one travel lane per direction, on-street parking (one side only), sidewalks, but no dedicated cycling lane.

It also clear in reviewing literature that there are many examples of North American cities that offer an attractive pedestrian environment even with the presence of one-way street networks.

- New York City, NY features a road network that is almost exclusively one-way streets, and it is considered an extremely vibrant pedestrian environment.

- Montreal, QC, Rue Sainte Catherine and Boulevard de Maisonneuve and others are one-way streets and are considered very successful commercial streets within the downtown core of the city.

In both of these cases, the width of the road, width of sidewalks, presence of on-street parking, access to public transit and most importantly, built form of the buildings on the street, each impact street life far greater than one-way traffic.

6.6 Downtown Brantford

For most of the one-way streets in the downtown Brantford, the identified cross sections generally consist of two travel lanes and sidewalks on both sides. Auxiliary turn lanes are seldom provided at intersection because they are not essential given the one-way operation (i.e., no conflicting movement in the opposite direction, and turning movements accommodated from one of the two available lanes at intersections). None of the existing one-way streets currently have dedicated, high quality, on-road cycling facilities.

With a limited ROW, and when striving for sidewalks of appropriate width particularly at intersections, it is not possible to have road cross-sections including three lanes of traffic and on-street cycling facilities. It is also concluded that in the downtown environment, for a two-way street, a turn lane would be preferred at most intersections to improve traffic operations.

This is to provide for a basic level of vehicle mobility, but also to enable the movement of emergency services vehicles through a congested or blocked intersection (such as during an accident), as well as transit vehicles and general traffic. This results in a three-lane cross-section at intersections, for two-way streets. However, for one-way streets, it may be appropriate to have only a two-lane cross-section at intersections. If one of the lanes is blocked either by a turning vehicle or an accident, there is an available lane for vehicles to “slip around” the blocked lane, and keep traffic flowing, including buses.

The conclusion is that, given the narrow right of way along Colborne Street and Dalhousie Street where a dedicated cycling facility is to be provided and sidewalks are to be of appropriate width, this can most readily be accomplished in a one-way vehicular arrangement. However, if dedicated cycling is not a requirement and shared use vehicle/cycling lanes are appropriate, then a two-way, two-lane (three-lane at intersections), with ample pedestrian sidewalk space can be accommodated.

6.7 Preferred Arrangement

The foregoing assessment indicates there are valid arguments for both maintaining an existing one-way street network in Downtown Brantford, and conversely, converting one-way operation to two-way operation.

There are many examples of one-way street conversions in other cities, typically on roads carrying modest traffic volumes, leading to improved commercial and pedestrian environments. Similarly, many examples of successful commercial and pedestrian environments within existing one-way street corridors, including New York City and Montreal. These successes demonstrate that there are likely elements at play other than the direction of traffic flow that characterizes a thriving street, such as the width of the roadway, number of travel lanes, width of sidewalks, presence of on-street parking, cycling facilities, access to public transit, the quality of built form and streetscaping along the street, and market conditions.

In the documented instances of one-way street conversions completed in other cities, the desired outcome for a community was often established based on urban planning principles (i.e., better pedestrian environment, improved retail, commercial viability, etc.). In most cases, the outcome appears to have been achieved from anecdotal evidence only. However, there is a surprising lack of quantitative evidence demonstrating the effects of the conversion from one-way to two-way operation. Pedestrian safety appears to be the most-cited metric of before-and-after studies, with many studies claiming a one-way street system was safer. In short, the technical findings were undoubtedly varied and non-conclusive. Traditional traffic performance measures, such as the impact on traffic volume, intersection performance, or travel time/delay, were not evident in the literature. Therefore it was not possible to learn much from the experiences of previous one-way street conversions in this regard.

In downtown Brantford's case, the primary one-way street network is considered somewhat unique given the connectivity the subject streets provide to key elements of the region's transportation infrastructure and bridge crossings of rivers. It is also worth noting that the downtown streets with the most mixed and street-oriented land use and high and sustained pedestrian activity are two-way streets. More importantly, the narrow ROW reality of downtown Brantford streets creates added pressure on the roads to operate as efficiently as possible for all modes. Since the vision for the downtown is to pursue streets that can provide wider sidewalks and on-street cycling facilities, as well as basic functionality for vehicles and buses, this tends to balance the scales towards one-way operation, provided the narrow ROW can be re-arranged accordingly.

7 Preferred Alternative

Alternative 4 and Alternative 5 both consist of maintain a one-way configuration with incorporating active transportation facilities. Differences between these alternatives is that Alternative 4 provides for bi-directional cycling facilities without an increase in the pedestrian realm whereas Alternative 5 consists of a single cycling lane with an increase in the pedestrian realm. To further evaluate each alternative, a number of additional criteria have been considered.

7.1 Additional Impacts

7.1.1 Road Safety

From a safety perspective, maintaining the one-way configuration is expected to:

- Improve cyclist safety and comfort by providing dedicated bicycle lanes and removing the potential conflicts between cyclists and vehicle parking;
- Have fewer turning movement conflicts at intersections; and
- Traffic control along a one-way street can be coordinated to maintain smooth, uninterrupted flow of traffic through a number of intersections.

Potential safety conflicts are still possible at:

- Intersections between cyclists and turning vehicles;
- The more efficient traffic movement along a one-way corridor could contribute to higher traffic speed
- Transit stops between cyclists and stopped transit vehicles and between cyclists with pedestrians getting on/off transit.

Overall Alternative 4 and 5 have similar cross-sections, however Alternative 4 provides for bi-directional cycling facilities which could led to increased collision potential at minor intersections as drivers can forget to check the other direction especially along a one-way configuration. Alternative 5 is preferred.

7.1.2 Emergency Vehicles

As Colborne Street and Dalhousie Street currently operate in a one-way configuration, emergency response delays are not expected to incur or degrade from current service levels. Alternative 4 and 5 perform similarly from an emergency vehicle perspective.

However, further consultation with Brantford Fire Service (BFS) and Emergency Medical Service (EMS) will need to further be undertaken to identify any potential concerns with the preferred cross-section.

7.1.3 On-Street Parking

Both alternatives results in a loss of 84 on-street parking spaces. Downtown Brantford contains well over 1,600 parking spaces in various offsite parking garage and lots can readily absorb these losses as there are 380 vacant spaces within these lots during peak periods.

With a fair amount of off-site parking located within the sub-study area and within walking distance, the need to provide on-street parking is not a significant requirement. Alternative 5 is preferred over Alternative 4 as it results in wider sidewalks and a more accessible, walkable pedestrian-friendly area.

7.1.4 Loading and Unloading

With two lanes on each street with existing one-way system loading activity takes place on one lane while the other lane remains open to traffic.

Alternative 4 and 5 perform similarly from a loading and unloading perspective.

7.1.5 Traffic Infiltration

Modelling results support the notion that localized traffic infiltration is not projected to occur to any significant degree with either alternative. This is further supported by the forecast operational analyses which show the surrounding local and collector roads and intersections performing well.

Alternative 4 and 5 perform similarly from a traffic infiltration perspective.

7.1.6 Transportation Demand Management

Transportation Demand Management (TDM) programs include policies that reduce car travel and reduce peak period travel in general, including encouraging flexible work hours, working with commercial building owners to provide cycling friendly infrastructure such as bike racks and shower facilities, a Smart Commute association including car pooling programs and incentives as well car share service should be further explored.

Alternative 4 provides for better cycling facilities as cyclists can navigate more quickly through the bi-directional cycling lanes; however Alternative 5 provides for an increased pedestrian realm to improve the walking experience.

Overall, as the intent of TDM is to encourage active transportation, both Alternative 4 and 5 encourage sustainable travel.

Additionally, TDM programs in the sub-area should continue and be encouraged through policy enforcement and implementation to decrease peak hour vehicle demand. In any event, a follow-up traffic study to the Environmental Assessment should be conducted to investigate the aforementioned options.

7.2 Preferred Alternative

Alternative 5 is preferred over Alternative 4 as this option is better suited to improving and providing increased protection for active transportation users. This alternative further encourages TDM within the study area by significantly focusing on active travel modes.

7.3 Preferred Lane Arrangement

The lane configuration of the preferred scenario is summarized in the following sections.

7.3.1 Colborne Street at Brant Avenue

Preferred lane configuration consists of dual left turn lanes for the eastbound approach and separate left turn lanes for the northbound and southbound approaches. From a safety perspective, removal of the southbound channelization could reduce conflicts between vehicles and pedestrians. However, given the large volumes of southbound right turning vehicles, removal of the channelization would likely have an impact on operations along Brant Avenue. Instead, the installation of a Pedestrian Crossover (PXO) would provide for a controlled crossing opportunity for pedestrians while still maintaining capacity to serve the high volume of southbound right turns.

Forecast operations at this intersection under the 2051 horizon is noted to be acceptable (LOS C) with optimized traffic control signals.

7.3.2 Colborne Street at King Street

Preferred lane configuration consists of a shared left/through lane and separate through lane for the eastbound approach. The southbound approach to consist of a single left turn lane. Stop control is provided for the southbound approach. A cycle lane on the north side is proposed as well as an increased pedestrian realm to improve the active transportation network.

Forecast operations at this intersection under the 2051 horizon is noted to be acceptable (LOS A) with stop control for the southbound approach.

7.3.3 Colborne Street at Queen Street

Preferred lane configuration consists of a shared left/through lane and separate through lane for the eastbound approach. The southbound approach to consist of a single left turn lane. A cycle lane on the north side is proposed as well as an increased pedestrian realm to improve the active transportation network.

Forecast operations at this intersection under the 2051 horizon is noted to be acceptable (LOS B) with stop control for the southbound approach.

7.3.4 Colborne Street at Charlotte Street

Preferred lane configuration consists of a shared left/through lane and separate through lane for the eastbound approach. The southbound approach to consist of a single left turn lane. A cycle lane on the north side is proposed as well as an increased pedestrian realm to improve the active transportation network.

Forecast operations at this intersection under the 2051 horizon is noted to be acceptable (LOS A) with stop control for the southbound approach.

7.3.5 Colborne Street at Clarence Street

Preferred lane configuration consists of a separate left turn lane for the eastbound and southbound approaches. A separate right turn lane be provided for the eastbound and northbound approaches.

Forecast operations at this intersection under the 2051 horizon is noted to be acceptable (LOS C) with optimized traffic control signals.

7.3.6 Dalhousie Street at Clarence Street

Preferred lane configuration consists of a separate left turn lane and right turn lane for the westbound approach. The northbound approaches will operate with a separated left turn lane, separate through lane and shared right/through lane.

Forecast operations at this intersection under the 2051 horizon is noted to be satisfactory (LOS D) with optimized traffic control signals.

7.3.7 Dalhousie Street at Charlotte Street

Preferred lane configuration consists of a shared left/through lane and shared right/through lane for the westbound approach. The southbound approach to consist of a single through/right turn lane while the northbound approach to consist of a shared through/left turn lane. Stop control is provided for the southbound approach. A cycle lanes on the south side is proposed and an increased pedestrian realm.

Forecast operations at this intersection under the 2051 horizon is noted to be acceptable (LOS A) with stop control for the southbound and northbound approach.

7.3.8 Dalhousie Street at Market Street

Preferred lane configuration consists of a shared right/through lane and separate through lane for the westbound approach. The southbound approach to consist of a single right turn lane. A cycle lanes on the south side is proposed and an increased pedestrian realm.

Forecast operations at this intersection under the 2051 horizon is noted to be acceptable (LOS B) with optimized traffic control signals.

7.3.9 Dalhousie Street at Queen Street

Preferred lane configuration consists of a shared through/left turn lane and shared through/right turn lane for the westbound approach. The southbound approach to consist of a separate right turn lane and through lane while the northbound approach to consist of a shared through/left turn lane. A cycle lane on the south side is proposed and an increased pedestrian realm.

Forecast operations at this intersection under the 2051 horizon is noted to be acceptable (LOS B) with optimized traffic control signals.

7.3.10 Dalhousie Street at King Street

The preferred lane configuration consists of a shared left/through lane and a shared through/right turn lane for the westbound approach. The southbound approach consists of a single through/right turn lane while the northbound approach consists of a shared through/left turn lane. A cycle lane on the south side and an increased pedestrian realm are proposed.

Forecast operations at this intersection under the 2051 horizon are considered acceptable (LOS B) with optimized traffic control signals.

7.3.11 Dalhousie Street at Brant Avenue

The preferred lane configuration consists of dual left turn lanes for the westbound approach. From a safety perspective, the projected volumes indicate a separate westbound right turn lane is not required; instead, a shared through/right turn lane will provide adequate operations while reducing the crossing distance for pedestrians.

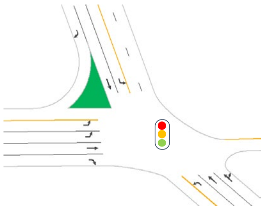
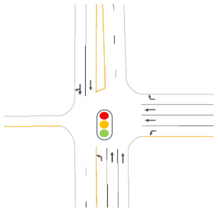
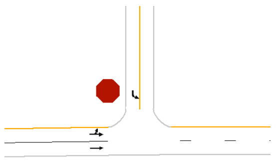
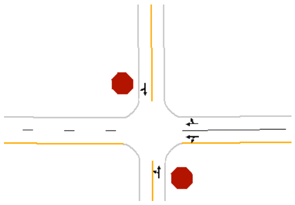
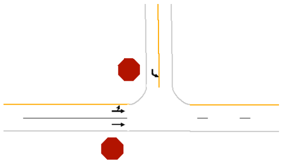
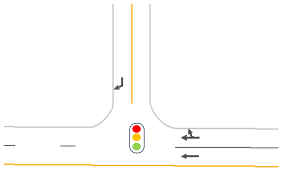
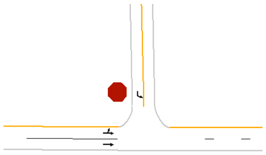
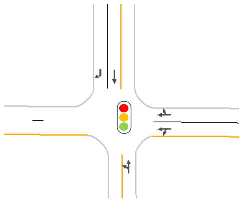
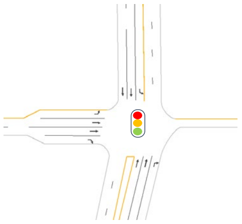
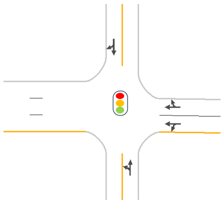
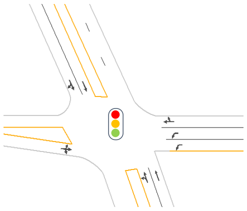
Forecast operations at this intersection under the 2051 horizon is noted to be acceptable (LOS C) with optimized traffic control signals.

7.4 Operations

A sensitivity analysis has been undertaken for the preferred lane configuration. **Table 7.1** summarizes the lane configuration assumptions, the AM and PM LOS, the critical movements v/c ratio, and the total delay for the 2051 two-way operational analysis. **Figure 7.3** graphically displays the results and note:

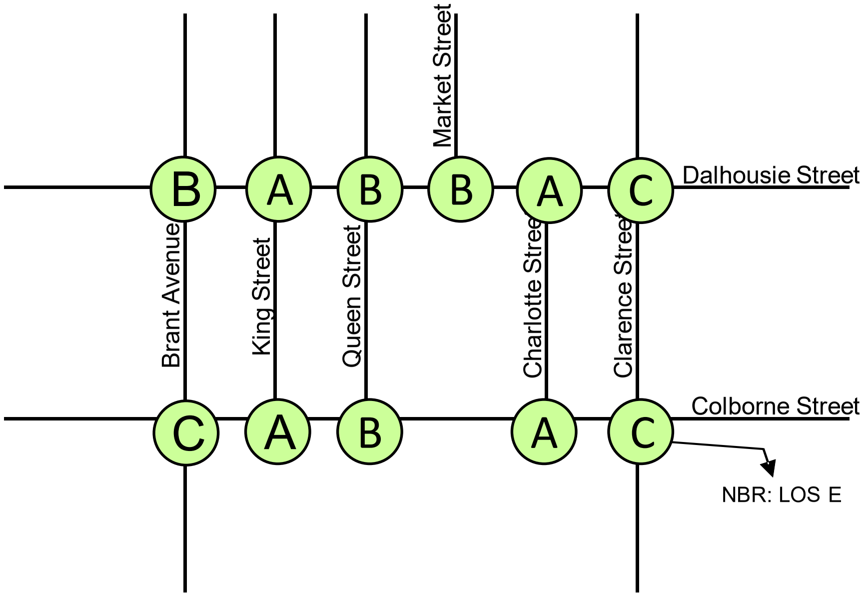
- With the addition of left-turn lanes along the Clarence Street corridor, the intersections with Colborne Street and Dalhousie Street operate with improved operations during the weekday peak hours.

TABLE 7.1: 2051 PREFERRED TRAFFIC OPERATIONS

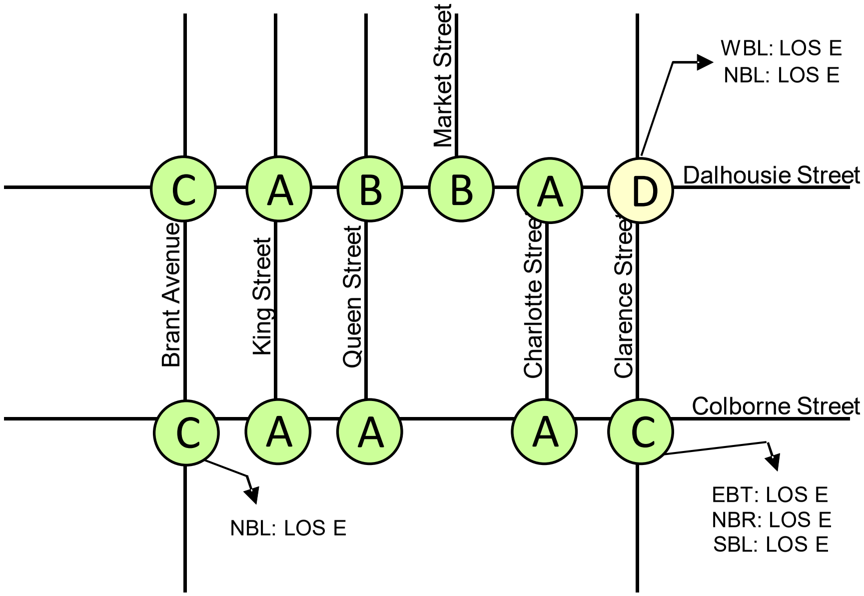
Intersection	Lane Configuration	LOS		Critical Movements	Intersection	Lane Configuration	LOS		Critical Movements
		AM	PM	LOS - V/C - Delay			AM	PM	LOS - V/C - Delay
1 - Colborne Street at Brant Avenue		C	C	NBL PM E 0.93 59.4	8 - Dalhousie Street at Clarence Street		C	D	WBL PM E 0.95 66.6 NBL PM E 0.69 62.2
2 - Colborne Street at King Street		A	A		9 - Dalhousie Street at Charlotte Street		A	A	
3 - Colborne Street at Queen Street		B	A		10 - Dalhousie Street at Market Street		B	B	
5 - Colborne Street at Charlotte Street		A	A		11 - Dalhousie Street at Queen Street		B	B	
5 - Colborne Street at Clarence Street		C	C	NBR AM E 1.04 61.0 EBT PM E 0.87 59.9 NBR PM E 1.02 58.9 SBL PM E 0.98 55.1	12 - Dalhousie Street at King Street		A	A	
					13 - Dalhousie Street at Brant Avenue		B	C	

LOS (Delay s)	DESCRIPTION	LOS (Delay s)	DESCRIPTION
A (<10)	Little to no delay	D (35 – 55)	Frequent queuing and delay
B (10-20)	Minimal delay	E (55 – 80)	Increased queuing and delay
C (20–35)	Some queuing and delay	F (>80)	Significant queuing and delay

Weekday AM Peak Hour



Weekday PM Peak Hour



2051 (Preferred)
Weekday Peak Hour LOS

Figure 7.1

7.5 Queen Street Closure

As the study area consists of a gride network with short blocks, there is an opportunity to modify to transform some of the street network as a predominately active transportation corridor.

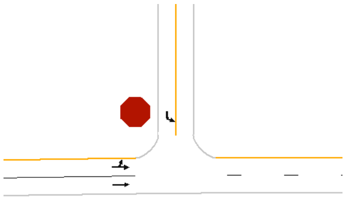
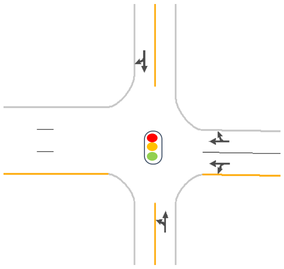
Pedestrian-only streets prioritize people and are typically most appropriate in corridors with commercial activity on both edges of the road. They are strategically selected streets where pedestrian volume is high and vehicular traffic is restricted. These streets offer opportunities for diverse activities such as shopping or sitting, dining or dawdling, promenading or performing. When placed, designed, and maintained well, pedestrian-only streets become a destination, resulting in economic benefits for adjacent businesses.

These streets are not new to Brantford, as Market Street between Colborne Street and Dalhousie Street currently operates in this manner. Based on the pedestrian "heat maps" in **Figure 5.2**, Queen Street would be a suitable candidate for a pedestrian-only street as there is a high volume of pedestrians along Queen Street at both the Colborne Street and Dalhousie Street intersections.

With the closure of Queen Street, traffic volumes are expected to re-route to the adjacent corridor of King Street. To determine the impacts, the reassignment of trips has been modelled to determine if any traffic operations impacts are projected. **Table 7.2** the results of the analysis for the 2051 horizon. The following is noted:

- With the addition of re-routed traffic to the intersections of Colborne Street at King Street and Dalhousie Street at King Street with the closure of Queen Street, the intersections are projected to operate with acceptable operations during the weekday peak hours.

TABLE 7.2: 2051 QUEEN CLOSED TRAFFIC OPERATIONS

Intersection	Lane Configuration	LOS		Critical Movements	Intersection	Lane Configuration	LOS		Critical Movements
		AM	PM	LOS - V/C - Delay			AM	PM	LOS - V/C - Delay
2 - Colborne Street at King Street		A	A		12 - Dalhousie Street at King Street		A	A	

8 Conclusions

Colborne Street and Dalhousie Street has frequently been discussed as potential street to convert from one-way to two-way. Decisions regarding one-way versus two-way streets need to be context-sensitive and value-based, having regard for the shared community vision, planned road functions, and competing interests for the valued and often constrained right-of-way (ROW) of any given street.

Operations

The 2051 forecast traffic conditions under the one-way and two-way scenarios indicate that the peak period level of service conditions at the downtown street intersections are generally satisfactory. This is particularly the case within the downtown area, where most intersections operate at a level of service A or B. The intersections projected to experience some congestion are generally at the centre of the downtown core (i.e., Clarence Street) under both the one-way and two-way scenarios.

A widening of Clarence Street would result in significant property impacts and would be constrained by the railway spur line on the east side (limiting widening options to the west side). The Veterans Memorial Parkway partial extension (to Murray Street) provides an opportunity for an alternative route out of downtown via Murray Street. A partial extension of the Veterans Memorial Parkway could be considered beyond 2051 to address potential long-term issues and should be protected for as an alternative to Clarence Street.

In addition, the two-way scenario is also expected to create some additional capacity constraints at the intersection of Colborne Steet and Brant Avenue given modifications to the east leg are required to achieve a straight alignment through the intersection.

In summary, the one-way scenario offers the least amount of delay and travel time as a result of limited conflicts for turning vehicles at intersections as there is no traffic travelling in the opposite direction to delay either a left turn or right turn movement.

Complete Street

As the primary intent of the preferred streetscaping alternative is to improve walkability and accessibility for all transportation modes, one of the main objectives in determining the preferred alternative is to create a complete street. Although it seems to be a commonly held view that converting the high-speed and high-capacity one-way downtown streets to two-way could be necessary for a downtown revitalization program, there are advantages to bringing together different types of activities within a relatively dense and diversified environment. There are also advantages to using multitudinous strategies to achieve an objective with several interrelated factors.

As the downtown streets are provided with a narrow right-of-way with limited opportunity to expand, there are many competing interests for space, including sidewalks, bus stops/shelters, landscaping, public art, bicycle parking, vendor boxes, streetlights, fire hydrants, on-street parking, and travel lanes. Given the intensity of use and the increase in intensity envisioned with the Streetscape investment, decisions regarding space allocation are anticipated to become more complex.

Balancing the competing interests for space is always the number one challenge when designing complete streets. In downtown Brantford, this competition is fierce due to the volume of travel in all modes that must be accommodated within municipal street rights-of-way that are incredibly narrow. As a result, it is sensible to create street design solutions that can fit within the narrow right-of-way that cover most of downtown Brantford.

Pedestrian Safety

Pedestrian safety in downtown commercial streets is paramount because in most cases, a downtown motorist’s destination is some place to park the car, namely a garage, lot or on-street parking space; upon parking, the motorist leaves the vehicle as a pedestrian to access the final destination.

Both sides of the one-way to two-way debate accept the importance of pedestrian safety but there is not an agreement as to which way of travel is actually safer as pedestrian safety may depend on characteristics that can only be determined on a case-by-case basis. There are several benefits of two-way streets that positively affect pedestrian safety and pedestrian experience; a relatively new criterion for successful downtowns.

Preferred Arrangement

The foregoing assessment indicates there are valid arguments for both maintaining an existing one-way street network in Downtown Brantford, and conversely, converting one-way operation to two-way operation.

In downtown Brantford’s case, the primary one-way street network is considered somewhat unique given the connectivity the subject streets provide to critical elements of the region’s transportation infrastructure and bridge crossings of rivers. It is also worth noting that the downtown streets with the most mixed and street-oriented land use and high and sustained pedestrian activity are two-way streets. More importantly, the narrow ROW reality of downtown Brantford streets creates added pressure on the roads to operate as efficiently as possible for all modes. Since the vision for the downtown is to pursue avenues that can provide wider sidewalks and on-street cycling facilities, as well as basic functionality for vehicles and buses, this tends to balance the scales towards one-way operation, provided the narrow ROW can be re-arranged accordingly.

Preferred Alternative

As the one-way operation is seen as the beneficial arrangement in meeting the overall goals and intent of the Streetscaping alternative, Alternatives 4 and 5 were determined to meet this criteria for further consideration. A comparison of these alternative concluded that Alternative 5 is preferred over Alternative 4 as it is better suited towards improving road safety and enhancing the overall pedestrian realm.

To ensure that the response times of emergency vehicles are not impacted negatively by the proposed changes to Colborne Street and Dalhousie Street, it is recommended that City of Brantford Transportation Services work with Brantford Fire Services to further refine the pre-emption along the Colborne Street and Dalhousie Street corridor. In addition, further consultation with Brantford Fire Services is recommended during detailed design.

To improve the potential safety hazards within the sub study-area, the implementation of a blanket 40 kilometres posted speed limit along Colborne Street and Dalhousie Street is preferred. Furthermore, improved sidewalks (i.e., wider with limited to no obstructions) and cycling facilities will need to be incorporated. Ultimately, the preferred design and streetscape design should support these recommendations.

Other improvements that may need to be considered in the final design could include bike signals, pedestrian only phases (reserved for intersections with high pedestrian volumes) and pedestrian leading green time to provide pedestrians with an advance opportunity to cross before vehicles are allowed to proceed right.

Additionally, the measures identified are further recommended for consideration:

- The intersection of Dalhousie Street and Bridge Street be modified to only one-way traffic in the northbound direction to reduce the number of potential conflicts with westbound through traffic.
- To mitigate the number of active transportation collisions along Colborne Street between the Market Street IPS and Clarence Street, an additional controlled crossing be considered.

Appendix A

Traffic Data

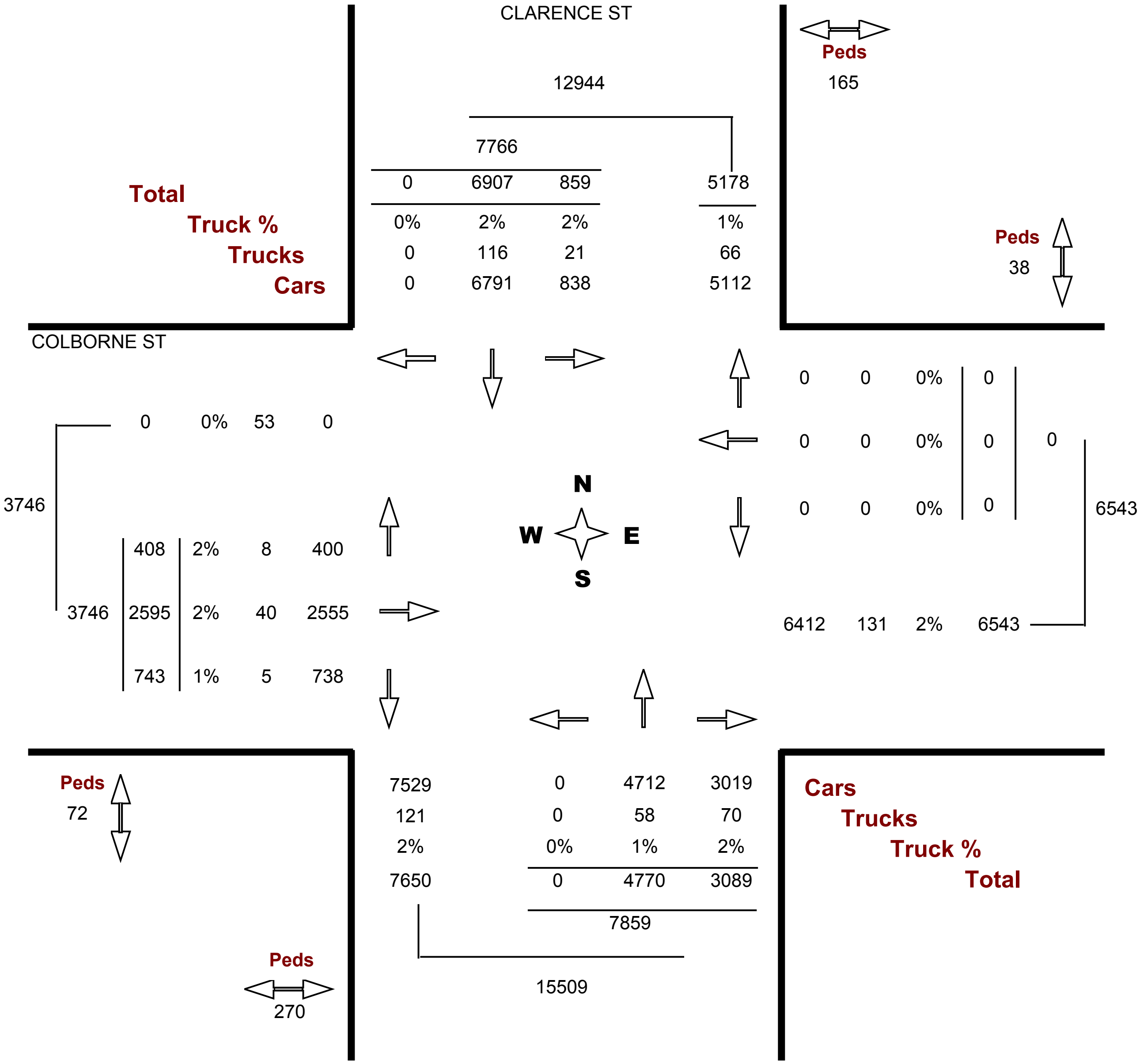
Turning Movements Count - Full Study Report

Location............. CLARENCE ST @ COLBORNE ST

Municipality....... BRANTFORD

GeoID....... N1559

Count Date....... Wednesday, 14 November, 2018



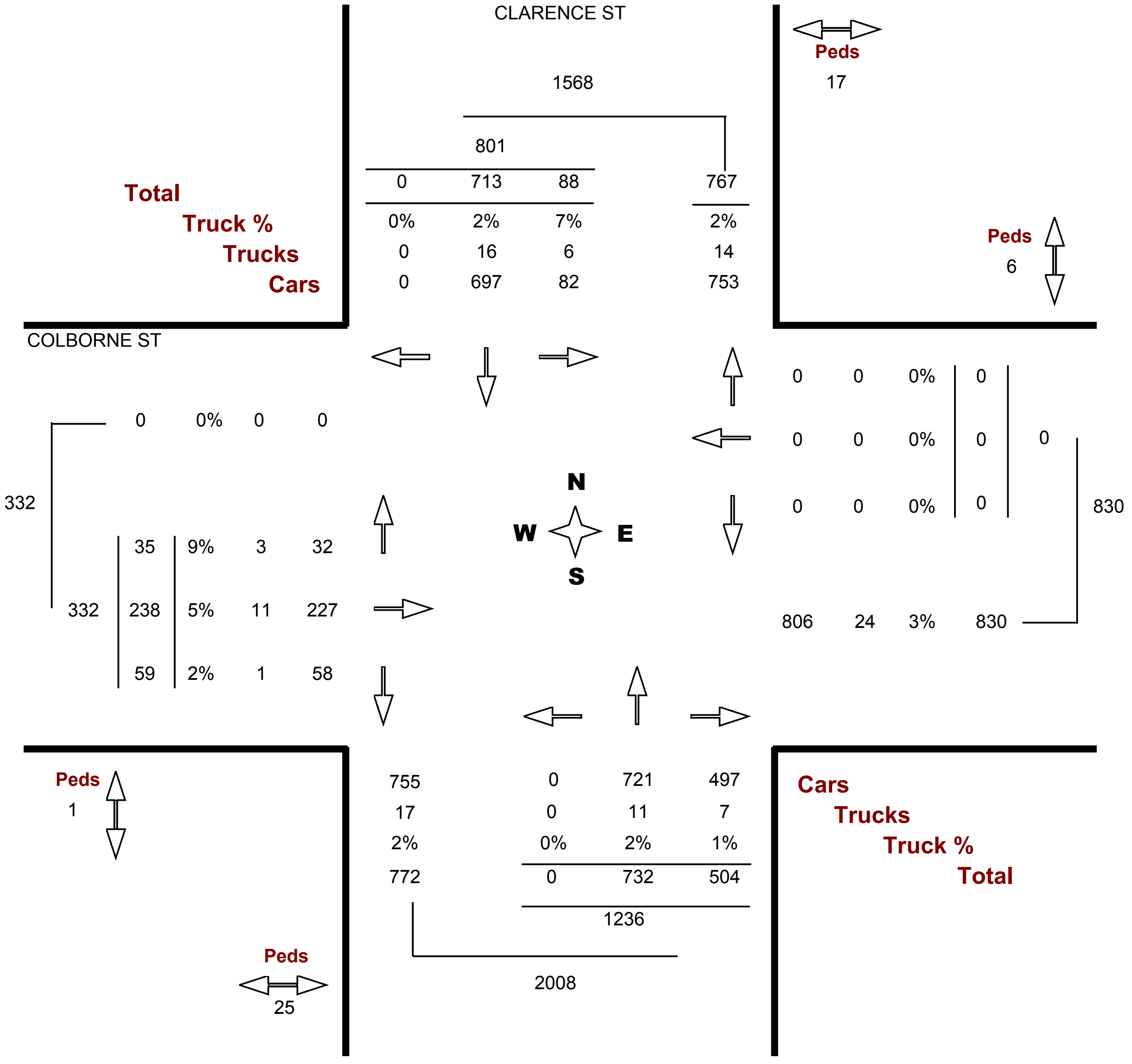
Turning Movements Report - AM Period

Location............. CLARENCE ST @ COLBORNE ST

Municipality....... BRANTFORD

GeoID....... N1559

Count Date....... Wednesday, 14 November, 2018 **Peak Hour......** 08:15 AM — 09:15 AM



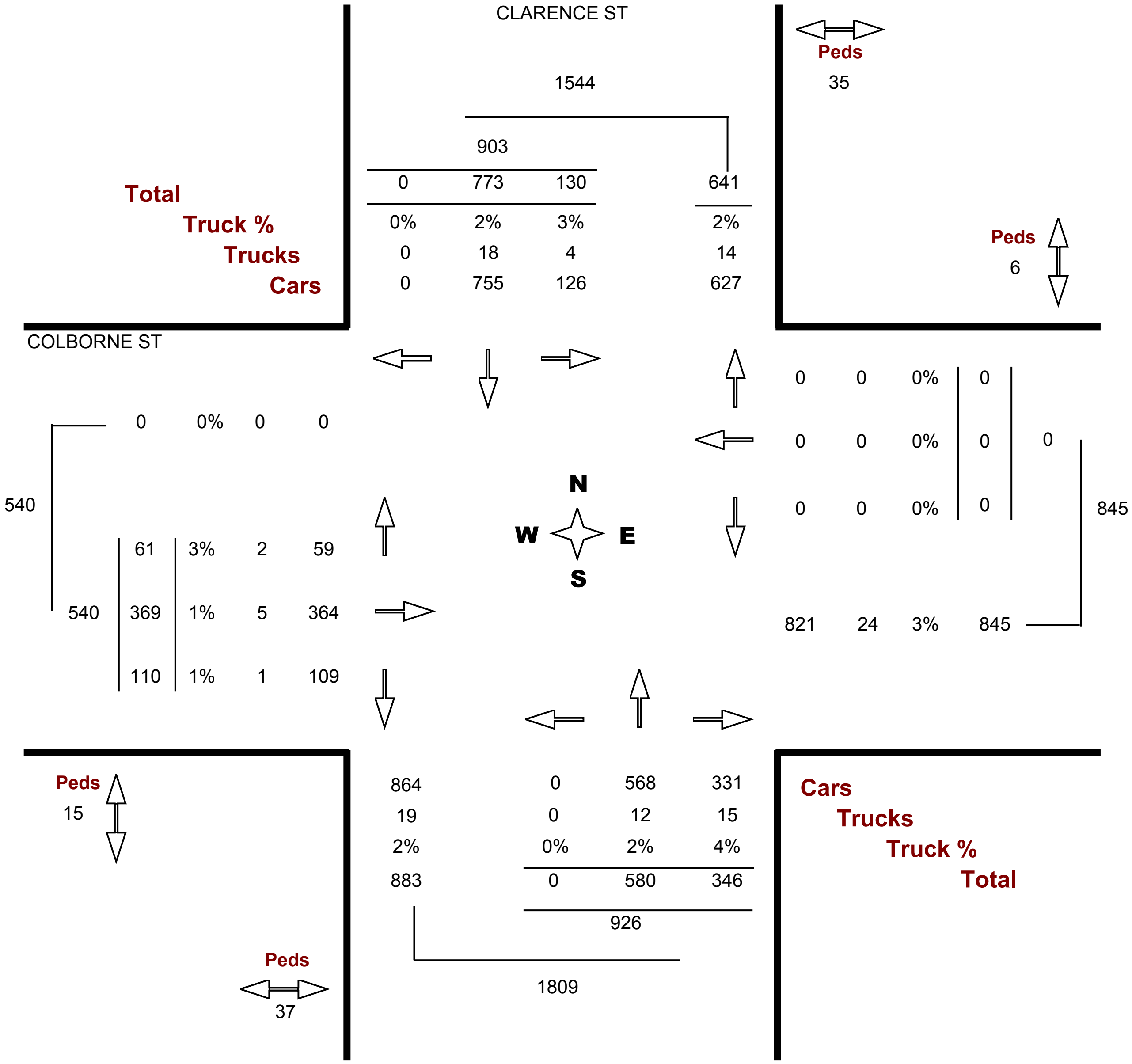
Turning Movements Report - MD Period

Location............. CLARENCE ST @ COLBORNE ST

Municipality....... BRANTFORD

GeoID....... N1559

Count Date....... Wednesday, 14 November, 2018 **Peak Hour......** 12:15 PM —— 01:15 PM



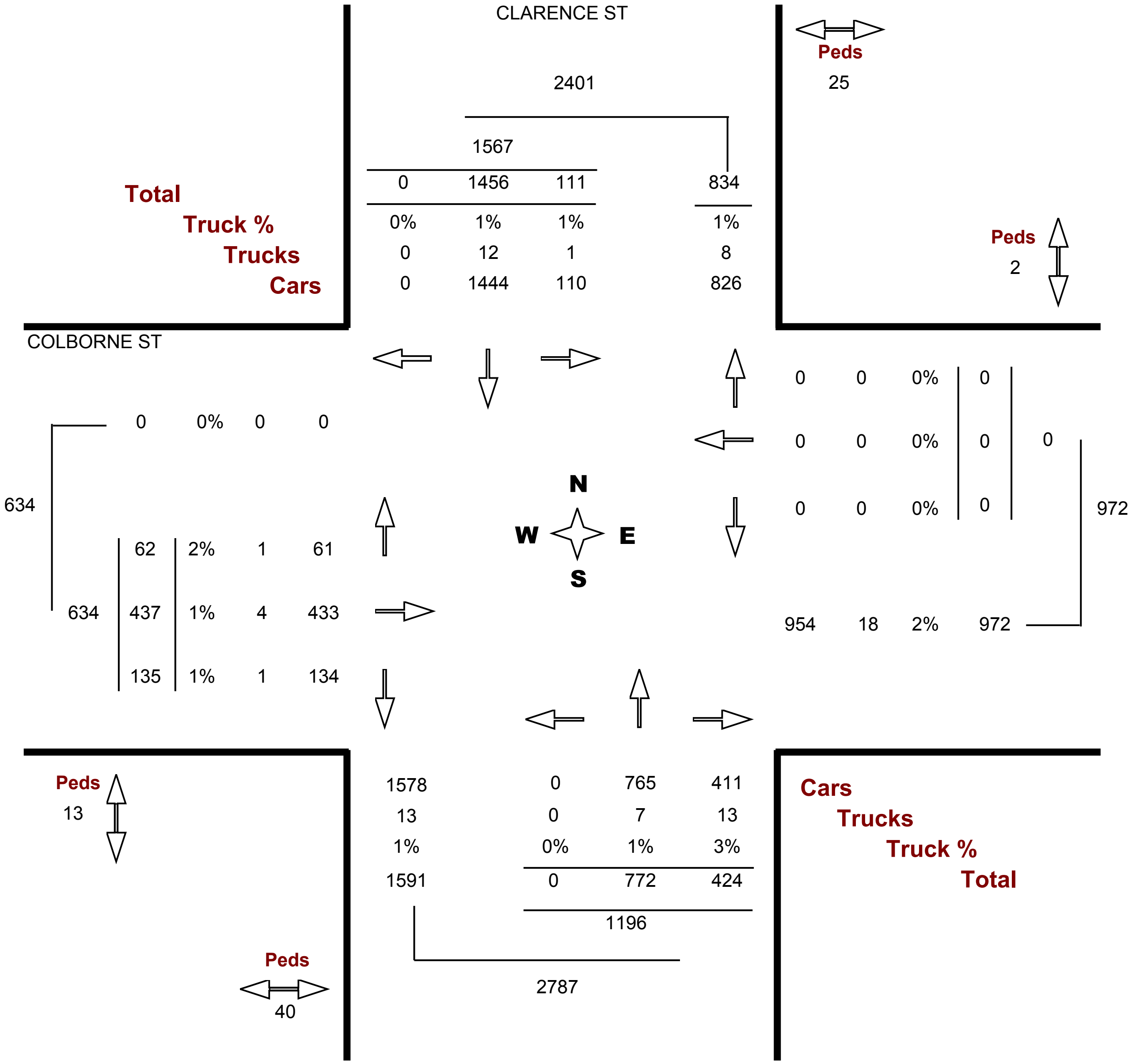
Turning Movements Report - PM Period

Location............. CLARENCE ST @ COLBORNE ST

Municipality....... BRANTFORD

GeoID....... N1559

Count Date....... Wednesday, 14 November, 2018 **Peak Hour......** 04:15 PM —05:15 PM



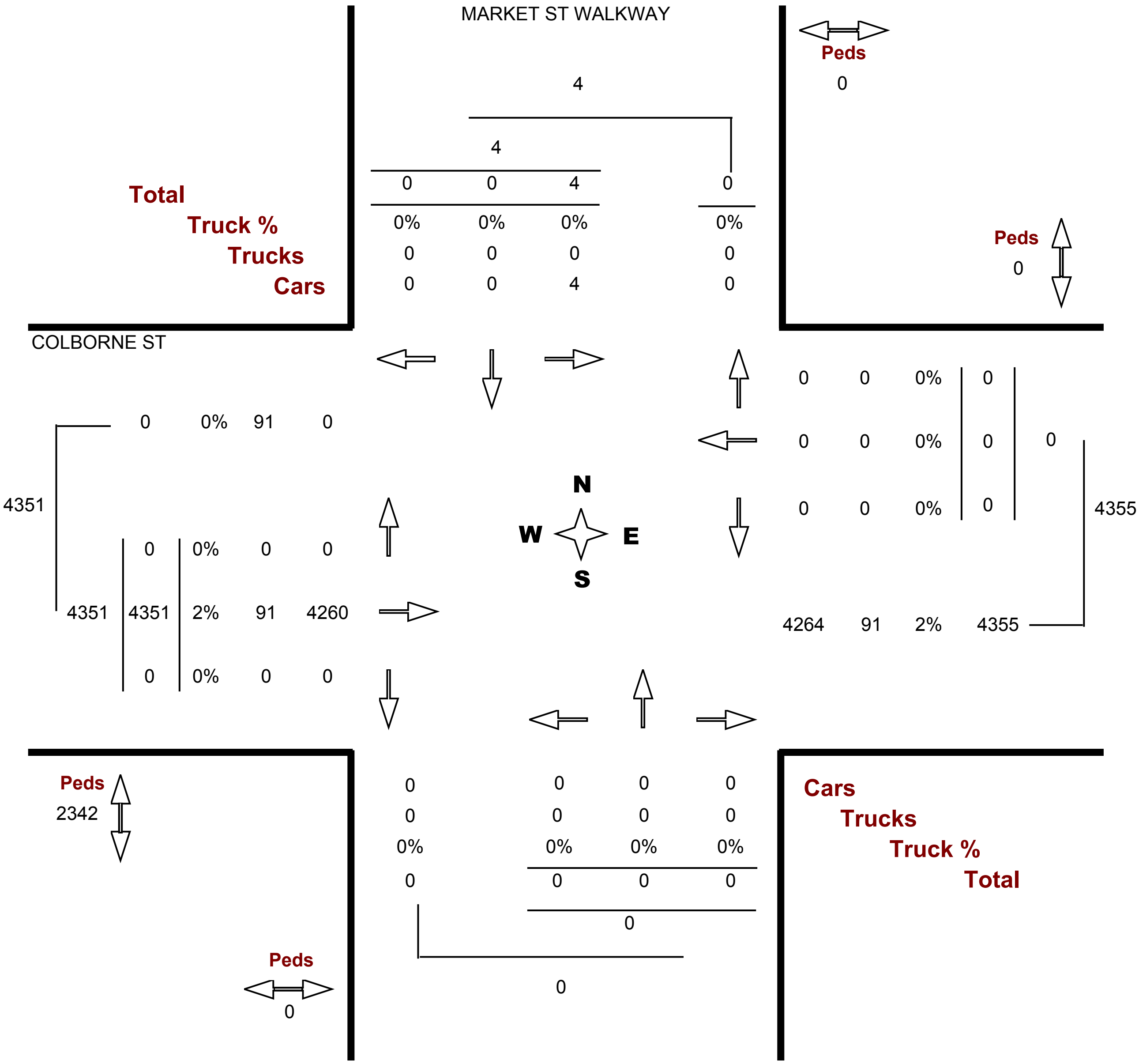
Turning Movements Count - Full Study Report

Location............. COLBORNE ST @ MARKET ST WALKWAY

Municipality....... BRANTFORD

GeoID....... N2193

Count Date....... Tuesday, 19 June, 2012



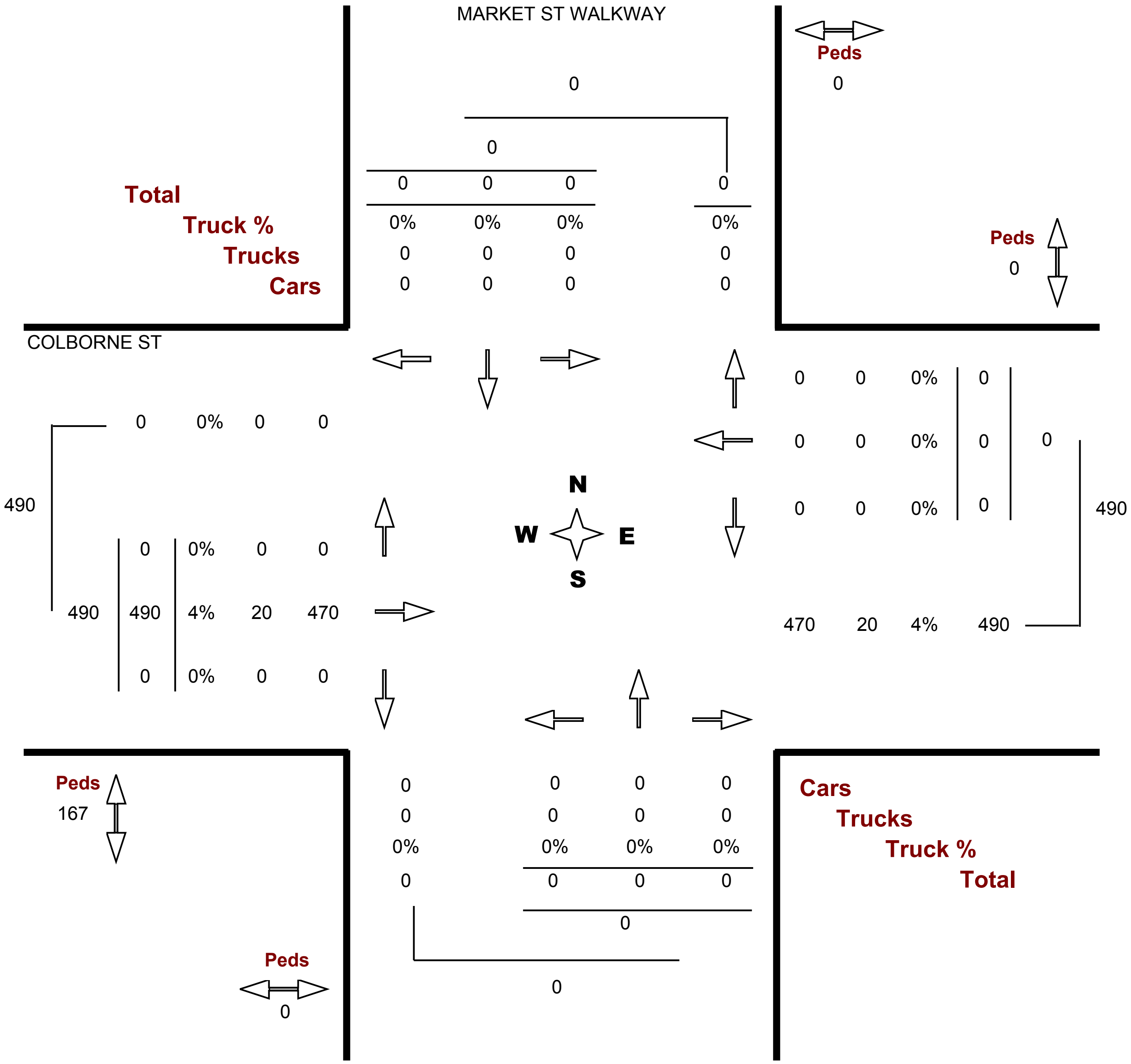
Turning Movements Report - AM Period

Location............. COLBORNE ST @ MARKET ST WALKWAY

Municipality....... BRANTFORD

GeoID....... N2193

Count Date....... Tuesday, 19 June, 2012 **Peak Hour......** 08:45 AM — 09:45 AM



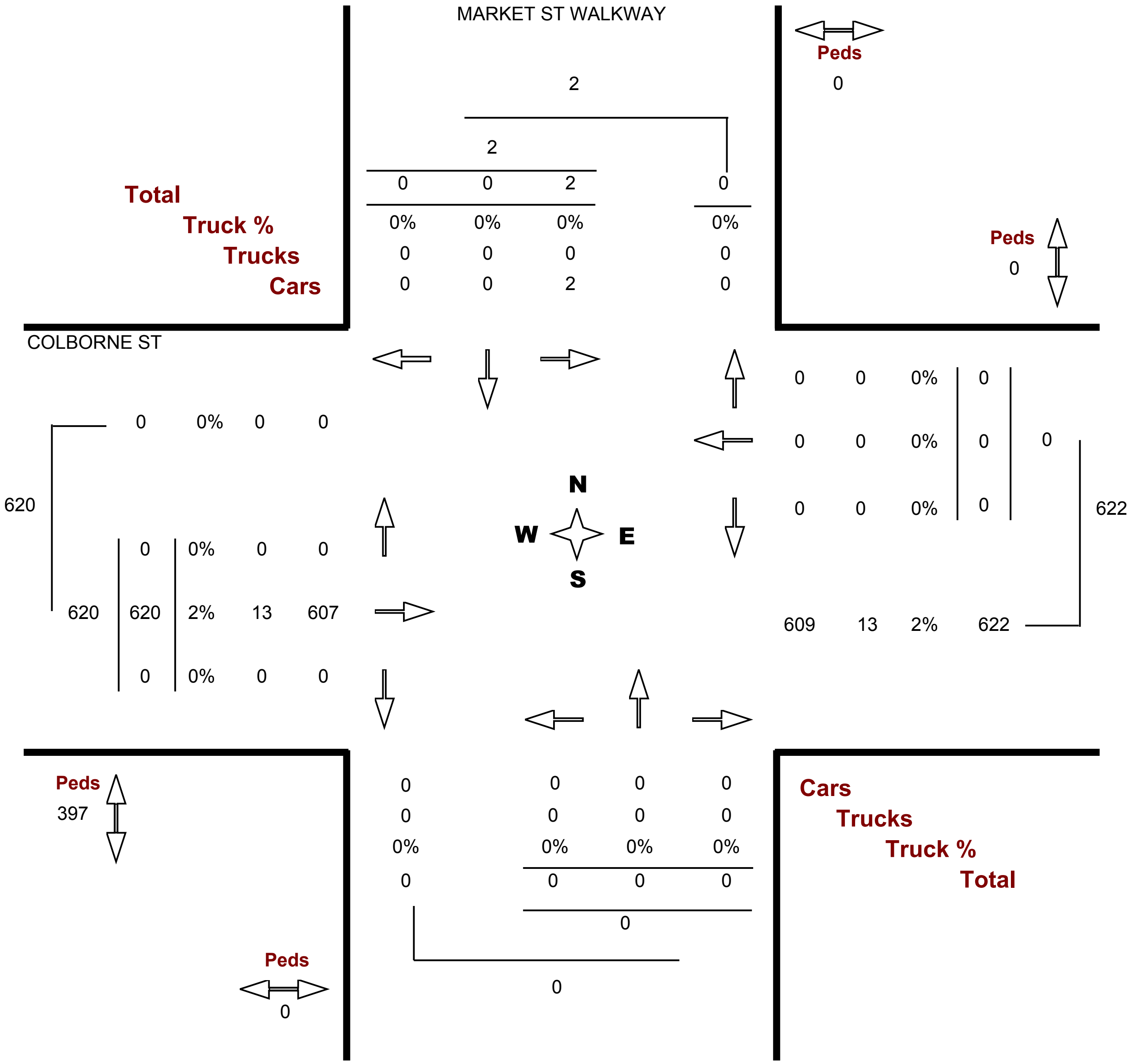
Turning Movements Report - MD Period

Location............. COLBORNE ST @ MARKET ST WALKWAY

Municipality....... BRANTFORD

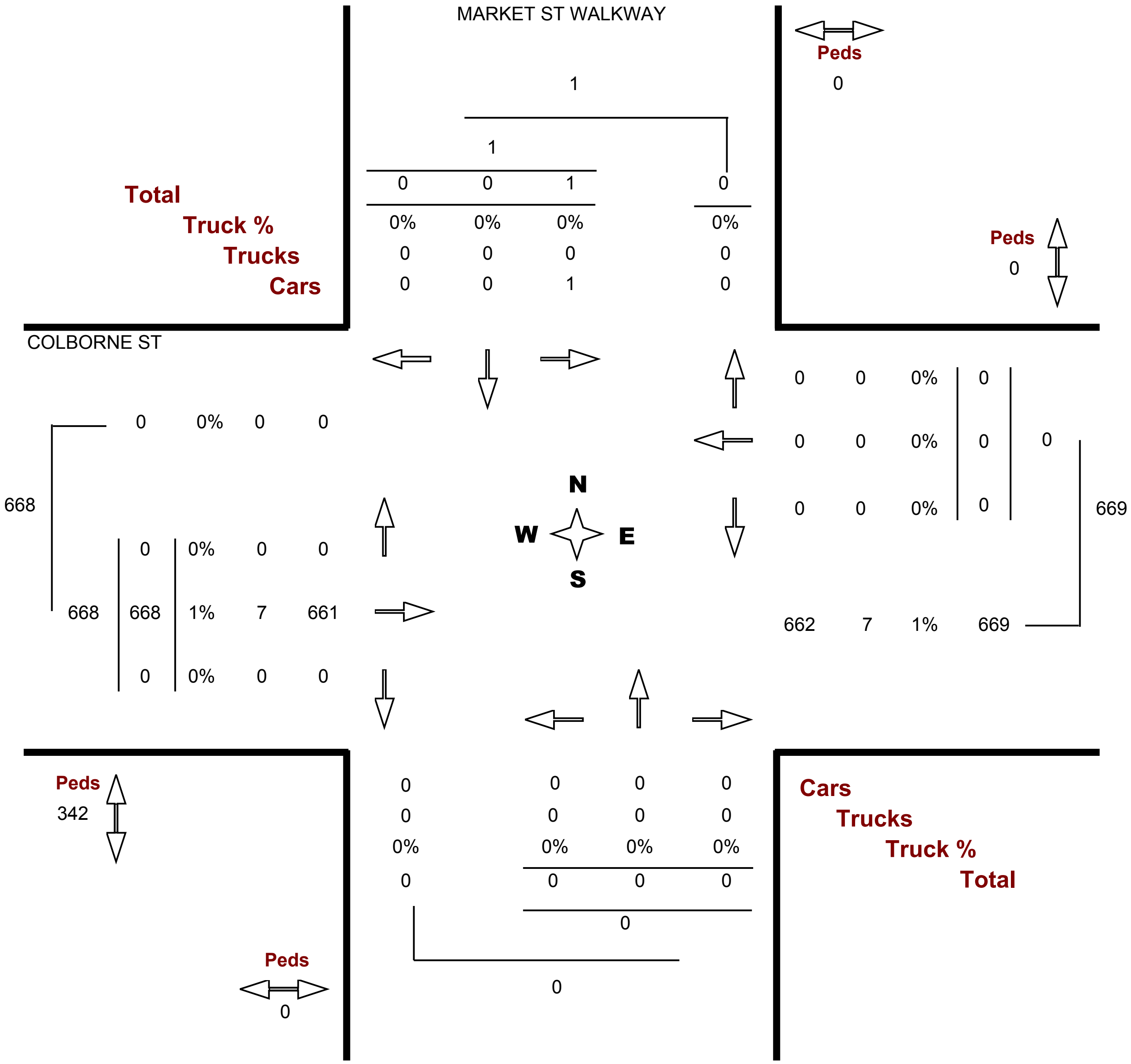
GeoID....... N2193

Count Date....... Tuesday, 19 June, 2012 **Peak Hour......** 12:30 PM —— 01:30 PM



Turning Movements Report - PM Period

Location............. COLBORNE ST @ MARKET ST WALKWAY
Municipality....... BRANTFORD
GeoID....... N2193
Count Date....... Tuesday, 19 June, 2012 **Peak Hour......** 03:15 PM — 04:15 PM



Colborne St W @ Brant 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: Brantford
Site #: 0000000004
Intersection: Brant St & Colborne St W
TFR File #: 4
Count date: 4-Nov-2020

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Brant St runs N/S

North Leg Total: 2197
North Entering: 1118
North Peds: 9
Peds Cross: ⋈

Heavys	17	15	9	41
Trucks	9	5	3	17
Cars	720	242	98	1060
Totals	746	262	110	

Heavys	40
Trucks	9
Cars	1030
Totals	1079

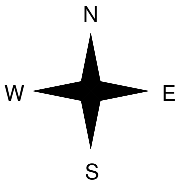
East Leg Total: 375
East Entering: 0
East Peds: 9
Peds Cross: ⧗

Brant St

Heavys	Trucks	Cars	Totals
22	9	758	789

Cars	Trucks	Heavys	Totals
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	

Colborne St W



Heavys	Trucks	Cars	Totals
27	7	778	812
6	4	234	244
5	0	39	44
38	11	1051	

Colborne St

Cars	Trucks	Heavys	Totals
353	7	15	375

Icomm Dr

Peds Cross: ⧗
West Peds: 10
West Entering: 1100
West Leg Total: 1889

Cars	281
Trucks	5
Heavys	20
Totals	306

Cars	38	252	21	311
Trucks	0	2	0	2
Heavys	5	13	0	18
Totals	43	267	21	

Peds Cross: ⋈
South Peds: 17
South Entering: 331
South Leg Total: 637

Comments

Colborne St W @ Brant St

Mid-day Peak Diagram

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

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

Municipality: Brantford
Site #: 0000000004
Intersection: Brant St & Colborne St W
TFR File #: 4
Count date: 4-Nov-2020

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

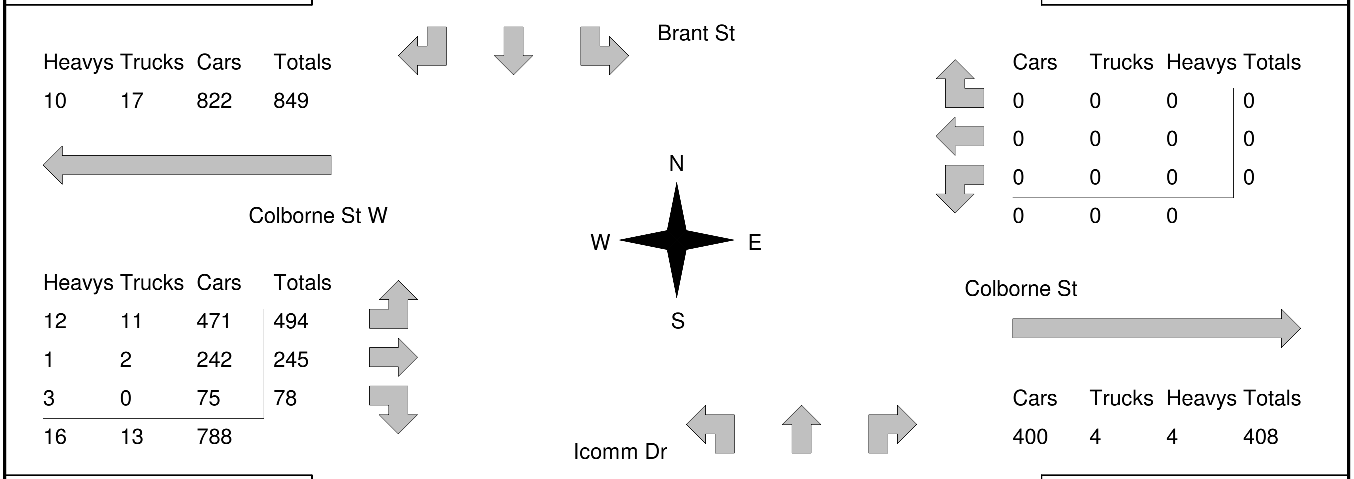
Major Road: Brant St runs N/S

North Leg Total: 1923
North Entering: 1193
North Peds: 11
Peds Cross: ⋈

Heavys	10	8	2	20
Trucks	15	6	2	23
Cars	754	281	115	1150
Totals	779	295	119	

Heavys	20
Trucks	15
Cars	695
Totals	730

East Leg Total: 408
East Entering: 0
East Peds: 16
Peds Cross: ⧗



Heavys	Trucks	Cars	Totals
10	17	822	849

Cars	Trucks	Heavys	Totals
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	

Heavys	Trucks	Cars	Totals
12	11	471	494
1	2	242	245
3	0	75	78
16	13	788	

Cars	Trucks	Heavys	Totals
400	4	4	408

Peds Cross: ⧗
West Peds: 10
West Entering: 817
West Leg Total: 1666

Cars	356
Trucks	6
Heavys	11
Totals	373

Cars	68	224	43	335
Trucks	2	4	0	6
Heavys	0	8	1	9
Totals	70	236	44	

Peds Cross: ⋈
South Peds: 19
South Entering: 350
South Leg Total: 723

Comments

Colborne St W @ Brant St

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

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

Municipality: Brantford
Site #: 0000000004
Intersection: Brant St & Colborne St W
TFR File #: 4
Count date: 4-Nov-2020

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

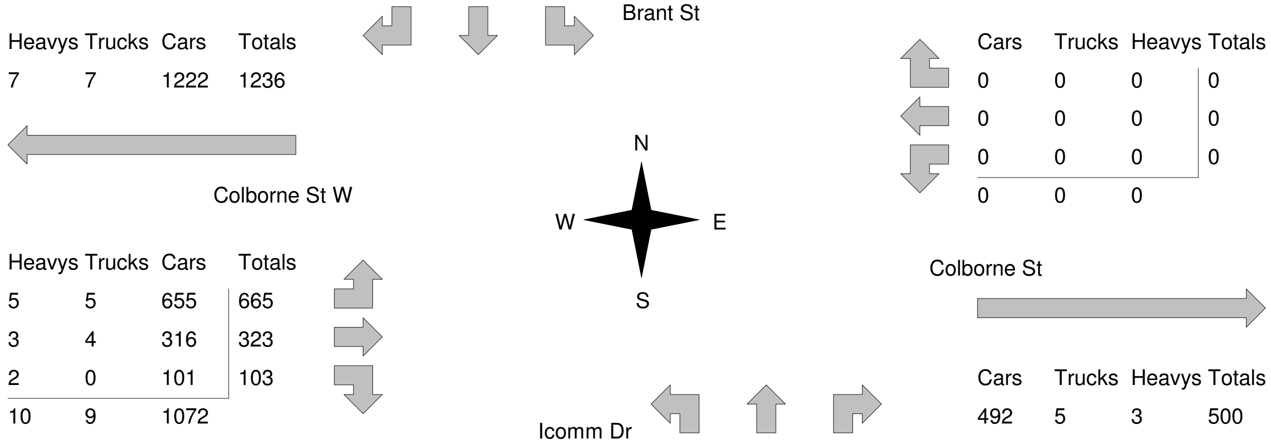
Major Road: Brant St runs N/S

North Leg Total:	2615
North Entering:	1627
North Peds:	21
Peds Cross:	⋈

Heavys	6	0	0	6
Trucks	6	1	0	7
Cars	1120	365	129	1614
Totals	1132	366	129	

Heavys	12
Trucks	7
Cars	969
Totals	988

East Leg Total:	500
East Entering:	0
East Peds:	25
Peds Cross:	⧗



Heavys	Trucks	Cars	Totals
7	7	1222	1236

Cars	Trucks	Heavys	Totals
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	

Heavys	Trucks	Cars	Totals
5	5	655	665
3	4	316	323
2	0	101	103
10	9	1072	

Cars	Trucks	Heavys	Totals
492	5	3	500

Peds Cross:	⧗
West Peds:	10
West Entering:	1091
West Leg Total:	2327

Cars	466
Trucks	1
Heavys	2
Totals	469

Cars	102	314	47	463
Trucks	1	2	1	4
Heavys	1	7	0	8
Totals	104	323	48	

Peds Cross:	⋈
South Peds:	28
South Entering:	475
South Leg Total:	944

Comments

Colborne St W @ Brant St

Total Count Diagram

Municipality: Brantford
Site #: 0000000004
Intersection: Brant St & Colborne St W
TFR File #: 4
Count date: 4-Nov-2020

Weather conditions:
Clear/Dry

Person(s) who counted:
Cam

**** Signalized Intersection ****

Major Road: Brant St runs N/S

North Leg Total: 16608
North Entering: 9850
North Peds: 95
Peds Cross: ⋈

Heavys	109	59	19	187
Trucks	84	27	12	123
Cars	6539	2193	808	9540
Totals	6732	2279	839	

Heavys	149
Trucks	105
Cars	6504
Totals	6758

East Leg Total: 3112
East Entering: 0
East Peds: 92
Peds Cross: ⧗

Brant St

Heavys	Trucks	Cars	Totals
119	91	7065	7275

Cars	Trucks	Heavys	Totals
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	

Colborne St W

N
W E
S

Colborne St

Heavys	Trucks	Cars	Totals
90	76	4730	4896
27	23	1954	2004
27	4	523	554
144	103	7207	

Cars	Trucks	Heavys	Totals
3024	40	48	3112

Icomm Dr

Peds Cross: ⧗
West Peds: 102
West Entering: 7454
West Leg Total: 14729

Cars	2716
Trucks	31
Heavys	86
Totals	2833

Cars	526	1774	262	2562
Trucks	7	29	5	41
Heavys	10	59	2	71
Totals	543	1862	269	

Peds Cross: ⋈
South Peds: 142
South Entering: 2674
South Leg Total: 5507

Comments

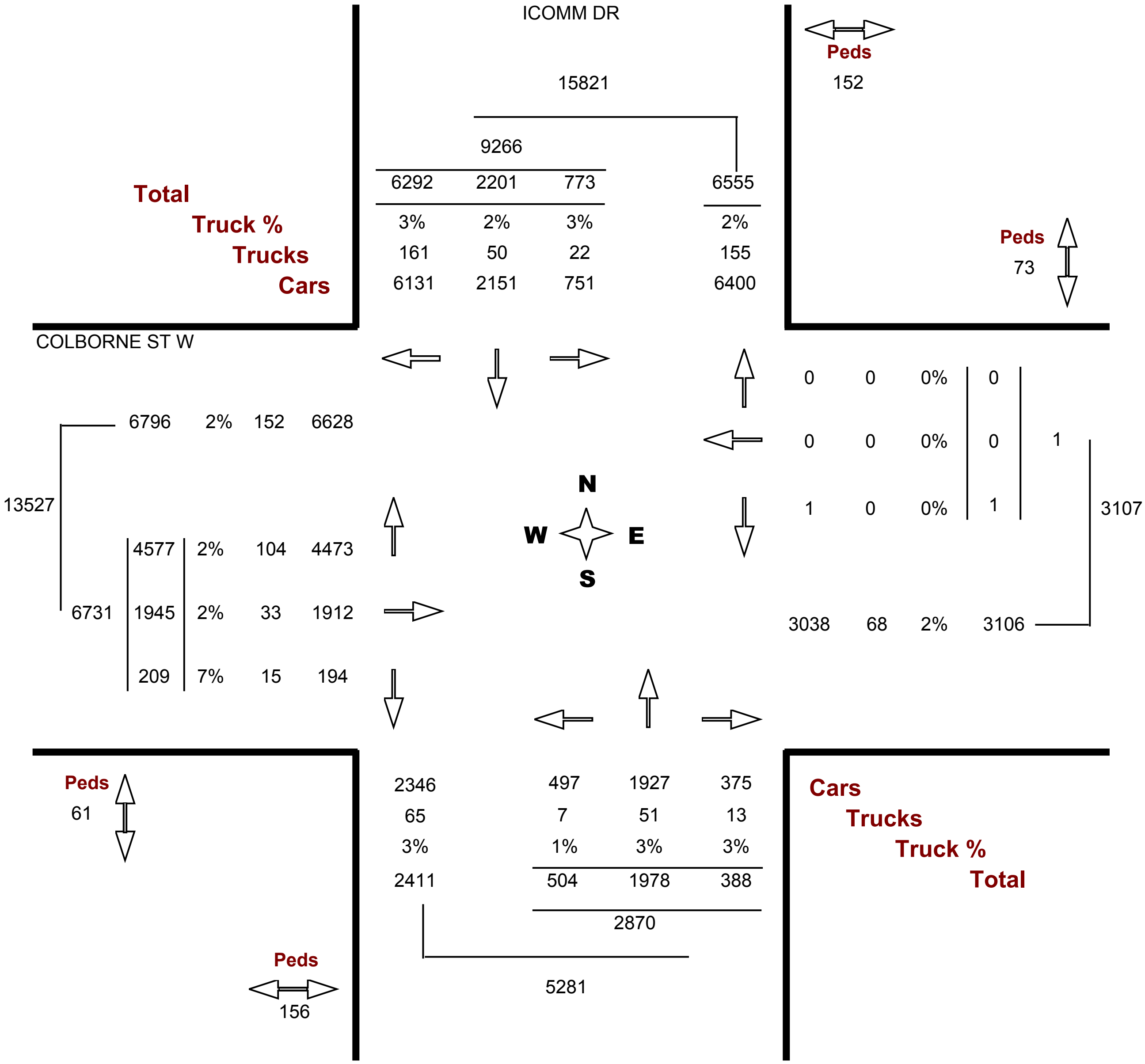
Turning Movements Count - Full Study Report

Location............. COLBORNE ST W @ ICOMM DR

Municipality....... BRANTFORD

GeoID....... N1587

Count Date....... Wednesday, 16 August, 2017



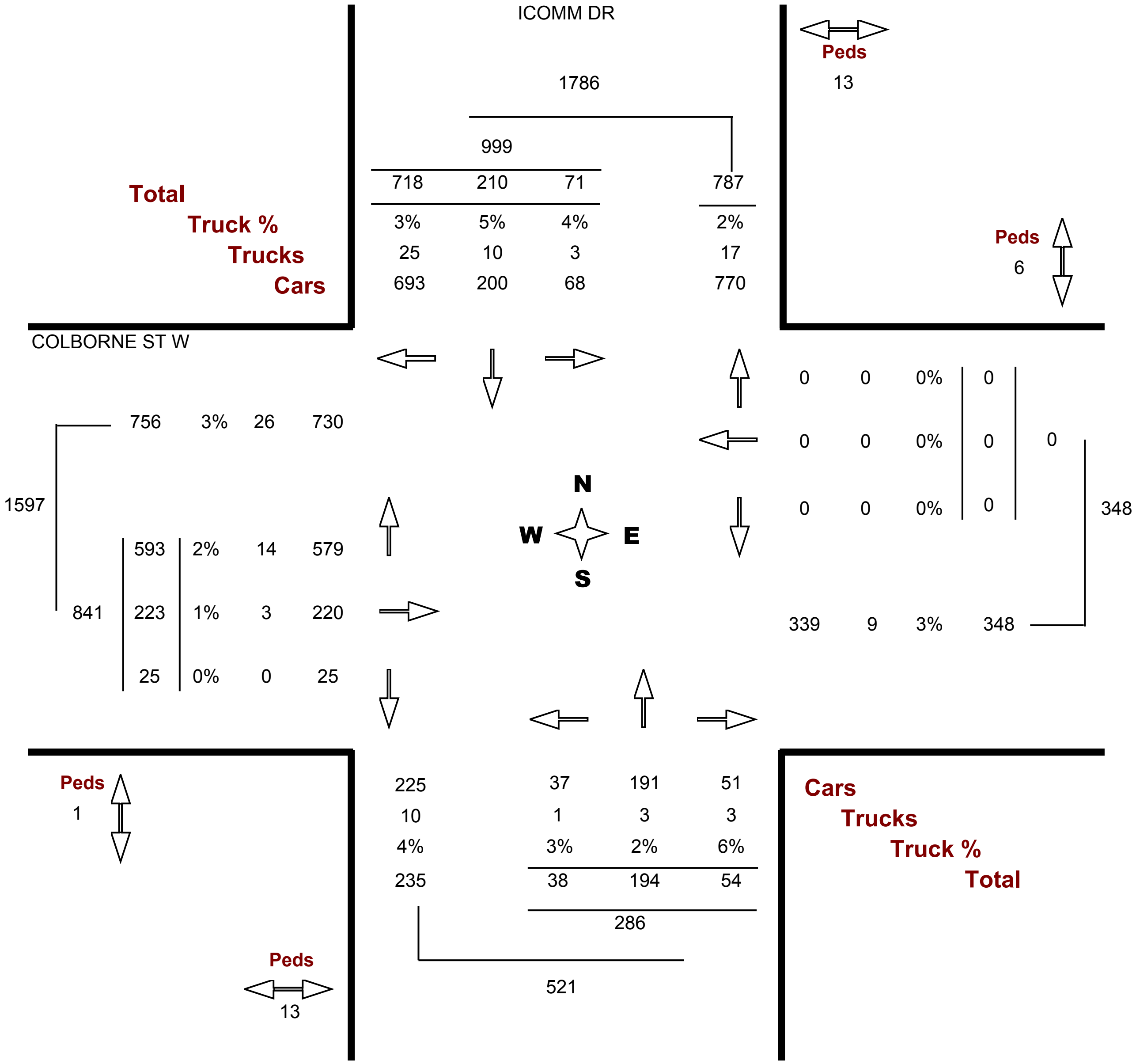
Turning Movements Report - AM Period

Location............. COLBORNE ST W @ ICOMM DR

Municipality....... BRANTFORD

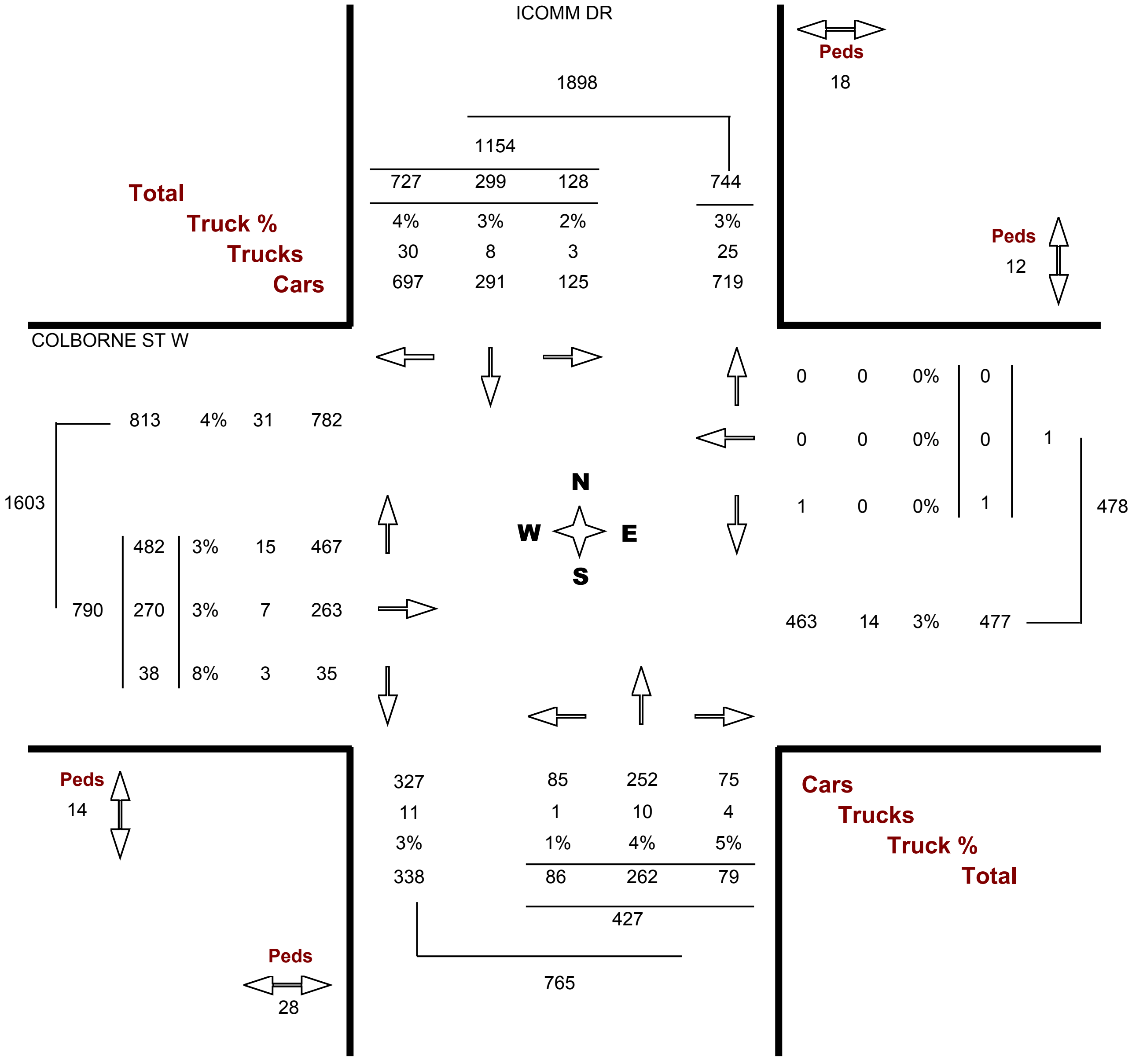
GeoID....... N1587

Count Date....... Wednesday, 16 August, 2017 **Peak Hour......** 08:15 AM —— 09:15 AM



Turning Movements Report - MD Period

Location.............	COLBORNE ST W @ ICOMM DR
Municipality.......	BRANTFORD
GeoID.......	N1587
Count Date.......	Wednesday, 16 August, 2017
Peak Hour......	12:30 PM —— 01:30 PM



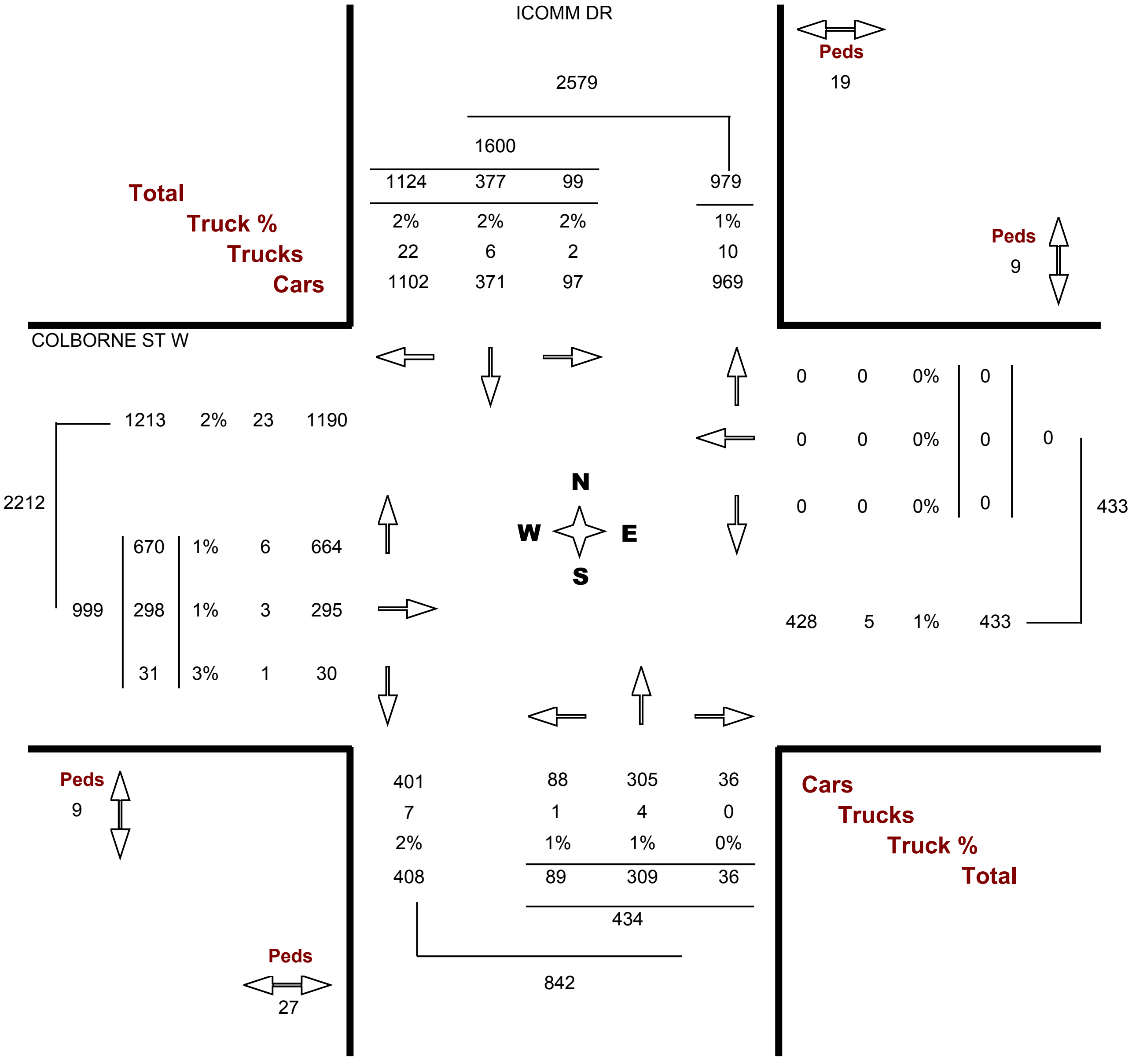
Turning Movements Report - PM Period

Location............. COLBORNE ST W @ ICOMM DR

Municipality....... BRANTFORD

GeoID....... N1587

Count Date....... Wednesday, 16 August, 2017 **Peak Hour......** 04:45 PM —— 05:45 PM



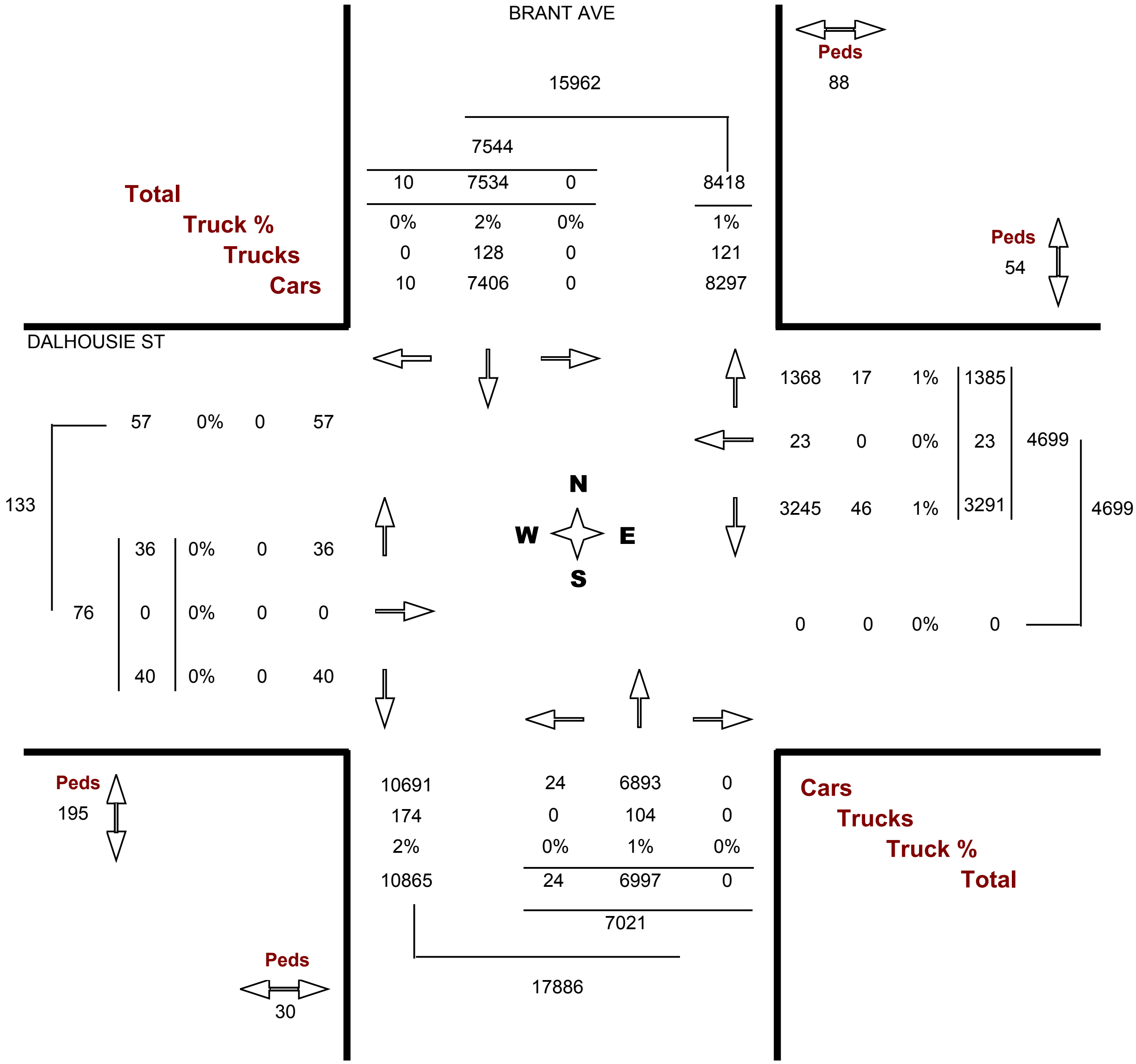
Turning Movements Count - Full Study Report

Location............. BRANT AVE @ DALHOUSIE ST

Municipality....... BRANTFORD

GeoID....... N1556

Count Date....... Thursday, 06 December, 2012



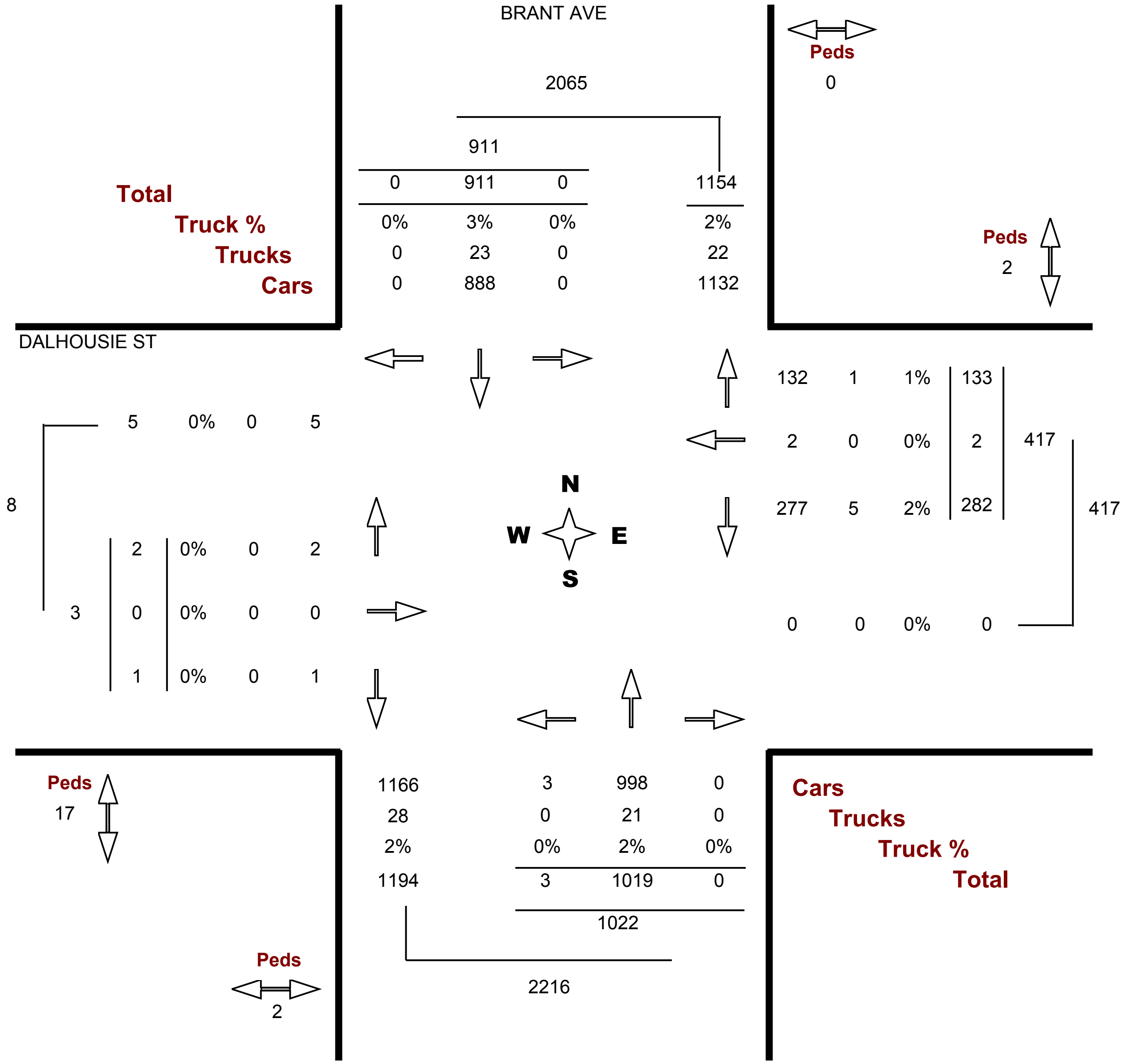
Turning Movements Report - AM Period

Location............. BRANT AVE @ DALHOUSIE ST

Municipality....... BRANTFORD

GeoID....... N1556

Count Date....... Thursday, 06 December, 2012 **Peak Hour......** 08:00 AM —— 09:00 AM



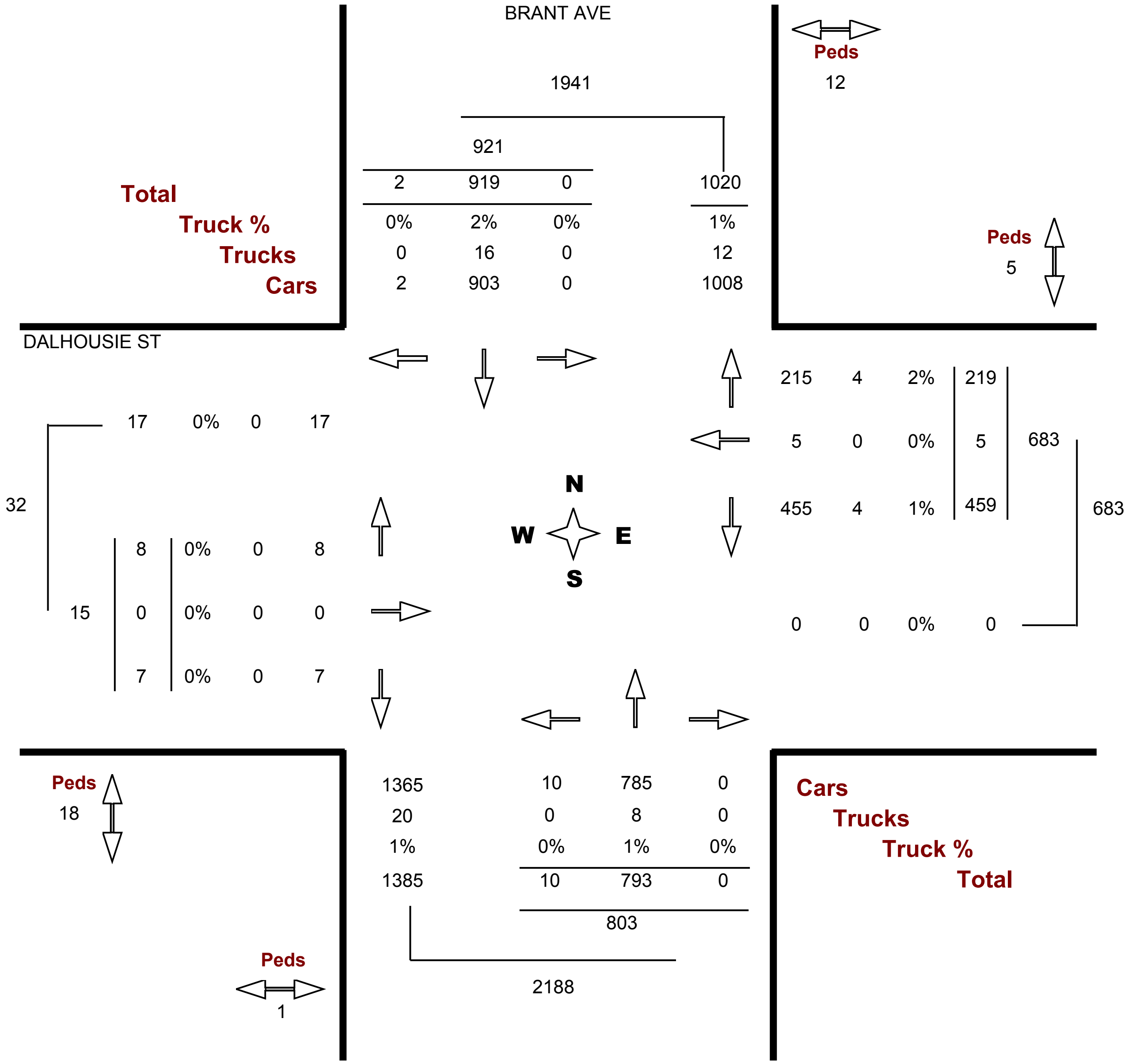
Turning Movements Report - MD Period

Location............. BRANT AVE @ DALHOUSIE ST

Municipality....... BRANTFORD

GeoID....... N1556

Count Date....... Thursday, 06 December, 2012 **Peak Hour......** 12:30 PM —— 01:30 PM



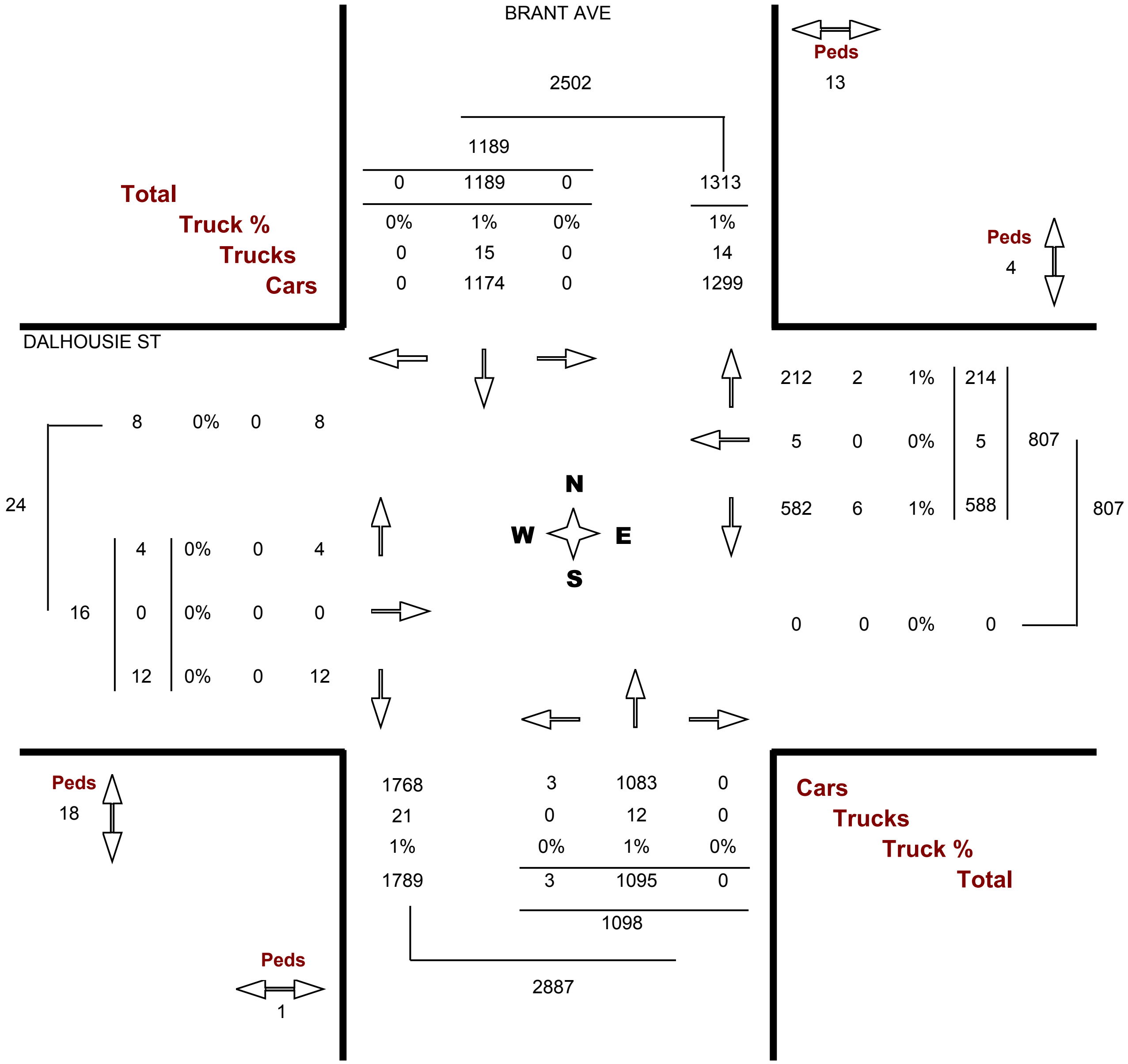
Turning Movements Report - PM Period

Location............. BRANT AVE @ DALHOUSIE ST

Municipality....... BRANTFORD

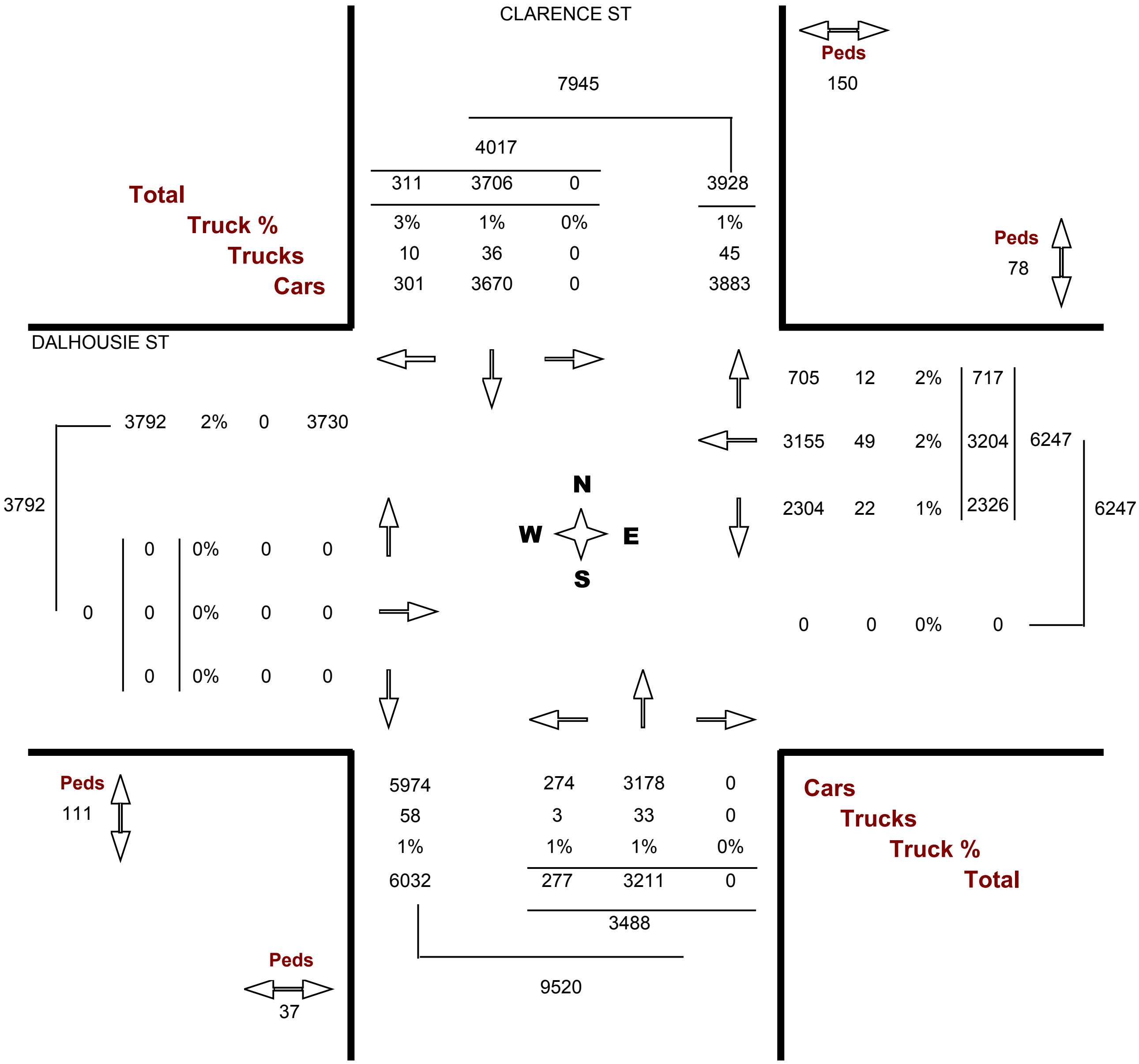
GeoID....... N1556

Count Date....... Thursday, 06 December, 2012 **Peak Hour......** 04:00 PM —— 05:00 PM



Turning Movements Count - Full Study Report

Location.............	CLARENCE ST @ DALHOUSIE ST
Municipality.......	BRANTFORD
GeoID.......	N1531
Count Date.......	Wednesday, 18 March, 2015



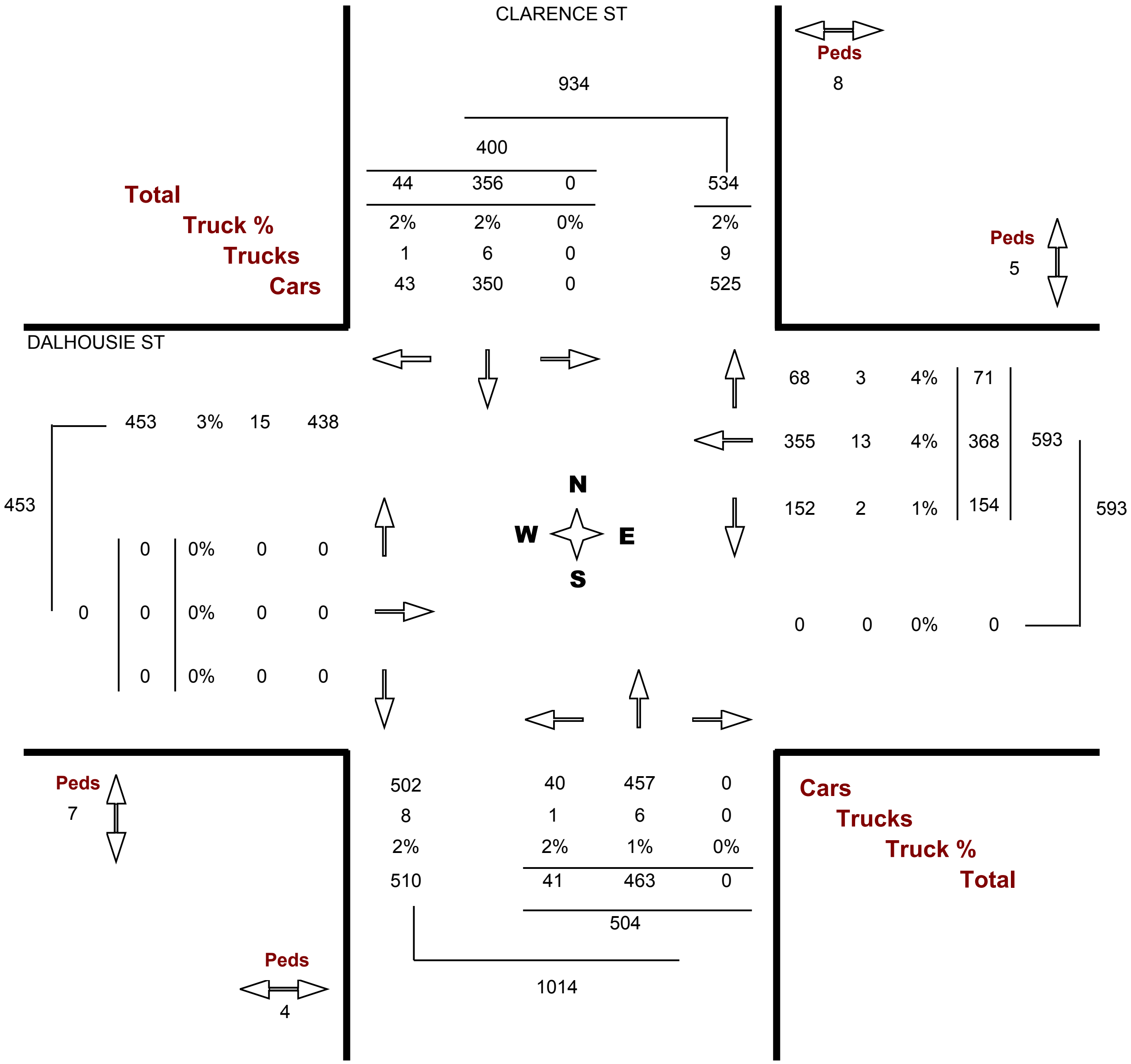
Turning Movements Report - AM Period

Location............. CLARENCE ST @ DALHOUSIE ST

Municipality....... BRANTFORD

GeoID....... N1531

Count Date....... Wednesday, 18 March, 2015 **Peak Hour......** 08:00 AM — 09:00 AM



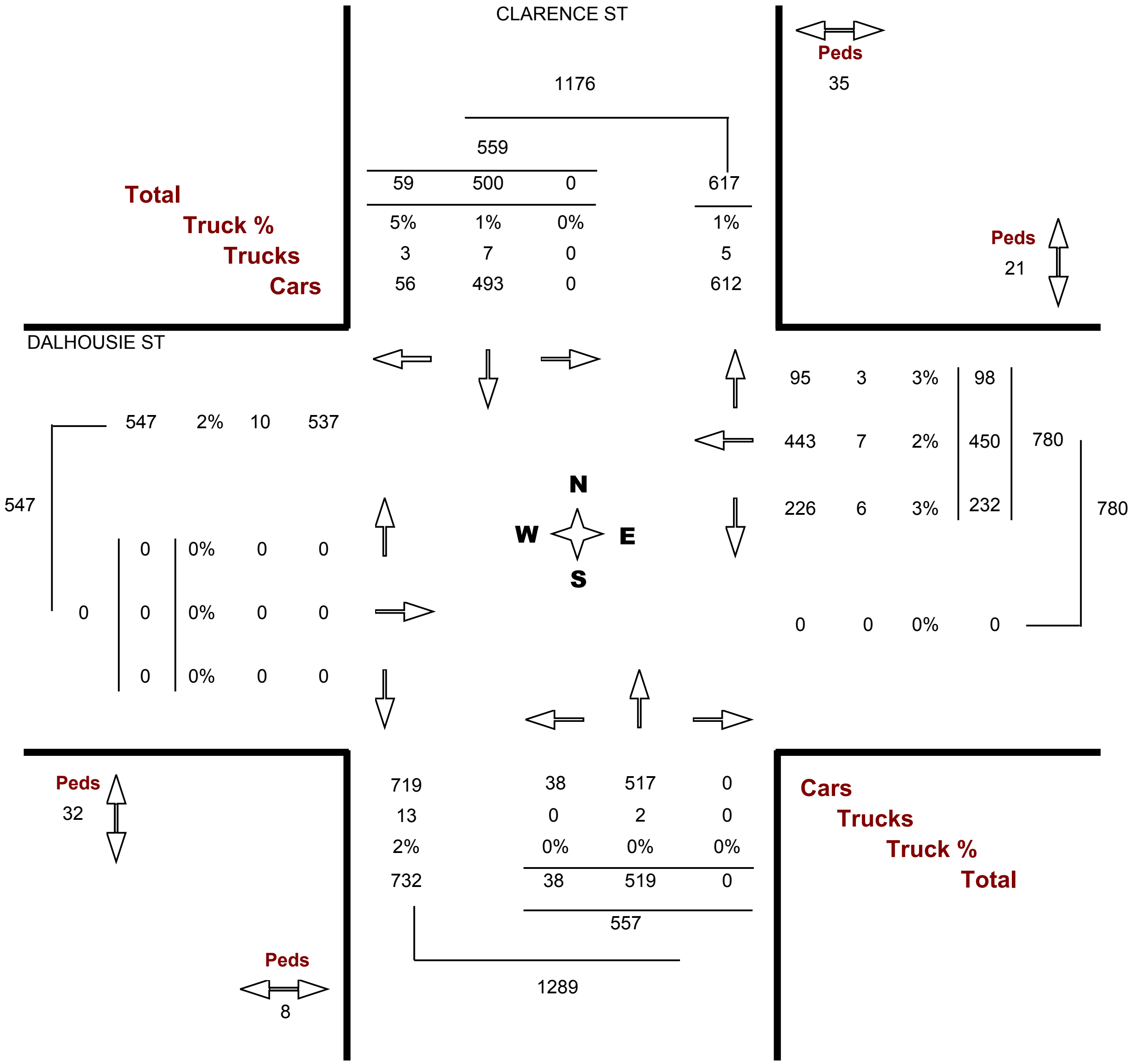
Turning Movements Report - MD Period

Location............. CLARENCE ST @ DALHOUSIE ST

Municipality....... BRANTFORD

GeoID....... N1531

Count Date....... Wednesday, 18 March, 2015 **Peak Hour......** 12:30 PM —— 01:30 PM



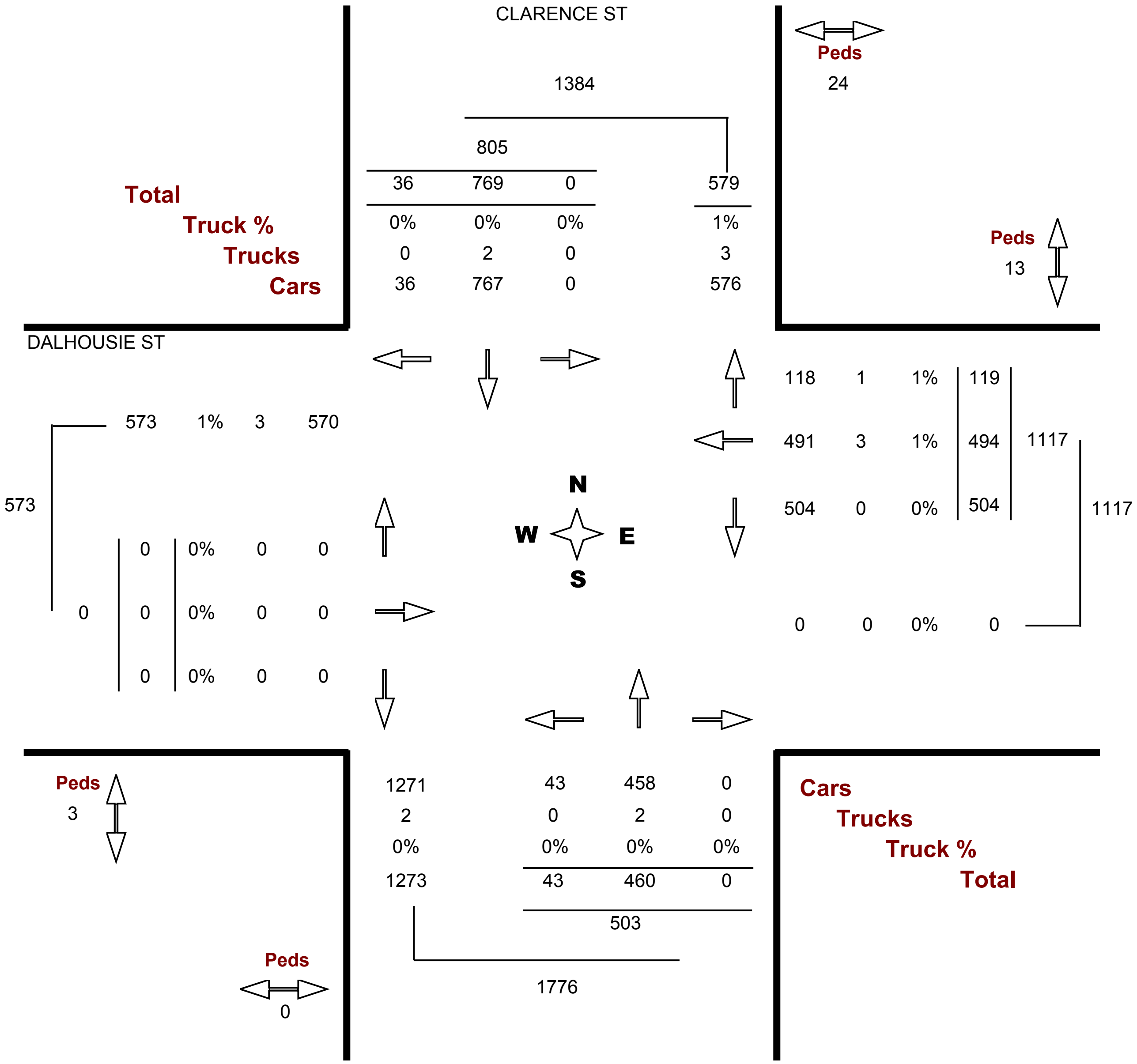
Turning Movements Report - PM Period

Location............. CLARENCE ST @ DALHOUSIE ST

Municipality....... BRANTFORD

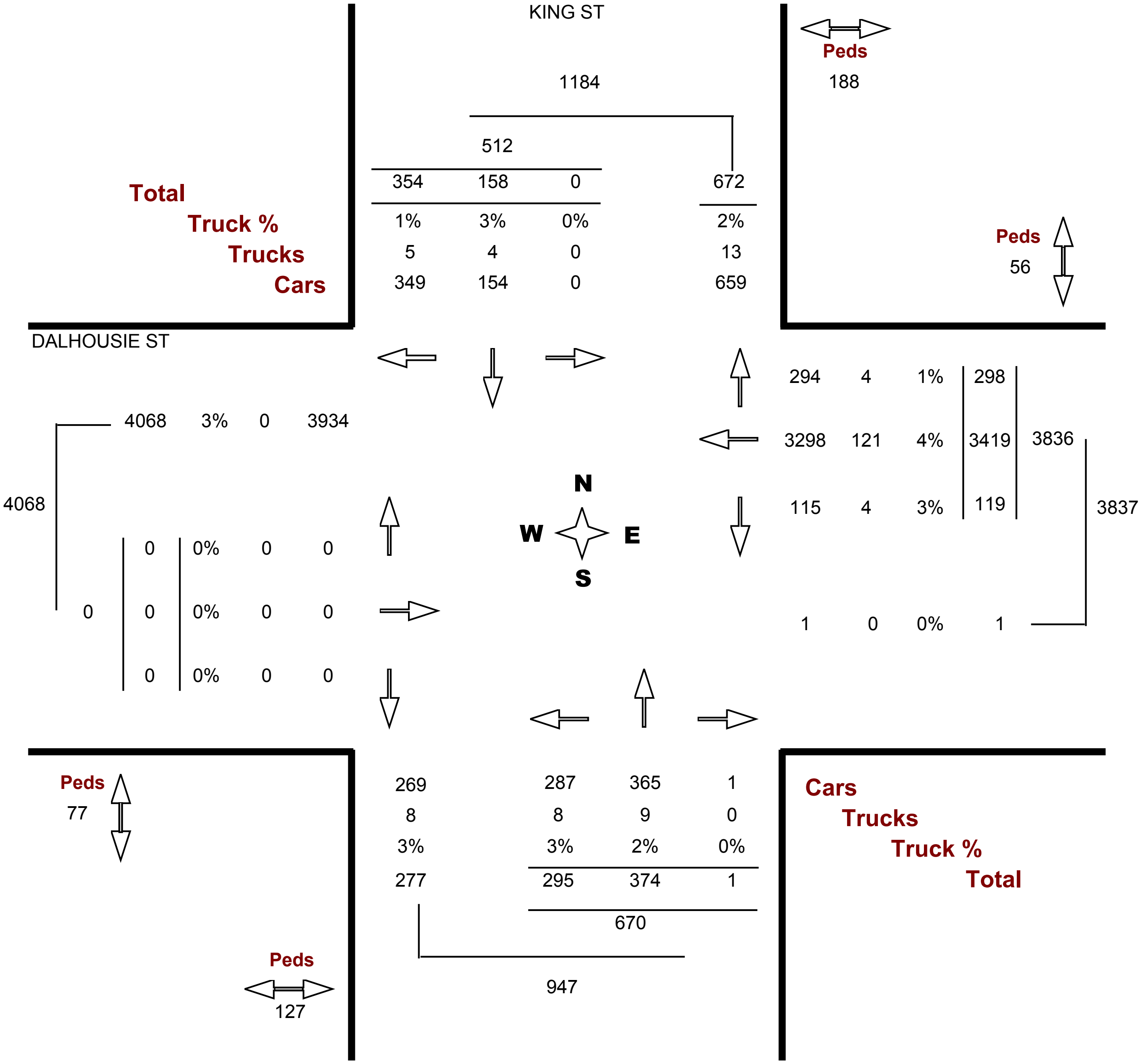
GeoID....... N1531

Count Date....... Wednesday, 18 March, 2015 **Peak Hour......** 04:45 PM —— 05:45 PM



Turning Movements Count - Full Study Report

Location............. DALHOUSIE ST @ KING ST
Municipality....... BRANTFORD
GeoID....... N1548
Count Date....... Tuesday, 25 February, 2014



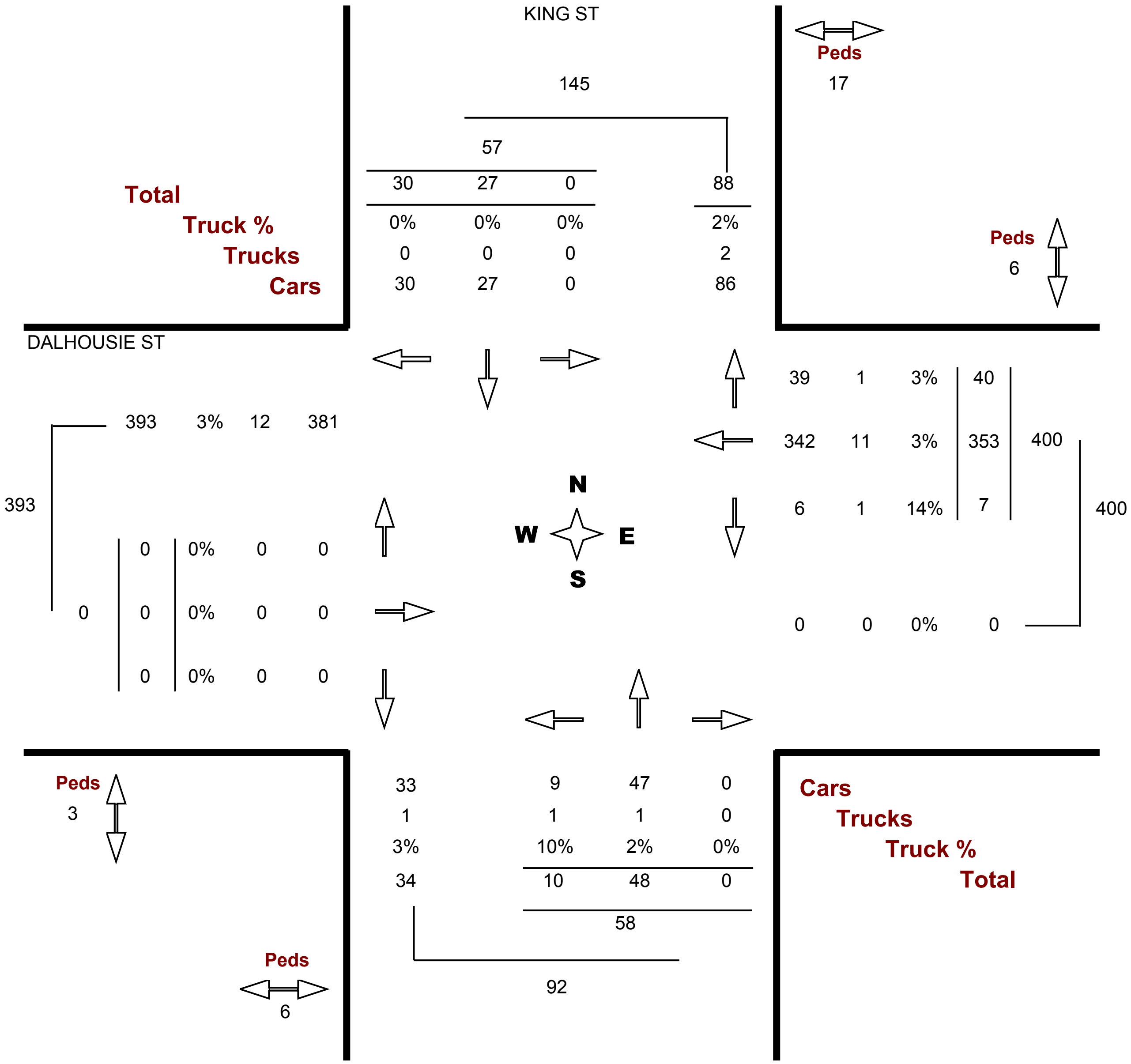
Turning Movements Report - AM Period

Location............. DALHOUSIE ST @ KING ST

Municipality....... BRANTFORD

GeoID....... N1548

Count Date....... Tuesday, 25 February, 2014 **Peak Hour......** 08:15 AM —— 09:15 AM



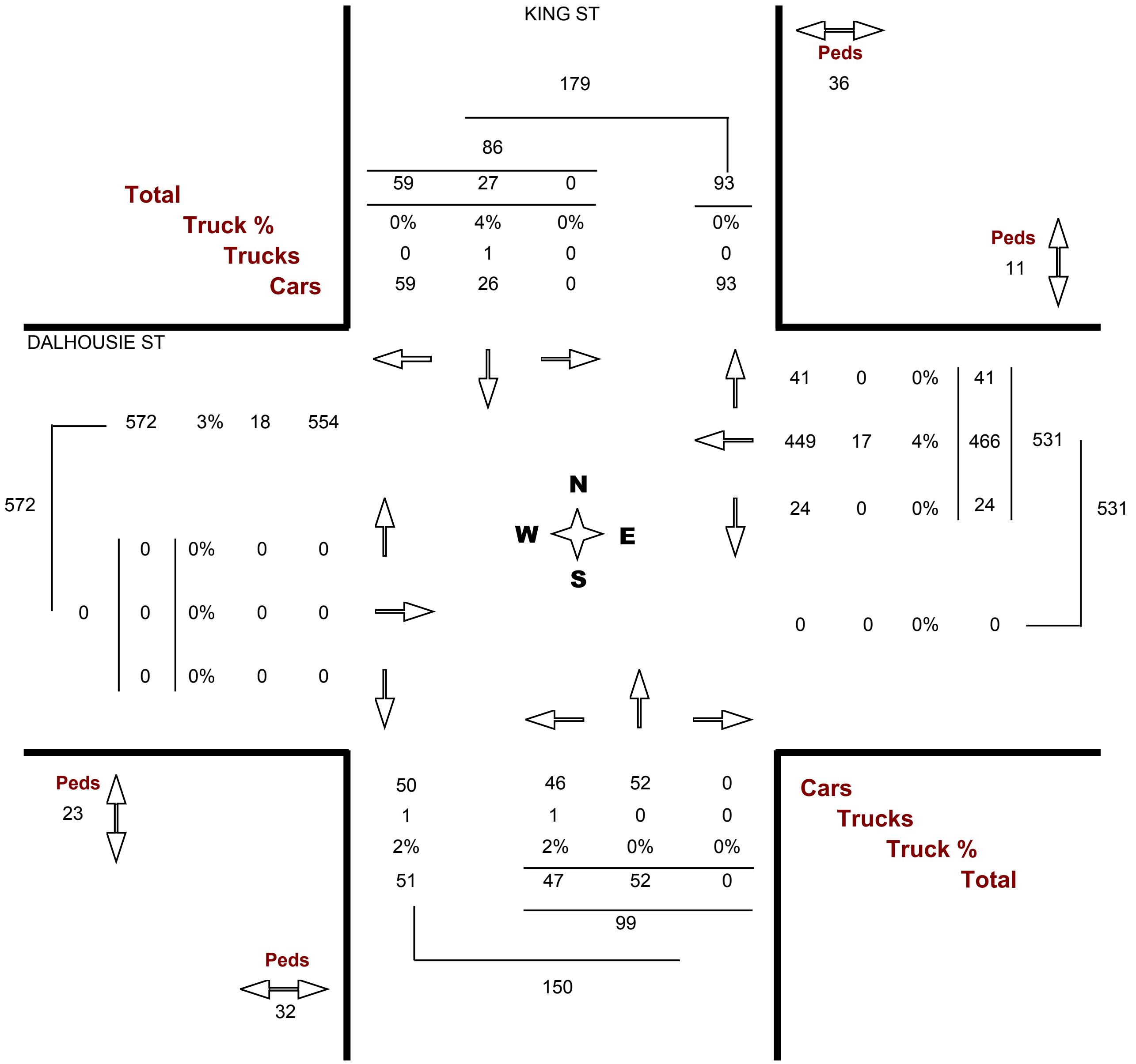
Turning Movements Report - MD Period

Location............. DALHOUSIE ST @ KING ST

Municipality....... BRANTFORD

GeoID....... N1548

Count Date....... Tuesday, 25 February, 2014 **Peak Hour......** 11:45 AM —12:45 PM



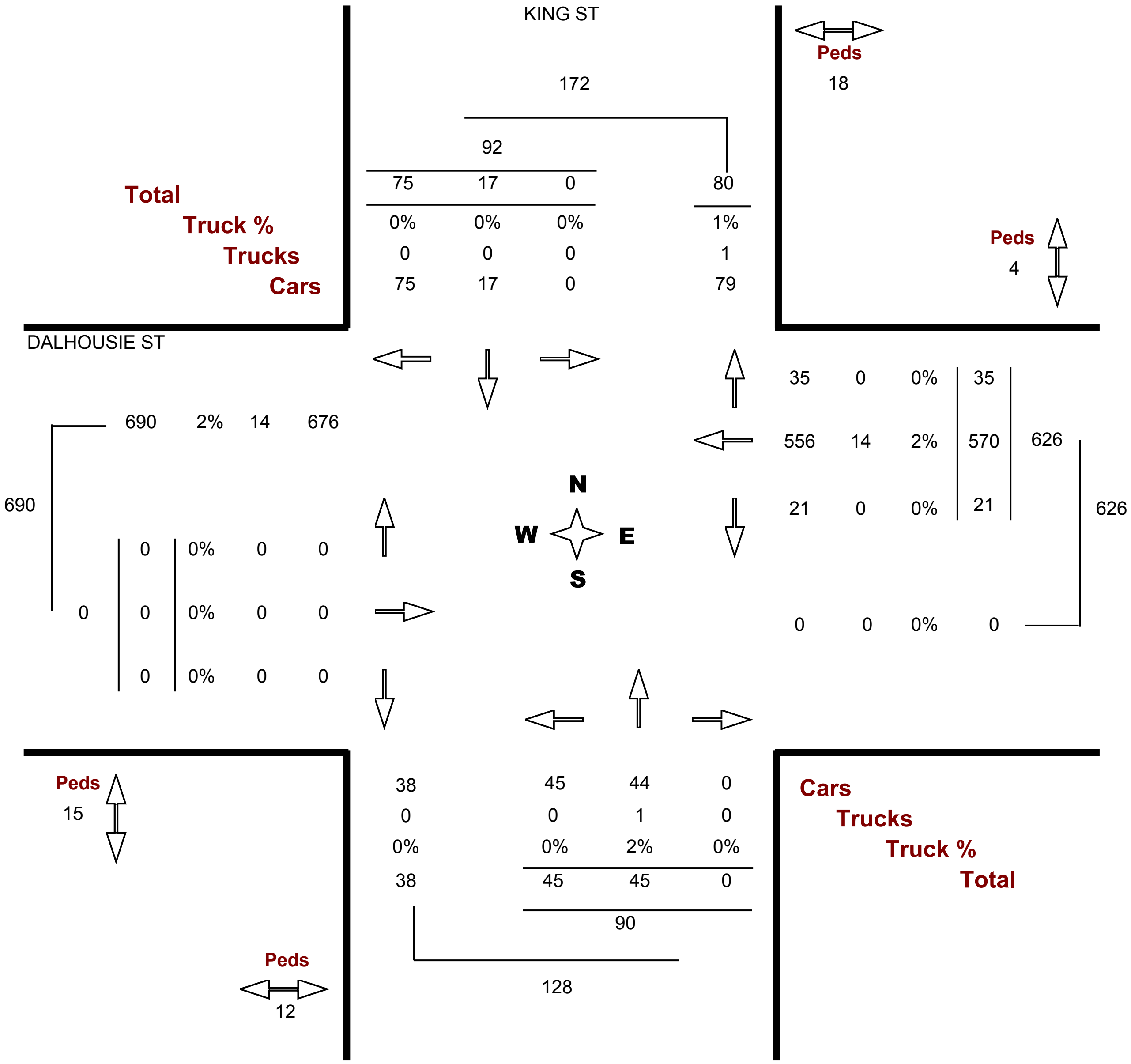
Turning Movements Report - PM Period

Location............. DALHOUSIE ST @ KING ST

Municipality....... BRANTFORD

GeoID....... N1548

Count Date....... Tuesday, 25 February, 2014 **Peak Hour......** 04:15 PM —— 05:15 PM



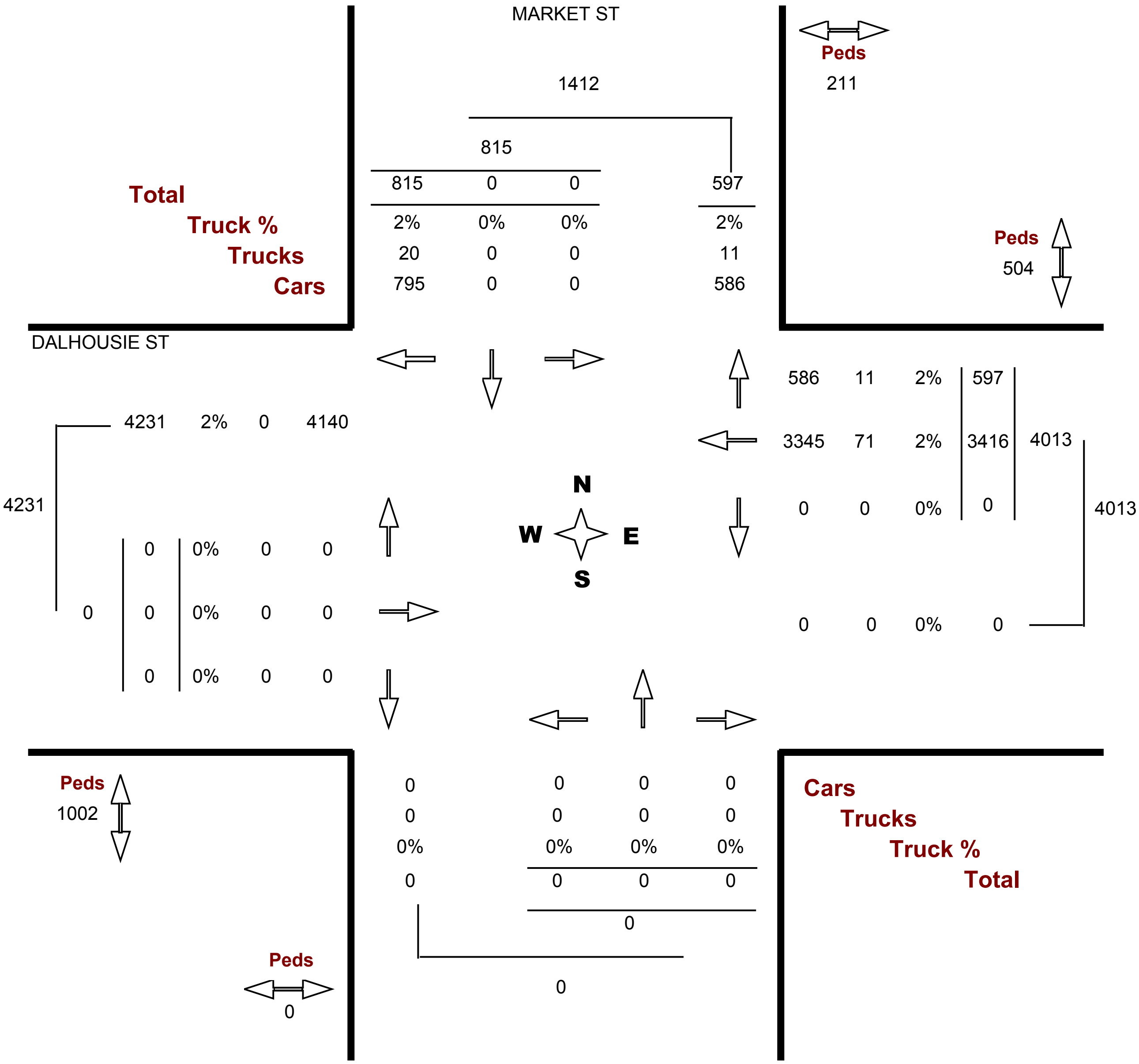
Turning Movements Count - Full Study Report

Location............. DALHOUSIE ST @ MARKET ST

Municipality....... BRANTFORD

GeoID....... N1539

Count Date....... Tuesday, 12 August, 2014



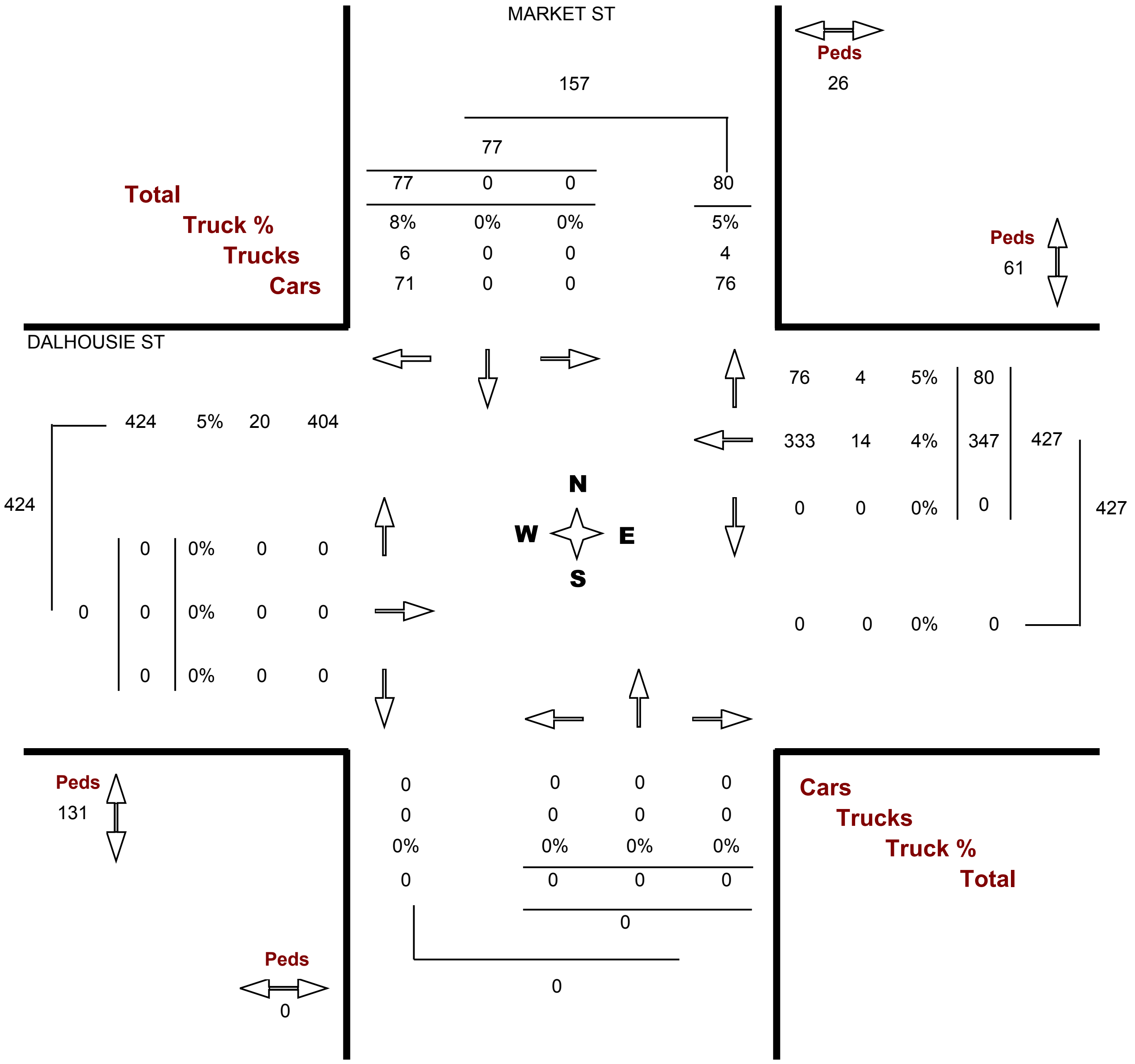
Turning Movements Report - AM Period

Location............. DALHOUSIE ST @ MARKET ST

Municipality....... BRANTFORD

GeoID....... N1539

Count Date....... Tuesday, 12 August, 2014 **Peak Hour......** 09:30 AM — 10:30 AM



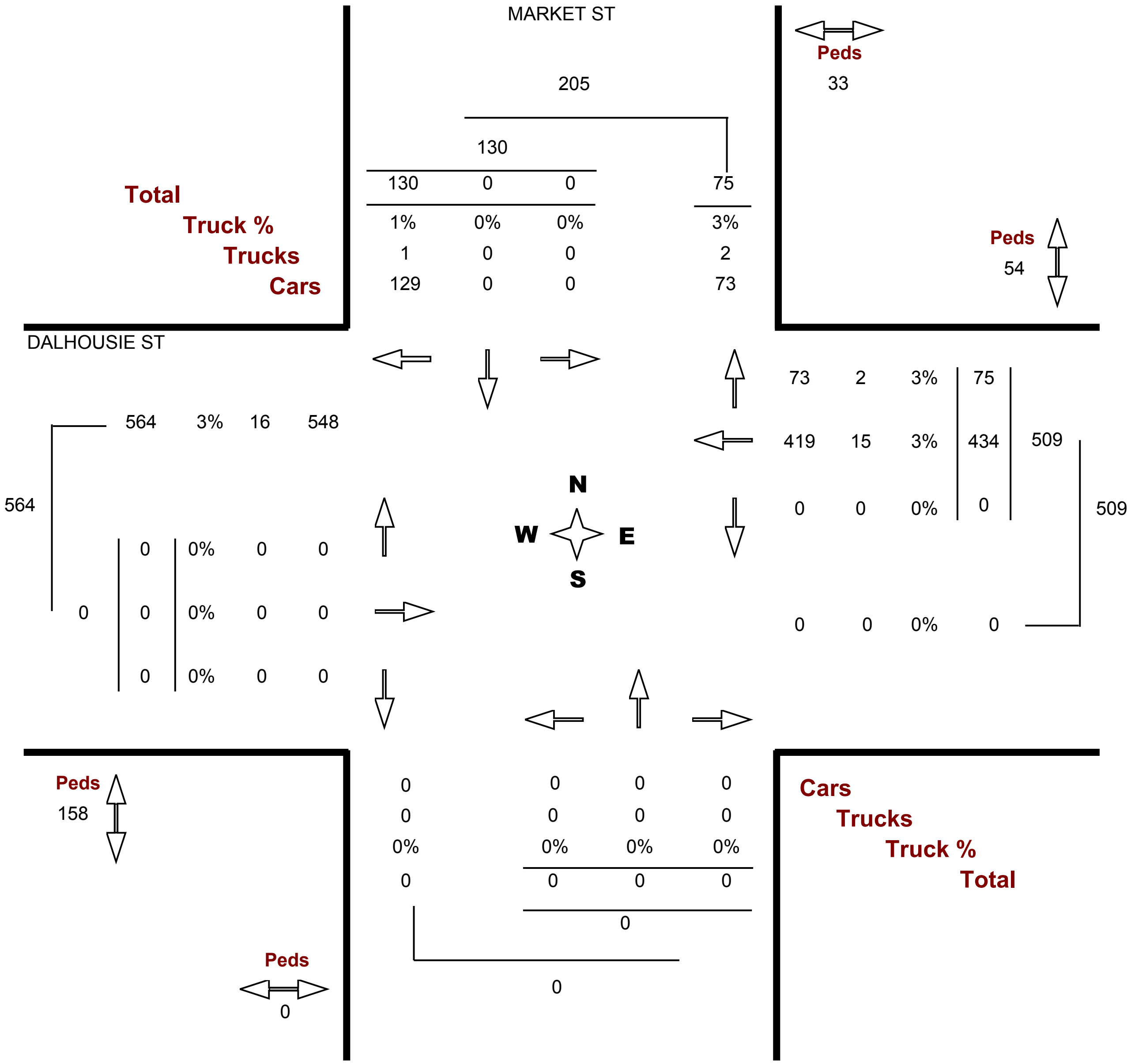
Turning Movements Report - MD Period

Location............. DALHOUSIE ST @ MARKET ST

Municipality....... BRANTFORD

GeoID....... N1539

Count Date....... Tuesday, 12 August, 2014 **Peak Hour......** 12:00 PM —01:00 PM



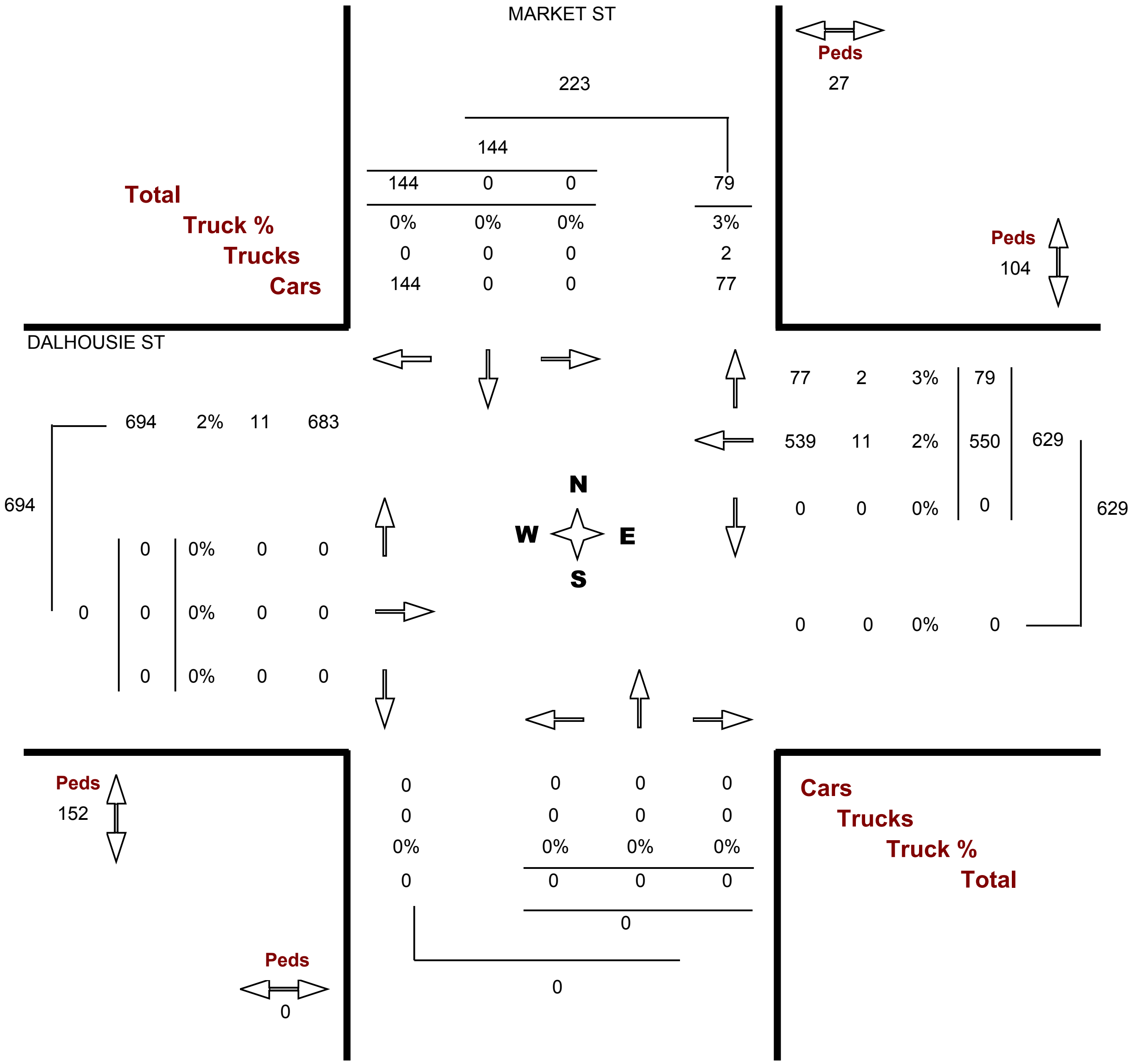
Turning Movements Report - PM Period

Location............. DALHOUSIE ST @ MARKET ST

Municipality....... BRANTFORD

GeoID....... N1539

Count Date....... Tuesday, 12 August, 2014 **Peak Hour......** 03:00 PM —04:00 PM



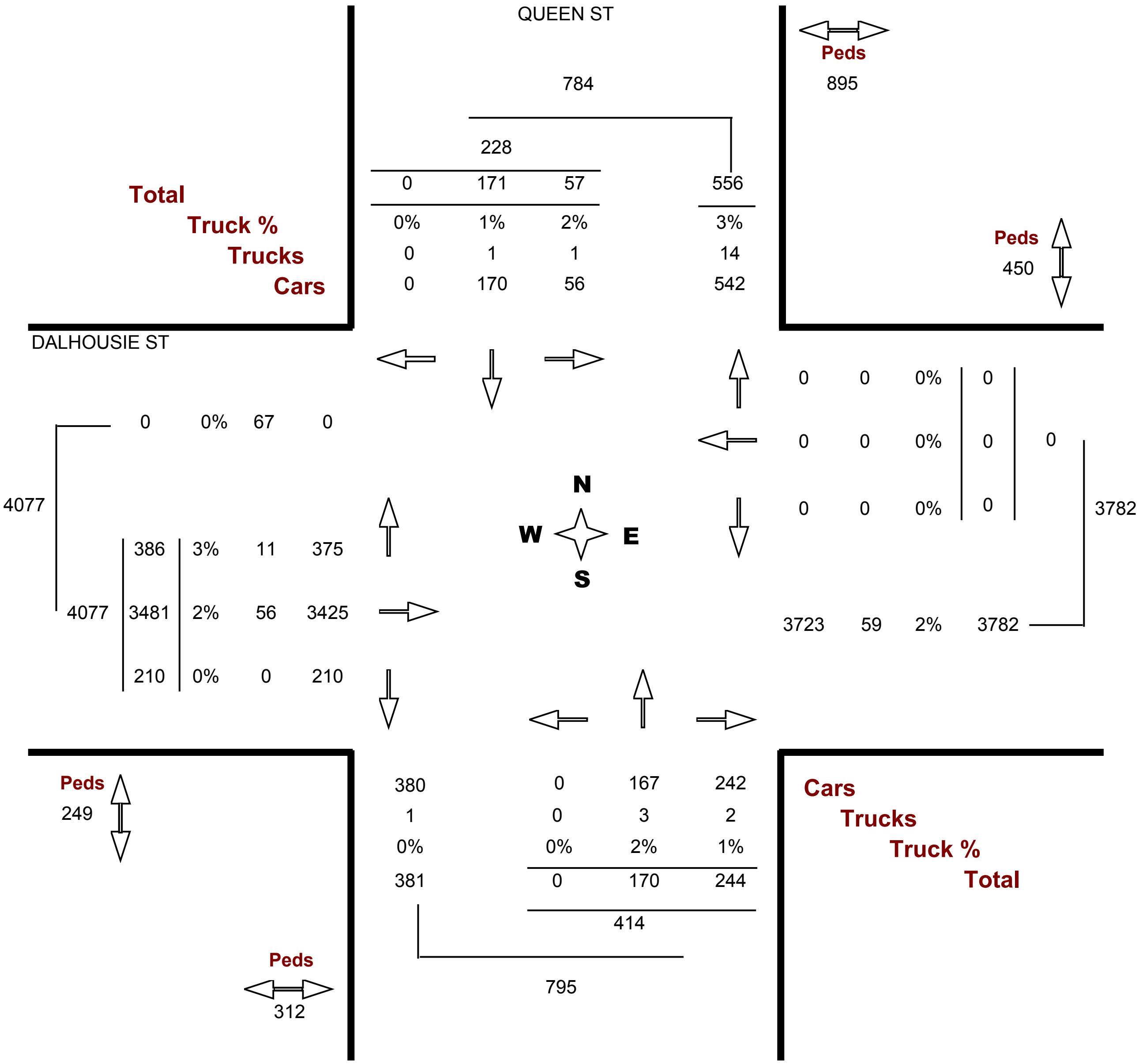
Turning Movements Count - Full Study Report

Location............. DALHOUSIE ST @ QUEEN ST

Municipality....... BRANTFORD

GeoID....... N1543

Count Date....... Wednesday, 11 July, 2018



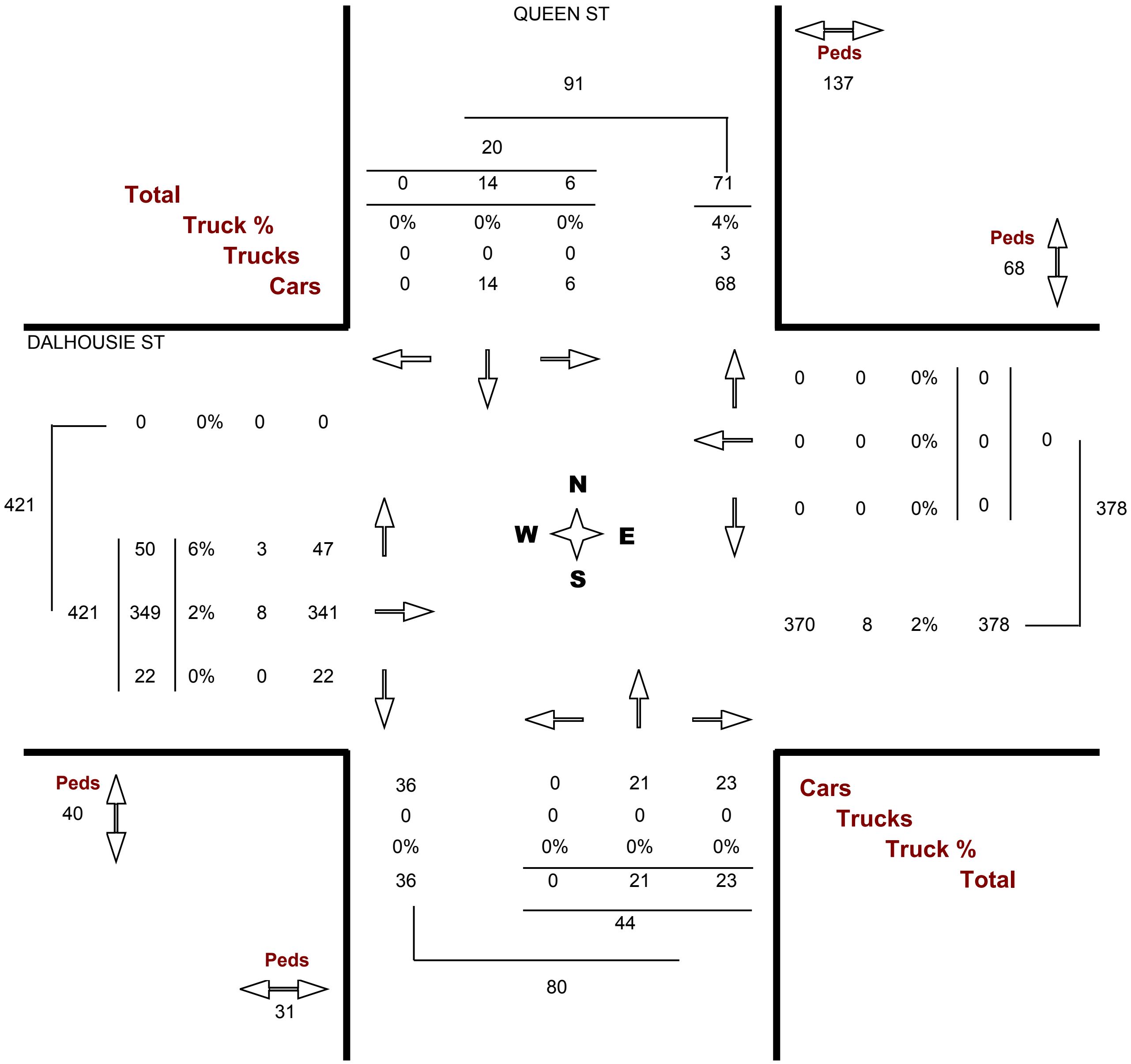
Turning Movements Report - AM Period

Location............. DALHOUSIE ST @ QUEEN ST

Municipality....... BRANTFORD

GeoID....... N1543

Count Date....... Wednesday, 11 July, 2018 **Peak Hour......** 09:30 AM —— 10:30 AM



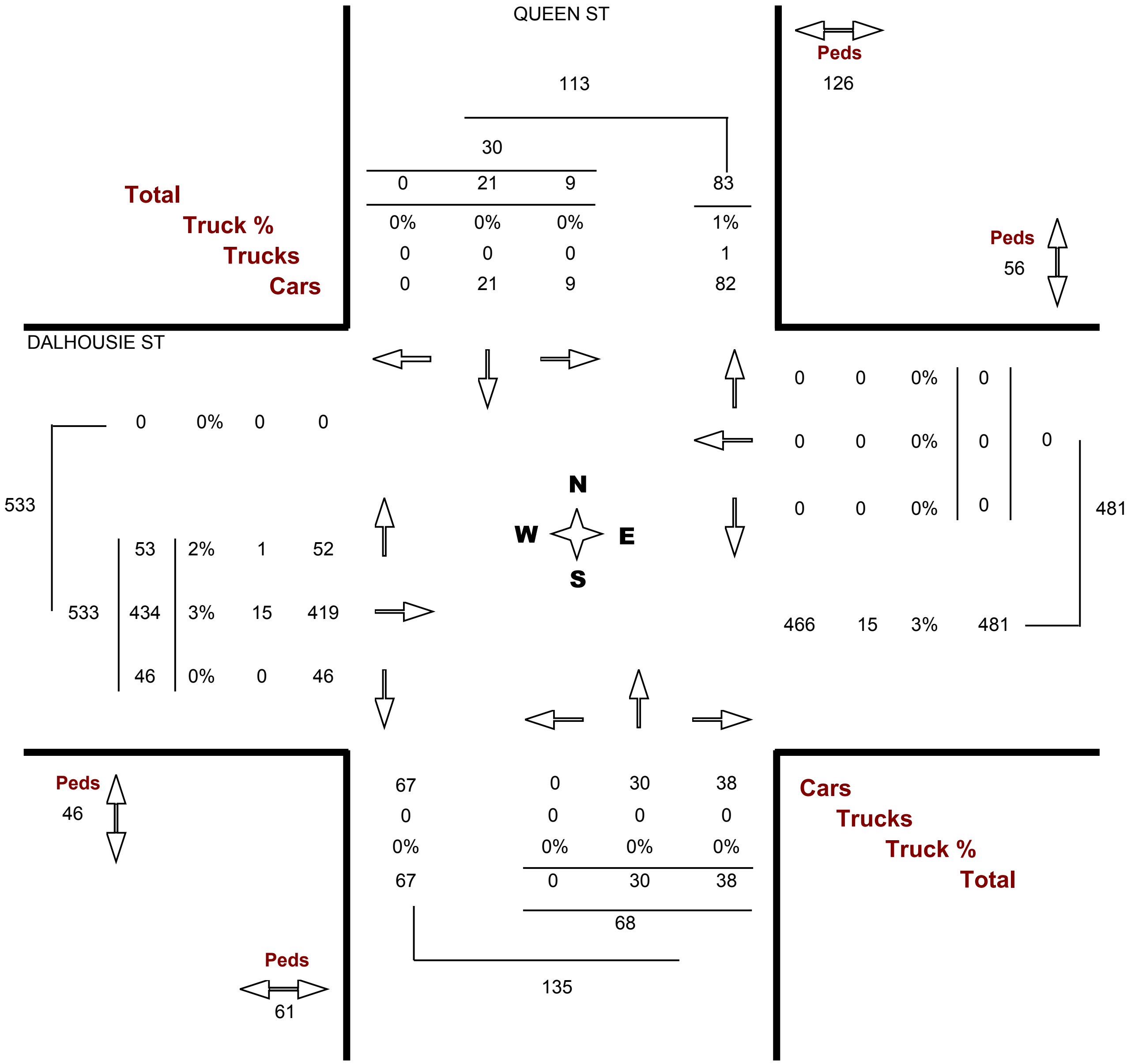
Turning Movements Report - MD Period

Location............. DALHOUSIE ST @ QUEEN ST

Municipality....... BRANTFORD

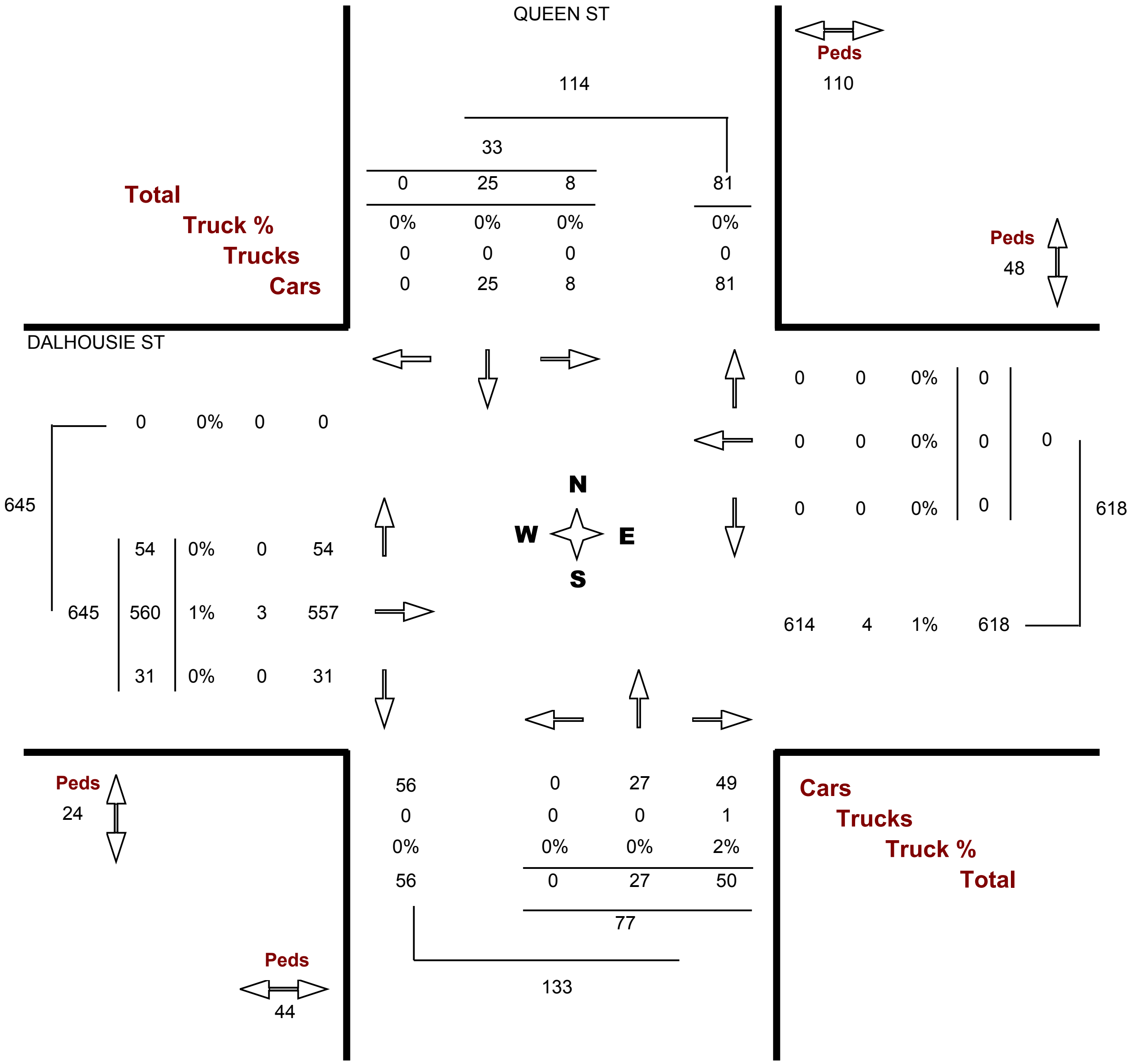
GeoID....... N1543

Count Date....... Wednesday, 11 July, 2018 **Peak Hour......** 12:30 PM —— 01:30 PM



Turning Movements Report - PM Period

Location............. DALHOUSIE ST @ QUEEN ST
Municipality....... BRANTFORD
GeoID....... N1543
Count Date....... Wednesday, 11 July, 2018 **Peak Hour......** 04:00 PM —— 05:00 PM



Appendix B

Base Year Traffic Operations

1: Icomm Dr/Brant Ave & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱				↰	↑↑	↱		↰↑	↱
Traffic Volume (vph)	869	261	47	0	0	0	46	286	22	118	280	798
Future Volume (vph)	869	261	47	0	0	0	46	286	22	118	280	798
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	110.0		210.0	40.0		0.0
Storage Lanes	1		1	0		0	1		2	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00
Ped Bike Factor	0.98	0.99	0.96				0.99		0.99		1.00	0.98
Frt			0.850						0.850			0.850
Flt Protected	0.950	0.970					0.950				0.984	
Satd. Flow (prot)	1597	3273	1484	0	0	0	1659	3579	1633	0	3421	1570
Flt Permitted	0.950	0.970					0.494				0.735	
Satd. Flow (perm)	1568	3237	1421	0	0	0	856	3579	1612	0	2554	1532
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95						68			877
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		446.3			127.5			177.1			125.8	
Travel Time (s)		33.5			9.6			12.8			9.1	
Confl. Peds. (#/hr)	19		33				9		1	1		9
Peak Hour Factor	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Adj. Flow (vph)	999	318	71	0	0	0	60	325	29	148	298	877
Shared Lane Traffic (%)	50%											
Lane Group Flow (vph)	499	818	71	0	0	0	60	325	29	0	446	877
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)		3.7			3.7			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm				pm+pt	NA	Perm	pm+pt	NA	Free
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4				2		2	6		Free
Minimum Split (s)	31.0	31.0	31.0				8.0	31.0	31.0	8.0	31.0	
Total Split (s)	39.0	39.0	39.0				11.0	30.0	30.0	11.0	30.0	
Total Split (%)	48.8%	48.8%	48.8%				13.8%	37.5%	37.5%	13.8%	37.5%	
Maximum Green (s)	35.0	35.0	35.0				7.0	24.0	24.0	7.0	24.0	
Yellow Time (s)	2.0	2.0	2.0				3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0				1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0	4.0				4.0	6.0	6.0		6.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Walk Time (s)	15.0	15.0	15.0					15.0	15.0		15.0	
Flash Dont Walk (s)	10.0	10.0	10.0					10.0	10.0		10.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

1: Icomm Dr/Brant Ave & Colborne St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱				↰	↑↑	↱		↰↑	↱
Traffic Volume (vph)	869	261	47	0	0	0	46	286	22	118	280	798
Future Volume (vph)	869	261	47	0	0	0	46	286	22	118	280	798
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0				4.0	6.0	6.0		6.0	4.0
Lane Util. Factor	0.91	0.91	1.00				1.00	0.95	1.00		0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.96				1.00	1.00	0.99		1.00	0.98
Flpb, ped/bikes	0.98	0.99	1.00				1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	0.97	1.00				0.95	1.00	1.00		0.98	1.00
Satd. Flow (prot)	1568	3238	1421				1653	3579	1612		3419	1532
Flt Permitted	0.95	0.97	1.00				0.49	1.00	1.00		0.73	1.00
Satd. Flow (perm)	1568	3238	1421				859	3579	1612		2554	1532
Peak-hour factor, PHF	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Adj. Flow (vph)	999	318	71	0	0	0	60	325	29	148	298	877
RTOR Reduction (vph)	0	0	40	0	0	0	0	0	20	0	0	0
Lane Group Flow (vph)	499	818	31	0	0	0	60	325	9	0	446	877
Confl. Peds. (#/hr)	19		33				9		1	1		9
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Turn Type	Perm	NA	Perm				pm+pt	NA	Perm	pm+pt	NA	Free
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4				2		2	6		Free
Actuated Green, G (s)	35.0	35.0	35.0				31.0	24.0	24.0		31.0	80.0
Effective Green, g (s)	35.0	35.0	35.0				31.0	24.0	24.0		31.0	80.0
Actuated g/C Ratio	0.44	0.44	0.44				0.39	0.30	0.30		0.39	1.00
Clearance Time (s)	4.0	4.0	4.0				4.0	6.0	6.0		6.0	
Lane Grp Cap (vph)	686	1416	621				402	1073	483		1065	1532
v/s Ratio Prot							0.01	0.09			0.04	
v/s Ratio Perm	c0.32	0.25	0.02				0.04		0.01		0.13	c0.57
v/c Ratio	0.73	0.58	0.05				0.15	0.30	0.02		0.42	0.57
Uniform Delay, d1	18.6	16.9	12.9				15.6	21.6	19.7		17.9	0.0
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.02	1.00
Incremental Delay, d2	6.6	1.7	0.2				0.8	0.7	0.1		1.1	1.4
Delay (s)	25.2	18.7	13.1				16.4	22.3	19.8		19.4	1.4
Level of Service	C	B	B				B	C	B		B	A
Approach Delay (s)		20.7			0.0			21.3			7.5	
Approach LOS		C			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

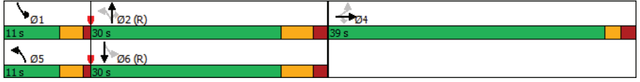
1: Icomm Dr/Brant Ave & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	35.0	35.0	35.0				33.0	24.0	24.0		29.0	80.0
Actuated g/C Ratio	0.44	0.44	0.44				0.41	0.30	0.30		0.36	1.00
v/c Ratio	0.73	0.58	0.11				0.14	0.30	0.05		0.46	0.57
Control Delay	26.1	19.0	2.3				13.0	22.5	1.0		18.2	4.3
Queue Delay	0.0	0.0	0.0				0.0	0.0	0.0		0.0	0.0
Total Delay	26.2	19.0	2.3				13.0	22.5	1.0		18.2	4.3
LOS	C	B	A				B	C	A		B	A
Approach Delay		20.7						19.6			8.9	
Approach LOS		C						B			A	
Queue Length 50th (m)	66.2	49.5	0.0				4.9	19.8	0.0		25.6	29.5
Queue Length 95th (m)	100.2	59.0	1.1				9.4	29.3	0.0		36.6	49.7
Internal Link Dist (m)		422.3			103.5			153.1			101.8	
Turn Bay Length (m)							110.0		210.0			
Base Capacity (vph)	686	1416	675				423	1073	531		980	1532
Starvation Cap Reductn	0	0	0				0	0	0		0	0
Spillback Cap Reductn	1	2	0				0	0	0		0	0
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.73	0.58	0.11				0.14	0.30	0.05		0.46	0.57

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 60 (75%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Pretimed
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 15.6 Intersection LOS: B
Intersection Capacity Utilization 79.1% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Icomm Dr/Brant Ave & Colborne St



2: Colborne St & King St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	62	339	0	0	90	0
Future Volume (vph)	62	339	0	0	90	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.992			0.950	
Satd. Flow (prot)	0	3550	0	0	1789	0
Flt Permitted		0.992			0.950	
Satd. Flow (perm)	0	3550	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		127.5	121.5		114.7	
Travel Time (s)		9.6	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	67	368	0	0	98	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	435	0	0	98	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 22.8% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Colborne St & King St

Base AM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	62	339	0	0	90	0
Future Volume (Veh/h)	62	339	0	0	90	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	368	0	0	98	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)		127				
pX, platoon unblocked						
vC, conflicting volume	0				318	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				318	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				84	100
cM capacity (veh/h)	1622				623	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	190	245	98
Volume Left	67	0	98
Volume Right	0	0	0
cSH	1622	1700	623
Volume to Capacity	0.04	0.14	0.16
Queue Length 95th (m)	1.0	0.0	4.2
Control Delay (s)	2.8	0.0	11.8
Lane LOS	A		B
Approach Delay (s)	1.2		11.8
Approach LOS			B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
3: Colborne St & Queen St

Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	20	409	0	0	68	0
Future Volume (vph)	20	409	0	0	68	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	3608	0	0	1807	0
Flt Permitted		0.998			0.950	
Satd. Flow (perm)	0	3608	0	0	1807	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	22	445	0	0	74	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	467	0	0	74	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 22.3%		ICU Level of Service A
Analysis Period (min) 15		

HCM Unsignalized Intersection Capacity Analysis
3: Colborne St & Queen St

Base AM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	20	409	0	0	68	0
Future Volume (vph)	20	409	0	0	68	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	445	0	0	74	0

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total (vph)	170	297	74
Volume Left (vph)	22	0	74
Volume Right (vph)	0	0	0
Hadj (s)	0.08	0.02	0.22
Departure Headway (s)	4.8	4.7	5.1
Degree Utilization, x	0.23	0.39	0.11
Capacity (veh/h)	743	750	662
Control Delay (s)	8.0	9.5	8.7
Approach Delay (s)	8.9		8.7
Approach LOS	A		A

Intersection Summary			
Delay	8.9		
Level of Service	A		
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	477	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	477	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Flt Permitted												
Satd. Flow (perm)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		183.0			240.0			61.0			43.5	
Travel Time (s)		13.7			18.0			4.6			3.3	
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
Adj. Flow (vph)	0	518	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	518	0	0	0	0	0	0	0	0	0	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2						2			2	
Detector Template		Thru						Thru			Thru	
Leading Detector (m)		10.0						10.0			10.0	
Trailing Detector (m)		0.0						0.0			0.0	
Detector 1 Position(m)		0.0						0.0			0.0	
Detector 1 Size(m)		0.6						0.6			0.6	
Detector 1 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0						0.0			0.0	
Detector 1 Queue (s)		0.0						0.0			0.0	
Detector 1 Delay (s)		0.0						0.0			0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Detector Phase		2						4			4	
Switch Phase												
Minimum Initial (s)		4.0						4.0			4.0	

Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

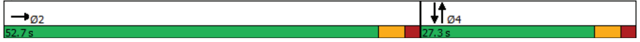
Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		27.3						27.3			27.3	
Total Split (s)		52.7						27.3			27.3	
Total Split (%)		65.9%						34.1%			34.1%	
Maximum Green (s)		47.4						22.0			22.0	
Yellow Time (s)		3.3						3.3			3.3	
All-Red Time (s)		2.0						2.0			2.0	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.3						5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0						3.0			3.0	
Recall Mode		Max						None			None	
Walk Time (s)		7.0						7.0			7.0	
Flash Dont Walk (s)		15.0						15.0			15.0	
Pedestrian Calls (#/hr)		0						120			120	
Act Effct Green (s)		64.9										
Actuated g/C Ratio		0.73										
v/c Ratio		0.20										
Control Delay		6.0										
Queue Delay		0.0										
Total Delay		6.0										
LOS		A										
Approach Delay		6.0										
Approach LOS		A										
Queue Length 50th (m)		17.9										
Queue Length 95th (m)		24.4										
Internal Link Dist (m)		159.0			216.0			37.0			19.5	
Turn Bay Length (m)												
Base Capacity (vph)		2596										
Starvation Cap Reductn		0										
Spillback Cap Reductn		0										
Storage Cap Reductn		0										
Reduced v/c Ratio		0.20										

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 89.5
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.20
Intersection Signal Delay: 6.0 — Intersection LOS: A
Intersection Capacity Utilization 17.6% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Market Street IPS/Market St IPS & Colborne St



Lanes, Volumes, Timings
5: Colborne St & Charlotte Street

Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	108	369	0	0	67	0
Future Volume (vph)	108	369	0	0	67	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.989			0.950	
Satd. Flow (prot)	0	3539	0	0	1789	0
Flt Permitted		0.989			0.950	
Satd. Flow (perm)	0	3539	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		240.0	140.5		77.6	
Travel Time (s)		18.0	10.5		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	401	0	0	73	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	518	0	0	73	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 23.7% — ICU Level of Service A
Analysis Period (min) 15

HCM Signalized Intersection Capacity Analysis
4: Market Street IPS/Market St IPS & Colborne St

Base AM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	477	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	477	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3										
Lane Util. Factor		0.95										
Frt		1.00										
Flt Protected		1.00										
Satd. Flow (prot)		3579										
Flt Permitted		1.00										
Satd. Flow (perm)		3579										
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)	0	518	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	518	0	0	0	0	0	0	0	0	0	0
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Actuated Green, G (s)		63.6										
Effective Green, g (s)		63.6										
Actuated g/C Ratio		0.70										
Clearance Time (s)		5.3										
Vehicle Extension (s)		3.0										
Lane Grp Cap (vph)		2506										
v/s Ratio Prot		c0.14										
v/s Ratio Perm												
v/c Ratio		0.21										
Uniform Delay, d1		4.8										
Progression Factor		1.00										
Incremental Delay, d2		0.2										
Delay (s)		5.0										
Level of Service		A										
Approach Delay (s)		5.0			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	10.6
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
5: Colborne St & Charlotte Street

Base AM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	108	369	0	0	67	0
Future Volume (Veh/h)	108	369	0	0	67	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	117	401	0	0	73	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)		240	141			
pX, platoon unblocked					0.99	
vC, conflicting volume	0				434	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				412	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				86	100
cM capacity (veh/h)	1622				522	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	251	267	73
Volume Left	117	0	73
Volume Right	0	0	0
cSH	1622	1700	522
Volume to Capacity	0.07	0.16	0.14
Queue Length 95th (m)	1.8	0.0	3.7
Control Delay (s)	3.8	0.0	13.0
Lane LOS	A		B
Approach Delay (s)	1.8		13.0
Approach LOS			B

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	23.7%	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)	36	340	60	0	0	0	0	747	514	90	727	0
Future Volume (vph)	36	340	60	0	0	0	0	747	514	90	727	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		23.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00
Ped Bike Factor	0.99		0.97						0.98		1.00	
Frt			0.850						0.850			
Flt Protected	0.950										0.995	
Satd. Flow (prot)	1807	3579	1633	0	0	0	0	3614	1601	0	3600	0
Flt Permitted	0.950										0.742	
Satd. Flow (perm)	1785	3579	1580	0	0	0	0	3614	1567	0	2684	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82						350			
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		140.5			1204.0			126.9			109.9	
Travel Time (s)		10.5			90.3			9.5			8.2	
Confl. Peds. (#/hr)	12		21						8	8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Adj. Flow (vph)	39	370	65	0	0	0	0	812	559	98	790	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	370	65	0	0	0	0	812	559	0	888	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Minimum Split (s)	28.0	28.0	28.0					25.0	25.0	9.0	25.0	
Total Split (s)	29.0	29.0	29.0					38.0	38.0	13.0	51.0	
Total Split (%)	36.3%	36.3%	36.3%					47.5%	47.5%	16.3%	63.8%	
Maximum Green (s)	25.0	25.0	25.0					34.0	34.0	8.0	47.0	
Yellow Time (s)	3.5	3.5	3.5					3.5	3.5	3.0	3.5	
All-Red Time (s)	0.5	0.5	0.5					0.5	0.5	2.0	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	17.0	17.0	17.0					14.0	14.0		14.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	25.0	25.0	25.0					34.0	34.0		47.0	
Actuated g/C Ratio	0.31	0.31	0.31					0.42	0.42		0.59	
v/c Ratio	0.07	0.33	0.12					0.53	0.64		0.53	
Control Delay	19.9	22.1	4.2					18.6	10.3		7.9	
Queue Delay	0.0	0.0	0.0					0.0	0.0		0.6	
Total Delay	19.9	22.1	4.2					18.6	10.3		8.6	
LOS	B	C	A					B	B		A	
Approach Delay		19.5						15.2			8.6	
Approach LOS		B						B			A	
Queue Length 50th (m)	4.1	22.4	0.0					46.5	20.6		4.5	
Queue Length 95th (m)	10.6	33.4	6.1					62.6	53.7		57.7	
Internal Link Dist (m)		116.5			1180.0			102.9			85.9	
Turn Bay Length (m)	25.0		23.0									
Base Capacity (vph)	557	1118	550					1535	867		1679	
Starvation Cap Reductn	0	0	0					0	0		416	
Spillback Cap Reductn	0	0	0					0	0		0	
Storage Cap Reductn	0	0	0					0	0		0	
Reduced v/c Ratio	0.07	0.33	0.12					0.53	0.64		0.70	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 19 (24%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 65
Control Type: Pretimed
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 13.8 Intersection LOS: B
Intersection Capacity Utilization 85.4% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 6: Clarence Street & Colborne

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱					↑↑	↱		↰↑	
Traffic Volume (vph)	36	340	60	0	0	0	0	747	514	90	727	0
Future Volume (vph)	36	340	60	0	0	0	0	747	514	90	727	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00					0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.97					1.00	0.98		1.00	
Flpb, ped/bikes	0.99	1.00	1.00					1.00	1.00		1.00	
Frt	1.00	1.00	0.85					1.00	0.85		1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00		0.99	
Satd. Flow (prot)	1785	3579	1580					3614	1567		3597	
Flt Permitted	0.95	1.00	1.00					1.00	1.00		0.74	
Satd. Flow (perm)	1785	3579	1580					3614	1567		2686	
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)	39	370	65	0	0	0	0	812	559	98	790	0
RTOR Reduction (vph)	0	0	45	0	0	0	0	0	201	0	0	0
Lane Group Flow (vph)	39	370	20	0	0	0	0	812	358	0	888	0
Confl. Peds. (#/hr)	12		21						8	8		
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Actuated Green, G (s)	25.0	25.0	25.0					34.0	34.0		47.0	
Effective Green, g (s)	25.0	25.0	25.0					34.0	34.0		47.0	
Actuated g/C Ratio	0.31	0.31	0.31					0.42	0.42		0.59	
Clearance Time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lane Grp Cap (vph)	557	1118	493					1535	665		1669	
v/s Ratio Prot		c0.10						0.22			c0.05	
v/s Ratio Perm	0.02		0.01						0.23		c0.26	
v/c Ratio	0.07	0.33	0.04					0.53	0.54		0.53	
Uniform Delay, d1	19.3	21.1	19.2					17.1	17.1		9.9	
Progression Factor	1.00	1.00	1.00					1.00	1.00		0.66	
Incremental Delay, d2	0.2	0.8	0.2					1.3	3.1		1.1	
Delay (s)	19.6	21.9	19.3					18.4	20.3		7.6	
Level of Service	B	C	B					B	C		A	
Approach Delay (s)		21.3			0.0			19.1			7.6	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑↑	↱	↰		↱↱	Y			
Traffic Volume (vph)	30	657	0	0	0	698	0	0	0	0
Future Volume (vph)	30	657	0	0	0	698	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		22.0	48.0		0.0	0.0	0.0	0.0	0.0
Storage Lanes	1		1	1		2	1	0	0	0
Taper Length (m)	7.5			7.5			7.5		7.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00	1.00
Frt						0.850				
Flt Protected	0.950									
Satd. Flow (prot)	1789	3579	1883	1883	0	2818	1883	0	0	0
Flt Permitted	0.950									
Satd. Flow (perm)	1789	3579	1883	1883	0	2818	1883	0	0	0
Right Turn on Red	Yes		Yes			Yes		Yes		
Satd. Flow (RTOR)	33					1830				
Link Speed (k/h)		48			48		48		48	
Link Distance (m)		1204.0			112.9		111.0		175.7	
Travel Time (s)		90.3			8.5		8.3		13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	714	0	0	0	759	0	0	0	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	33	714	0	0	0	759	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Right	Left	Right
Median Width(m)		3.7			3.7		3.7		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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24	14	24	14
Number of Detectors	1	2	1	1		1	1			
Detector Template	Left	Thru	Right	Left		Right	Left			
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0	2.0			
Trailing Detector (m)	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			
Detector 1 Size(m)	2.0	0.6	2.0	2.0		2.0	2.0			
Detector 1 Type	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			
Detector 1 Queue (s)	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			
Detector 2 Position(m)		9.4								
Detector 2 Size(m)		0.6								
Detector 2 Type		Cl+Ex								
Detector 2 Channel										
Detector 2 Extend (s)		0.0								
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Detector Phase	2	2	2	2			8			
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0			3.0			
Minimum Split (s)	21.6	21.6	21.6	21.6			8.3			
Total Split (s)	64.0	64.0	64.0	64.0			16.0			
Total Split (%)	80.0%	80.0%	80.0%	80.0%			20.0%			
Maximum Green (s)	58.4	58.4	58.4	58.4			10.7			
Yellow Time (s)	3.3	3.3	3.3	3.3			3.3			
All-Red Time (s)	2.3	2.3	2.3	2.3			2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			0.0			
Total Lost Time (s)	5.6	5.6	5.6	5.6			5.3			
Lead/Lag										
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			
Recall Mode	C-Max	C-Max	C-Max	C-Max			None			
Walk Time (s)	5.0	5.0	5.0	5.0			5.0			
Flash Dont Walk (s)	11.0	11.0	11.0	11.0			11.0			
Pedestrian Calls (#/hr)	0	0	0	0			0			
Act Effct Green (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
v/c Ratio	0.02	0.20				0.27				
Control Delay	0.0	0.1				0.2				
Queue Delay	0.0	0.0				0.0				
Total Delay	0.0	0.1				0.2				
LOS	A	A				A				
Approach Delay		0.1			0.2					
Approach LOS		A			A					
Queue Length 50th (m)	0.0	0.0				0.0				
Queue Length 95th (m)	m0.0	0.0				0.0				
Internal Link Dist (m)		1180.0			88.9		87.0		151.7	
Turn Bay Length (m)										
Base Capacity (vph)	1789	3579				2818				
Starvation Cap Reductn	0	0				0				
Spillback Cap Reductn	0	0				0				
Storage Cap Reductn	0	0				0				
Reduced v/c Ratio	0.02	0.20				0.27				

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.27
Intersection Signal Delay: 0.2 Intersection LOS: A
Intersection Capacity Utilization 22.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Canadian Tire Entrance & Colborne St & Dalhousie Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑↑	↱	↰		↱↱	↰↱			
Traffic Volume (vph)	30	657	0	0	0	698	0	0	0	0
Future Volume (vph)	30	657	0	0	0	698	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6				4.0				
Lane Util. Factor	1.00	0.95				0.88				
Frt	1.00	1.00				0.85				
Flt Protected	0.95	1.00				1.00				
Satd. Flow (prot)	1789	3579				2818				
Flt Permitted	0.95	1.00				1.00				
Satd. Flow (perm)	1789	3579				2818				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	714	0	0	0	759	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	33	714	0	0	0	759	0	0	0	0
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				
Actuated Green, G (s)	80.0	80.0				80.0				
Effective Green, g (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
Clearance Time (s)	5.6	5.6								
Vehicle Extension (s)	3.0	3.0								
Lane Grp Cap (vph)	1789	3579				2818				
v/s Ratio Prot		0.20								
v/s Ratio Perm	0.02					c0.27				
v/c Ratio	0.02	0.20				0.27				
Uniform Delay, d1	0.0	0.0				0.0				
Progression Factor	1.00	1.00				1.00				
Incremental Delay, d2	0.0	0.1				0.2				
Delay (s)	0.0	0.1				0.2				
Level of Service	A	A				A				
Approach Delay (s)		0.1			0.2		0.0		0.0	
Approach LOS		A			A		A		A	

Intersection Summary			
HCM 2000 Control Delay	0.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	284	357	122	41	742	0	0	533	45
Future Volume (vph)	0	0	0	284	357	122	41	742	0	0	533	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		50.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.97		0.97		1.00			1.00	
Frt						0.850					0.988	
Flt Protected				0.950				0.997				
Satd. Flow (prot)	0	0	0	1825	3614	1585	0	3572	0	0	3568	0
Flt Permitted				0.950				0.893				
Satd. Flow (perm)	0	0	0	1779	3614	1538	0	3199	0	0	3568	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						133					13	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		139.0			1069.0			109.9			102.5	
Travel Time (s)		10.4			80.2			8.2			7.7	
Confl. Peds. (#/hr)				23		17	8					8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	309	388	133	45	807	0	0	579	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	309	388	133	0	852	0	0	628	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA	Perm	pm+pt	NA			NA	
Protected Phases					2		7	4			8	
Permitted Phases				2		2	4					
Minimum Split (s)				28.1	28.1	28.1	9.0	31.1			31.1	
Total Split (s)				31.0	31.0	31.0	10.0	49.0			31.1	
Total Split (%)				38.8%	38.8%	38.8%	12.5%	61.3%			38.9%	
Maximum Green (s)				25.0	25.0	25.0	5.0	43.0			25.1	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0			4.0	
All-Red Time (s)				2.0	2.0	2.0	2.0	2.0			2.0	
Lost Time Adjust (s)				0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)				6.0	6.0	6.0		6.0			6.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)				15.0	15.0	15.0		18.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	

Lanes, Volumes, Timings
8: Clarence Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)				25.0	25.0	25.0		43.0			33.0	
Actuated g/C Ratio				0.31	0.31	0.31		0.54			0.41	
v/c Ratio				0.56	0.34	0.23		0.49			0.42	
Control Delay				27.4	22.2	5.2		15.7			17.5	
Queue Delay				0.0	0.0	0.0		0.3			0.0	
Total Delay				27.4	22.2	5.2		16.0			17.5	
LOS				C	C	A		B			B	
Approach Delay					21.4			16.0			17.5	
Approach LOS					C			B			B	
Queue Length 50th (m)				38.9	23.7	0.2		30.3			33.8	
Queue Length 95th (m)				62.8	34.7	11.1		50.8			47.2	
Internal Link Dist (m)		115.0			1045.0			85.9			78.5	
Turn Bay Length (m)						50.0						
Base Capacity (vph)				555	1129	572		1738			1479	
Starvation Cap Reductn				0	0	0		346			0	
Spillback Cap Reductn				0	0	0		0			0	
Storage Cap Reductn				0	0	0		0			0	
Reduced v/c Ratio				0.56	0.34	0.23		0.61			0.42	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 74 (93%), Referenced to phase 2:WBTL, Start of Green

Natural Cycle: 70

Control Type: Pretimed

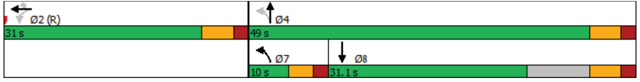
Maximum v/c Ratio: 0.56

Intersection Signal Delay: 18.3 Intersection LOS: B

Intersection Capacity Utilization 75.9% ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 8: Clarence Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis
8: Clarence Street & Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	284	357	122	41	742	0	0	533	45
Future Volume (vph)	0	0	0	284	357	122	41	742	0	0	533	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0		6.0			6.0	
Lane Util. Factor				1.00	0.95	1.00		0.95			0.95	
Frpb, ped/bikes				1.00	1.00	0.97		1.00			1.00	
Flpb, ped/bikes				0.97	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			0.99	
Flt Protected				0.95	1.00	1.00		1.00			1.00	
Satd. Flow (prot)				1779	3614	1538		3572			3569	
Flt Permitted				0.95	1.00	1.00		0.89			1.00	
Satd. Flow (perm)				1779	3614	1538		3197			3569	
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)	0	0	0	309	388	133	45	807	0	0	579	49
RTOR Reduction (vph)	0	0	0	0	0	91	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	309	388	42	0	852	0	0	620	0
Confl. Peds. (#/hr)				23		17	8					8
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA			NA	
Protected Phases					2		7	4			8	
Permitted Phases				2		2	4					
Actuated Green, G (s)				25.0	25.0	25.0		43.0			33.0	
Effective Green, g (s)				25.0	25.0	25.0		43.0			33.0	
Actuated g/C Ratio				0.31	0.31	0.31		0.54			0.41	
Clearance Time (s)				6.0	6.0	6.0		6.0			6.0	
Lane Grp Cap (vph)				555	1129	480		1741			1472	
v/s Ratio Prot					0.11			c0.03			0.17	
v/s Ratio Perm				c0.17		0.03		c0.23				
v/c Ratio				0.56	0.34	0.09		0.49			0.42	
Uniform Delay, d1				22.9	21.2	19.4		11.6			16.7	
Progression Factor				1.00	1.00	1.00		1.27			1.00	
Incremental Delay, d2				3.9	0.8	0.3		0.9			0.9	
Delay (s)				26.8	21.9	19.8		15.6			17.6	
Level of Service				C	C	B		B			B	
Approach Delay (s)		0.0			23.4			15.6			17.6	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
9: Charlotte Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↱	
Traffic Volume (vph)	0	0	0	78	342	23	72	40	0	0	44	11
Future Volume (vph)	0	0	0	78	342	23	72	40	0	0	44	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.992						0.973	
Flt Protected					0.991			0.969				
Satd. Flow (prot)	0	0	0	0	3518	0	0	1825	0	0	1833	0
Flt Permitted					0.991			0.969				
Satd. Flow (perm)	0	0	0	0	3518	0	0	1825	0	0	1833	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		241.1			139.0			32.3			102.3	
Travel Time (s)		18.1			10.4			2.4			7.7	
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
Adj. Flow (vph)	0	0	0	85	372	25	78	43	0	0	48	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	482	0	0	121	0	0	60	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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 31.9% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
9: Charlotte Street & Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↱	
Traffic Volume (veh/h)	0	0	0	78	342	23	72	40	0	0	44	11
Future Volume (Veh/h)	0	0	0	78	342	23	72	40	0	0	44	11
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	0	0	85	372	25	78	43	0	0	48	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		241			139							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	397			0			392	567	0	576	554	198
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	194			0			189	377	0	387	364	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			95			87	91	100	100	90	99
cM capacity (veh/h)	1277			1622			615	486	1084	454	495	1006

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	271	211	121	60
Volume Left	85	0	78	0
Volume Right	0	25	0	12
cSH	1622	1700	562	551
Volume to Capacity	0.05	0.12	0.22	0.11
Queue Length 95th (m)	1.3	0.0	6.2	2.8
Control Delay (s)	2.6	0.0	13.2	12.3
Lane LOS	A		B	B
Approach Delay (s)	1.5		13.2	12.3
Approach LOS			B	B

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
10: Dalhousie St & Market St

Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↱		↱
Traffic Volume (vph)	0	0	340	85	0	70
Future Volume (vph)	0	0	340	85	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0			10.0	0.0	0.0
Storage Lanes	0			1	0	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00
Ped Bike Factor				0.81		0.74
Frt				0.850		0.865
Flt Protected						
Satd. Flow (prot)	0	0	3614	1617	0	1645
Flt Permitted						
Satd. Flow (perm)	0	0	3614	1305	0	1217
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				92		332
Link Speed (k/h)		48	48		48	
Link Distance (m)		182.0	241.1		101.1	
Travel Time (s)		13.7	18.1		7.6	
Confl. Peds. (#/hr)				94		216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Adj. Flow (vph)	0	0	370	92	0	76
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	370	92	0	76
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Turn Type			NA	Perm		Perm
Protected Phases			2			
Permitted Phases				2		4
Minimum Split (s)			29.3	29.3		28.3
Total Split (s)			60.0	60.0		30.0
Total Split (%)			66.7%	66.7%		33.3%
Maximum Green (s)			54.7	54.7		24.7
Yellow Time (s)			3.3	3.3		3.3
All-Red Time (s)			2.0	2.0		2.0
Lost Time Adjust (s)			0.0	0.0		0.0
Total Lost Time (s)			5.3	5.3		5.3
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)			7.0	7.0		7.0
Flash Dont Walk (s)			17.0	17.0		16.0
Pedestrian Calls (#/hr)			0	0		0

HCM Signalized Intersection Capacity Analysis
10: Dalhousie St & Market St

Base AM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↱		↱
Traffic Volume (vph)	0	0	340	85	0	70
Future Volume (vph)	0	0	340	85	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			5.3	5.3		5.3
Lane Util. Factor			0.95	1.00		1.00
Frpb, ped/bikes			1.00	0.81		0.74
Flpb, ped/bikes			1.00	1.00		1.00
Frt			1.00	0.85		0.86
Flt Protected			1.00	1.00		1.00
Satd. Flow (prot)			3614	1305		1217
Flt Permitted			1.00	1.00		1.00
Satd. Flow (perm)			3614	1305		1217
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	370	92	0	76
RTOR Reduction (vph)	0	0	0	36	0	55
Lane Group Flow (vph)	0	0	370	56	0	21
Confl. Peds. (#/hr)				94		216
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Turn Type			NA	Perm		Perm
Protected Phases			2			
Permitted Phases				2		4
Actuated Green, G (s)			54.7	54.7		24.7
Effective Green, g (s)			54.7	54.7		24.7
Actuated g/C Ratio			0.61	0.61		0.27
Clearance Time (s)			5.3	5.3		5.3
Lane Grp Cap (vph)			2196	793		333
v/s Ratio Prot			c0.10			
v/s Ratio Perm				0.04		c0.02
v/c Ratio			0.17	0.07		0.06
Uniform Delay, d1			7.7	7.2		24.1
Progression Factor			1.00	1.00		1.00
Incremental Delay, d2			0.2	0.2		0.4
Delay (s)			7.9	7.4		24.5
Level of Service			A	A		C
Approach Delay (s)		0.0	7.8		24.5	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
10: Dalhousie St & Market St

Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)			54.7	54.7		24.7
Actuated g/C Ratio			0.61	0.61		0.27
v/c Ratio			0.17	0.11		0.13
Control Delay			8.0	2.0		0.5
Queue Delay			0.0	0.0		0.0
Total Delay			8.0	2.0		0.5
LOS			A	A		A
Approach Delay			6.8		0.5	
Approach LOS			A		A	
Queue Length 50th (m)			13.4	0.0		0.0
Queue Length 95th (m)			19.4	5.3		0.0
Internal Link Dist (m)		158.0	217.1		77.1	
Turn Bay Length (m)				10.0		
Base Capacity (vph)			2196	829		574
Starvation Cap Reductn			0	0		0
Spillback Cap Reductn			0	0		0
Storage Cap Reductn			0	0		0
Reduced v/c Ratio			0.17	0.11		0.13

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 37 (41%), Referenced to phase 2:WBT and 6:, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.17
Intersection Signal Delay: 5.9 Intersection LOS: A
Intersection Capacity Utilization 48.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 10: Dalhousie St & Market St

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↱			↰			↑	↱
Traffic Volume (vph)	0	0	0	47	341	22	6	14	0	0	21	23
Future Volume (vph)	0	0	0	47	341	22	6	14	0	0	21	23
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	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.95	1.00			0.99				0.97
Frt					0.991							0.850
Flt Protected				0.950				0.984				
Satd. Flow (prot)	0	0	0	1825	3601	0	0	1890	0	0	1921	1601
Flt Permitted				0.950				0.946				
Satd. Flow (perm)	0	0	0	1738	3601	0	0	1806	0	0	1921	1551
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					14							31
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	0	0	0	51	371	24	7	15	0	0	23	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	51	395	0	0	22	0	0	23	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Minimum Split (s)				26.3	26.3		26.3	26.3			26.3	26.3
Total Split (s)				52.0	52.0		28.0	28.0			28.0	28.0
Total Split (%)				65.0%	65.0%		35.0%	35.0%			35.0%	35.0%
Maximum Green (s)				46.7	46.7		22.7	22.7			22.7	22.7
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	3.3
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	2.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				5.3	5.3			5.3			5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)				14.0	14.0		14.0	14.0			14.0	14.0
Pedestrian Calls (#/hr)				0	0		0	0			0	0
Act Effct Green (s)				46.7	46.7			22.7			22.7	22.7
Actuated g/C Ratio				0.58	0.58			0.28			0.28	0.28
v/c Ratio				0.05	0.19			0.04			0.04	0.05

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay				7.4	7.8			21.2			21.1	7.4
Queue Delay				0.0	0.0			0.0			0.0	0.0
Total Delay				7.4	7.8			21.2			21.1	7.4
LOS				A	A			C			C	A
Approach Delay					7.7			21.2			14.0	
Approach LOS					A			C			B	
Queue Length 50th (m)				3.0	12.9			2.4			2.5	0.0
Queue Length 95th (m)				7.3	19.2			7.5			7.7	4.6
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)				1014	2107			512			545	462
Starvation Cap Reductn				0	0			0			0	0
Spillback Cap Reductn				0	0			0			0	0
Storage Cap Reductn				0	0			0			0	0
Reduced v/c Ratio				0.05	0.19			0.04			0.04	0.05

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 37 (46%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.19
Intersection Signal Delay: 8.9 Intersection LOS: A
Intersection Capacity Utilization 65.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St

HCM Signalized Intersection Capacity Analysis
11: Queen St/Queen Street & Dalhousie St

Base AM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↱			↰			↑	↱
Traffic Volume (vph)	0	0	0	47	341	22	6	14	0	0	21	23
Future Volume (vph)	0	0	0	47	341	22	6	14	0	0	21	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.3	5.3			5.3			5.3	5.3
Lane Util. Factor				1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00			1.00			1.00	0.97
Flpb, ped/bikes				0.95	1.00			0.99			1.00	1.00
Frt				1.00	0.99			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.98			1.00	1.00
Satd. Flow (prot)				1738	3600			1880			1921	1551
Flt Permitted				0.95	1.00			0.95			1.00	1.00
Satd. Flow (perm)				1738	3600			1807			1921	1551
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)	0	0	0	51	371	24	7	15	0	0	23	25
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	0	0	0	18
Lane Group Flow (vph)	0	0	0	51	389	0	0	22	0	0	23	7
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Actuated Green, G (s)				46.7	46.7			22.7			22.7	22.7
Effective Green, g (s)				46.7	46.7			22.7			22.7	22.7
Actuated g/C Ratio				0.58	0.58			0.28			0.28	0.28
Clearance Time (s)				5.3	5.3			5.3			5.3	5.3
Lane Grp Cap (vph)				1014	2101			512			545	440
v/s Ratio Prot					c0.11						0.01	
v/s Ratio Perm				0.03				c0.01				0.00
v/c Ratio				0.05	0.19			0.04			0.04	0.02
Uniform Delay, d1				7.1	7.8			20.8			20.8	20.6
Progression Factor				1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2				0.1	0.2			0.2			0.1	0.1
Delay (s)				7.2	8.0			20.9			20.9	20.7
Level of Service				A	A			C			C	C
Approach Delay (s)		0.0			7.9			20.9			20.8	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (vph)	0	0	0	7	321	42	11	51	0	0	29	32
Future Volume (vph)	0	0	0	7	321	42	11	51	0	0	29	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99			1.00			0.99	
Frt					0.983						0.929	
Flt Protected					0.999			0.991				
Satd. Flow (prot)	0	0	0	0	3535	0	0	1904	0	0	1624	0
Flt Permitted					0.999			0.958				
Satd. Flow (perm)	0	0	0	0	3534	0	0	1839	0	0	1624	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					29						35	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		172.6			119.6			114.7			99.2	
Travel Time (s)		12.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	0	0	0	8	349	46	12	55	0	0	32	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	403	0	0	67	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Minimum Split (s)				27.3	27.3		27.3	27.3			27.3	
Total Split (s)				51.0	51.0		29.0	29.0			29.0	
Total Split (%)				63.8%	63.8%		36.3%	36.3%			36.3%	
Maximum Green (s)				45.7	45.7		23.7	23.7			23.7	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				15.0	15.0		15.0	15.0			15.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					45.7			23.7			23.7	
Actuated g/C Ratio					0.57			0.30			0.30	
v/c Ratio					0.20			0.12			0.13	

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

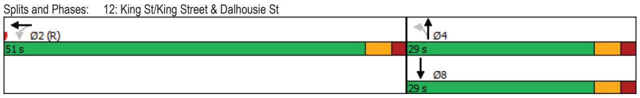
Base AM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					2.3			24.9			12.7	
Queue Delay					0.0			0.0			0.0	
Total Delay					2.3			24.9			12.7	
LOS					A			C			B	
Approach Delay					2.3			24.9			12.7	
Approach LOS					A			C			B	
Queue Length 50th (m)					2.3			7.2			3.5	
Queue Length 95th (m)					4.5			m15.0			12.1	
Internal Link Dist (m)		148.6			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)					2031			544			505	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.20			0.12			0.13	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 43 (54%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.20
Intersection Signal Delay: 6.4 Intersection LOS: A
Intersection Capacity Utilization 45.5% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: King St/King Street & Dalhousie St



12: King St/King Street & Dalhousie St

04-20-2021

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (vph)	0	0	0	7	321	42	11	51	0	0	29	32
Future Volume (vph)	0	0	0	7	321	42	11	51	0	0	29	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	
Lane Util. Factor					0.95			1.00			1.00	
Frpb, ped/bikes					0.99			1.00			0.99	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.98			1.00			0.93	
Flt Protected					1.00			0.99			1.00	
Satd. Flow (prot)					3534			1903			1625	
Flt Permitted					1.00			0.96			1.00	
Satd. Flow (perm)					3534			1839			1625	
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)	0	0	0	8	349	46	12	55	0	0	32	35
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	0	0	25	0
Lane Group Flow (vph)	0	0	0	0	391	0	0	67	0	0	42	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Actuated Green, G (s)					45.7			23.7			23.7	
Effective Green, g (s)					45.7			23.7			23.7	
Actuated g/C Ratio					0.57			0.30			0.30	
Clearance Time (s)					5.3			5.3			5.3	
Lane Grp Cap (vph)					2018			544			481	
v/s Ratio Prot											0.03	
v/s Ratio Perm					0.11			c0.04				
v/c Ratio					0.19			0.12			0.09	
Uniform Delay, d1					8.3			20.6			20.3	
Progression Factor					0.27			1.17			1.00	
Incremental Delay, d2					0.2			0.4			0.4	
Delay (s)					2.4			24.5			20.7	
Level of Service					A			C			C	
Approach Delay (s)		0.0			2.4			24.5			20.7	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

13: Brant Ave & Armoury/Dalhousie St

04-20-2021

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio		0.02		0.31	0.00	0.22		0.66			0.48	
Control Delay		19.0		14.4	11.5	6.7		6.9			11.6	
Queue Delay		0.0		0.0	0.0	0.0		0.2			0.0	
Total Delay		19.0		14.4	11.5	6.7		7.1			11.6	
LOS		B		B	B	A		A			B	
Approach Delay		19.0			12.1			7.1			11.6	
Approach LOS		B			B			A			B	
Queue Length 50th (m)		0.8		8.8	0.2	1.0		27.2			43.7	
Queue Length 95th (m)		1.1		25.3	0.7	2.4		32.2			57.8	
Internal Link Dist (m)		30.4			148.6			101.8			311.3	
Turn Bay Length (m)												
Base Capacity (vph)		455		934	650	558		1902			2028	
Starvation Cap Reductn		0		0	0	0		141			0	
Spillback Cap Reductn		0		0	0	0		0			0	
Storage Cap Reductn		0		0	0	0		0			0	
Reduced v/c Ratio		0.02		0.31	0.00	0.22		0.71			0.48	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 12 (15%), Referenced to phase 2:NBSB, Start of Green

Natural Cycle: 60

Control Type: Pretimed

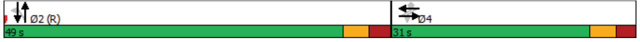
Maximum v/c Ratio: 0.66

Intersection Signal Delay: 9.6 Intersection LOS: A

Intersection Capacity Utilization 64.4% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 13: Brant Ave & Armoury/Dalhousie St



13: Brant Ave & Armoury/Dalhousie St

04-20-2021

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰↰	↑	↱		↰↑			↑↱	
Traffic Volume (vph)	2	0	0	272	2	115	3	1152	0	0	924	0
Future Volume (vph)	2	0	0	272	2	115	3	1152	0	0	924	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.99		0.96		1.00				
Frt						0.850						
Flt Protected		0.950		0.950								
Satd. Flow (prot)	0	1825	0	3506	1921	1617	0	3579	0	0	3614	0
Flt Permitted		0.756		0.752				0.947				
Satd. Flow (perm)	0	1452	0	2759	1921	1546	0	3389	0	0	3614	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						52						
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		54.4			172.6			125.8			335.3	
Travel Time (s)		4.1			12.9			9.1			24.1	
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Peak Hour Factor	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	8	0	0	289	3	122	9	1239	0	0	983	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	289	3	122	0	1248	0	0	983	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)		7.4			7.4			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2					
Minimum Split (s)	28.0	28.0		28.0	28.0	28.0	29.1	29.1			29.1	
Total Split (s)	31.0	31.0		31.0	31.0	31.0	49.0	49.0			49.0	
Total Split (%)	38.8%	38.8%		38.8%	38.8%	38.8%	61.3%	61.3%			61.3%	
Maximum Green (s)	25.1	25.1		25.1	25.1	25.1	42.9	42.9			42.9	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3			3.3	
All-Red Time (s)	2.6	2.6		2.6	2.6	2.6	2.8	2.8			2.8	
Lost Time Adjust (s)		0.0		-2.0	-2.0	-2.0		-2.0			-2.0	
Total Lost Time (s)		5.9		3.9	3.9	3.9		4.1			4.1	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0	14.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0			0	
Act Effct Green (s)		25.1		27.1	27.1	27.1		44.9			44.9	
Actuated g/C Ratio		0.31		0.34	0.34	0.34		0.56			0.56	

13: Brant Ave & Armoury/Dalhousie St

04-20-2021

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰↰	↑	↱		↰↑			↑↱	
Traffic Volume (vph)	2	0	0	272	2	115	3	1152	0	0	924	0
Future Volume (vph)	2	0	0	272	2	115	3	1152	0	0	924	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.9		3.9	3.9	3.9		4.1			4.1	
Lane Util. Factor		1.00		0.97	1.00	1.00		0.95			0.95	
Frpb, ped/bikes		1.00		1.00	1.00	0.96		1.00			1.00	
Flpb, ped/bikes		1.00		0.99	1.00	1.00		1.00			1.00	
Frt		1.00		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.95		0.95	1.00	1.00		1.00			1.00	
Satd. Flow (prot)		1825		3486	1921	1546		3578			3614	
Flt Permitted		0.76		0.75	1.00	1.00		0.95			1.00	
Satd. Flow (perm)		1452		2761	1921	1546		3389			3614	
Peak-hour factor, PHF	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Adj. Flow (vph)	8	0	0	289	3	122	9	1239	0	0	983	0
RTOR Reduction (vph)	0	0	0	0	0	34	0	0	0	0	0	0
Lane Group Flow (vph)	0	8	0	289	3	88	0	1248	0	0	983	0
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2					
Actuated Green, G (s)		25.1		25.1	25.1	25.1		42.9			42.9	
Effective Green, g (s)		25.1		27.1	27.1	27.1		44.9			44.9	
Actuated g/C Ratio		0.31		0.34	0.34	0.34		0.56			0.56	
Clearance Time (s)		5.9		5.9	5.9	5.9		6.1			6.1	
Lane Grp Cap (vph)		455		935	650	523		1902			2028	
v/s Ratio Prot					0.00						0.27	
v/s Ratio Perm		0.01		c0.10		0.06		c0.37				
v/c Ratio		0.02		0.31	0.00	0.17		0.66			0.48	
Uniform Delay, d1		18.9		19.5	17.5	18.5		12.2			10.6	
Progression Factor		1.00		0.68	0.66	0.50		0.43			1.00	
Incremental Delay, d2		0.1		0.9	0.0	0.7		1.5			0.8	
Delay (s)		19.0		14.2	11.6	9.9		6.8			11.4	
Level of Service		B		B	B	A		A			B	
Approach Delay (s)		19.0			12.9			6.8			11.4	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
1: Icomm Dr/Brant Ave & Colborne St

Base PM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱				↰	↑↑	↱		↰↑	↱
Traffic Volume (vph)	712	346	110	0	0	0	111	346	51	138	392	1211
Future Volume (vph)	712	346	110	0	0	0	111	346	51	138	392	1211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	110.0		210.0	40.0		0.0
Storage Lanes	1		1	0		0	1		2	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00
Ped Bike Factor	0.98	0.99	0.96				0.99		0.99		1.00	0.98
Frt			0.850						0.850			0.850
Flt Protected	0.950	0.976					0.950				0.986	
Satd. Flow (prot)	1597	3297	1484	0	0	0	1659	3579	1633	0	3424	1570
Flt Permitted	0.950	0.976					0.376				0.725	
Satd. Flow (perm)	1570	3270	1423	0	0	0	653	3579	1612	0	2517	1532
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			167						67			901
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		446.3			127.5			177.1			125.8	
Travel Time (s)		33.5			9.6			12.8			9.1	
Confl. Peds. (#/hr)	19		33				9		1	1		9
Peak Hour Factor	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Adj. Flow (vph)	818	422	167	0	0	0	144	393	67	173	417	1331
Shared Lane Traffic (%)	50%											
Lane Group Flow (vph)	409	831	167	0	0	0	144	393	67	0	590	1331
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)		3.7			3.7			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm				Perm	NA	Perm	Perm	NA	Free
Protected Phases		4						2			6	
Permitted Phases	4		4				2		2	6		Free
Minimum Split (s)	31.0	31.0	31.0				31.0	31.0	31.0	31.0	31.0	
Total Split (s)	40.0	40.0	40.0				35.0	35.0	35.0	35.0	35.0	
Total Split (%)	53.3%	53.3%	53.3%				46.7%	46.7%	46.7%	46.7%	46.7%	
Maximum Green (s)	34.0	34.0	34.0				29.0	29.0	29.0	29.0	29.0	
Yellow Time (s)	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0				2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.0	6.0	6.0				6.0	6.0	6.0		6.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	15.0	15.0	15.0				15.0	15.0	15.0	15.0	15.0	
Flash Dont Walk (s)	10.0	10.0	10.0				10.0	10.0	10.0	10.0	10.0	
Pedestrian Calls (#/hr)	0	0	0				0	0	0	0	0	

Lanes, Volumes, Timings
1: Icomm Dr/Brant Ave & Colborne St

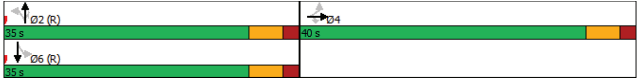
Base PM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	34.0	34.0	34.0				29.0	29.0	29.0		29.0	75.0
Actuated g/C Ratio	0.45	0.45	0.45				0.39	0.39	0.39		0.39	1.00
v/c Ratio	0.58	0.56	0.23				0.57	0.28	0.10		0.61	0.87
Control Delay	19.2	16.9	3.1				28.9	16.5	4.7		21.7	8.1
Queue Delay	0.0	0.0	0.0				0.0	0.0	0.0		0.0	0.0
Total Delay	19.2	16.9	3.1				28.9	16.5	4.7		21.7	8.1
LOS	B	B	A				C	B	A		C	A
Approach Delay		15.9						18.2			12.2	
Approach LOS		B						B			B	
Queue Length 50th (m)	44.9	45.2	0.0				15.6	19.6	0.0		34.2	0.0
Queue Length 95th (m)	70.0	54.5	3.1				27.3	28.5	4.8		50.2	#12.0
Internal Link Dist (m)		422.3			103.5			153.1			101.8	
Turn Bay Length (m)							110.0		210.0			
Base Capacity (vph)	711	1482	736				252	1383	664		973	1532
Starvation Cap Reductn	0	0	0				0	0	0		0	0
Spillback Cap Reductn	0	0	0				0	0	0		0	0
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.58	0.56	0.23				0.57	0.28	0.10		0.61	0.87

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 46 (61%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Pretimed
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 77.5% 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: Icomm Dr/Brant Ave & Colborne St



HCM Signalized Intersection Capacity Analysis
1: Icomm Dr/Brant Ave & Colborne St

Base PM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱				↰	↑↑	↱		↰↑	↱
Traffic Volume (vph)	712	346	110	0	0	0	111	346	51	138	392	1211
Future Volume (vph)	712	346	110	0	0	0	111	346	51	138	392	1211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				6.0	6.0	6.0		6.0	4.0
Lane Util. Factor	0.91	0.91	1.00				1.00	0.95	1.00		0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.96				1.00	1.00	0.99		1.00	0.98
Flpb, ped/bikes	0.98	0.99	1.00				0.99	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	0.98	1.00				0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)	1570	3270	1423				1650	3579	1612		3422	1532
Flt Permitted	0.95	0.98	1.00				0.38	1.00	1.00		0.73	1.00
Satd. Flow (perm)	1570	3270	1423				653	3579	1612		2518	1532
Peak-hour factor, PHF	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Adj. Flow (vph)	818	422	167	0	0	0	144	393	67	172	417	1331
RTOR Reduction (vph)	0	0	91	0	0	0	0	0	41	0	0	0
Lane Group Flow (vph)	409	831	76	0	0	0	144	393	26	0	590	1331
Confl. Peds. (#/hr)	19		33				9		1	1		9
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Turn Type	Perm	NA	Perm				Perm	NA	Perm	Perm	NA	Free
Protected Phases		4						2			6	
Permitted Phases	4		4				2		2	6		Free
Actuated Green, G (s)	34.0	34.0	34.0				29.0	29.0	29.0		29.0	75.0
Effective Green, g (s)	34.0	34.0	34.0				29.0	29.0	29.0		29.0	75.0
Actuated g/C Ratio	0.45	0.45	0.45				0.39	0.39	0.39		0.39	1.00
Clearance Time (s)	6.0	6.0	6.0				6.0	6.0	6.0		6.0	
Lane Grp Cap (vph)	711	1482	645				252	1383	623		973	1532
v/s Ratio Prot								0.11				
v/s Ratio Perm	0.26	0.25	0.05				0.22		0.02		0.23	c0.87
v/c Ratio	0.58	0.56	0.12				0.57	0.28	0.04		0.61	0.87
Uniform Delay, d1	15.2	15.0	11.8				18.1	15.8	14.3		18.4	0.0
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.4	1.5	0.4				9.1	0.5	0.1		2.8	7.0
Delay (s)	18.5	16.6	12.2				27.2	16.4	14.5		21.2	7.0
Level of Service	B	B	B				C	B	B		C	A
Approach Delay (s)		16.6			0.0			18.7			11.3	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Colborne St & King St

Base PM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	70	465	0	0	105	0
Future Volume (vph)	70	465	0	0	105	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.994			0.950	
Satd. Flow (prot)	0	3557	0	0	1789	0
Flt Permitted		0.994			0.950	
Satd. Flow (perm)	0	3557	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		127.5	121.5		114.7	
Travel Time (s)		9.6	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	505	0	0	114	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	581	0	0	114	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 27.4% ICU Level of Service A
Analysis Period (min) 15

2: Colborne St & King St

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	70	465	0	0	105	0
Future Volume (Veh/h)	70	465	0	0	105	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	505	0	0	114	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)		127				
pX, platoon unblocked						
vC, conflicting volume	0				404	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				404	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				79	100
cM capacity (veh/h)	1622				547	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	244	337	114
Volume Left	76	0	114
Volume Right	0	0	0
cSH	1622	1700	547
Volume to Capacity	0.05	0.20	0.21
Queue Length 95th (m)	1.1	0.0	5.9
Control Delay (s)	2.5	0.0	13.3
Lane LOS	A		B
Approach Delay (s)	1.1		13.3
Approach LOS			B

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

3: Colborne St & Queen St

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	34	536	0	0	82	0
Future Volume (vph)	34	536	0	0	82	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	583	0	0	89	0

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total (vph)	231	389	89
Volume Left (vph)	37	0	89
Volume Right (vph)	0	0	0
Hadj (s)	0.09	0.02	0.22
Departure Headway (s)	4.9	4.8	5.4
Degree Utilization, x	0.31	0.52	0.13
Capacity (veh/h)	733	744	630
Control Delay (s)	8.8	11.5	9.2
Approach Delay (s)	10.5		9.2
Approach LOS	B		A

Intersection Summary			
Delay	10.4		
Level of Service	B		
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		

3: Colborne St & Queen St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	34	536	0	0	82	0
Future Volume (vph)	34	536	0	0	82	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected		0.997			0.950	
Satd. Flow (prot)	0	3605	0	0	1807	0
Flt Permitted		0.997			0.950	
Satd. Flow (perm)	0	3605	0	0	1807	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	37	583	0	0	89	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	620	0	0	89	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 27.0%		ICU Level of Service A
Analysis Period (min) 15		

4: Market Street IPS/Market St IPS & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	618	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	618	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Flt Permitted												
Satd. Flow (perm)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		183.0			240.0			61.0			43.5	
Travel Time (s)		13.7			18.0			4.6			3.3	
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
Adj. Flow (vph)	0	672	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	672	0	0	0	0	0	0	0	0	0	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2						2			2	
Detector Template		Thru						Thru			Thru	
Leading Detector (m)		10.0						10.0			10.0	
Trailing Detector (m)		0.0						0.0			0.0	
Detector 1 Position(m)		0.0						0.0			0.0	
Detector 1 Size(m)		0.6						0.6			0.6	
Detector 1 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0						0.0			0.0	
Detector 1 Queue (s)		0.0						0.0			0.0	
Detector 1 Delay (s)		0.0						0.0			0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Detector Phase		2						4			4	
Switch Phase												
Minimum Initial (s)		4.0						4.0			4.0	

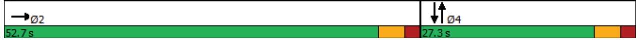
Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		27.3						27.3			27.3	
Total Split (s)		52.7						27.3			27.3	
Total Split (%)		65.9%						34.1%			34.1%	
Maximum Green (s)		47.4						22.0			22.0	
Yellow Time (s)		3.3						3.3			3.3	
All-Red Time (s)		2.0						2.0			2.0	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.3						5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0						3.0			3.0	
Recall Mode		Max						None			None	
Walk Time (s)		7.0						7.0			7.0	
Flash Dont Walk (s)		15.0						15.0			15.0	
Pedestrian Calls (#/hr)		0						120			120	
Act Effct Green (s)		64.9										
Actuated g/C Ratio		0.73										
v/c Ratio		0.26										
Control Delay		6.4										
Queue Delay		0.0										
Total Delay		6.4										
LOS		A										
Approach Delay		6.4										
Approach LOS		A										
Queue Length 50th (m)		24.4										
Queue Length 95th (m)		32.6										
Internal Link Dist (m)		159.0			216.0			37.0			19.5	
Turn Bay Length (m)												
Base Capacity (vph)		2596										
Starvation Cap Reductn		0										
Spillback Cap Reductn		0										
Storage Cap Reductn		0										
Reduced v/c Ratio		0.26										

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 89.5
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.26
Intersection Signal Delay: 6.4 Intersection LOS: A
Intersection Capacity Utilization 21.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Market Street IPS/Market St IPS & Colborne St



HCM Signalized Intersection Capacity Analysis
4: Market Street IPS/Market St IPS & Colborne St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	618	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	618	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3										
Lane Util. Factor		0.95										
Frt		1.00										
Flt Protected		1.00										
Satd. Flow (prot)		3579										
Flt Permitted		1.00										
Satd. Flow (perm)		3579										
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)	0	672	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	672	0	0	0	0	0	0	0	0	0	0
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Actuated Green, G (s)		63.6										
Effective Green, g (s)		63.6										
Actuated g/C Ratio		0.70										
Clearance Time (s)		5.3										
Vehicle Extension (s)		3.0										
Lane Grp Cap (vph)		2506										
v/s Ratio Prot		c0.19										
v/s Ratio Perm												
v/c Ratio		0.27										
Uniform Delay, d1		5.0										
Progression Factor		1.00										
Incremental Delay, d2		0.3										
Delay (s)		5.3										
Level of Service		A										
Approach Delay (s)		5.3			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	10.6
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Colborne St & Charlotte Street

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	76	542	0	0	125	0
Future Volume (vph)	76	542	0	0	125	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.994			0.950	
Satd. Flow (prot)	0	3557	0	0	1789	0
Flt Permitted		0.994			0.950	
Satd. Flow (perm)	0	3557	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		240.0	140.5		77.6	
Travel Time (s)		18.0	10.5		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	589	0	0	136	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	672	0	0	136	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 30.8% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
5: Colborne St & Charlotte Street

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	76	542	0	0	125	0
Future Volume (Veh/h)	76	542	0	0	125	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	83	589	0	0	136	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)		240	141			
pX, platoon unblocked					0.96	
vC, conflicting volume	0				460	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				350	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				76	100
cM capacity (veh/h)	1622				565	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	279	393	136
Volume Left	83	0	136
Volume Right	0	0	0
cSH	1622	1700	565
Volume to Capacity	0.05	0.23	0.24
Queue Length 95th (m)	1.2	0.0	7.1
Control Delay (s)	2.5	0.0	13.4
Lane LOS	A		B
Approach Delay (s)	1.0		13.4
Approach LOS			B

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	30.8%	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)	85	455	127	0	0	0	0	787	432	113	1485	0
Future Volume (vph)	85	455	127	0	0	0	0	787	432	113	1485	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		23.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00
Ped Bike Factor	0.99		0.97						0.98		1.00	
Frt			0.850						0.850			
Flt Protected	0.950										0.996	
Satd. Flow (prot)	1807	3579	1633	0	0	0	0	3614	1601	0	3602	0
Flt Permitted	0.950										0.726	
Satd. Flow (perm)	1785	3579	1580	0	0	0	0	3614	1567	0	2625	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82						273			
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		140.5			1204.0			126.9			109.9	
Travel Time (s)		10.5			90.3			9.5			8.2	
Confl. Peds. (#/hr)	12		21						8	8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Adj. Flow (vph)	92	495	138	0	0	0	0	855	470	123	1614	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	495	138	0	0	0	0	855	470	0	1737	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Minimum Split (s)	28.0	28.0	28.0					25.0	25.0	9.0	25.0	
Total Split (s)	29.0	29.0	29.0					38.0	38.0	13.0	51.0	
Total Split (%)	36.3%	36.3%	36.3%					47.5%	47.5%	16.3%	63.8%	
Maximum Green (s)	25.0	25.0	25.0					34.0	34.0	8.0	47.0	
Yellow Time (s)	3.5	3.5	3.5					3.5	3.5	3.0	3.5	
All-Red Time (s)	0.5	0.5	0.5					0.5	0.5	2.0	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	17.0	17.0	17.0					14.0	14.0		14.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	25.0	25.0	25.0					34.0	34.0		47.0	
Actuated g/C Ratio	0.31	0.31	0.31					0.42	0.42		0.59	
v/c Ratio	0.17	0.44	0.25					0.56	0.57		1.05	
Control Delay	21.0	23.5	10.7					19.1	10.0		56.8	
Queue Delay	0.0	0.0	0.0					0.0	0.0		20.4	
Total Delay	21.0	23.5	10.7					19.1	10.0		77.2	
LOS	C	C	B					B	B		E	
Approach Delay		20.7						15.8			77.2	
Approach LOS		C						B			E	
Queue Length 50th (m)	10.0	31.3	6.0					49.8	19.0		~112.6	
Queue Length 95th (m)	20.5	44.6	18.3					66.6	46.2		#194.5	
Internal Link Dist (m)		116.5			1180.0			102.9			85.9	
Turn Bay Length (m)	25.0		23.0									
Base Capacity (vph)	557	1118	550					1535	822		1652	
Starvation Cap Reductn	0	0	0					0	0		272	
Spillback Cap Reductn	0	0	0					0	0		0	
Storage Cap Reductn	0	0	0					0	0		0	
Reduced v/c Ratio	0.17	0.44	0.25					0.56	0.57		1.26	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 19 (24%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 44.9 Intersection LOS: D
Intersection Capacity Utilization 101.9% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Clarence Street & Colborne

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱					↑↑	↱		↰↑	
Traffic Volume (vph)	85	455	127	0	0	0	0	787	432	113	1485	0
Future Volume (vph)	85	455	127	0	0	0	0	787	432	113	1485	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00					0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.97					1.00	0.98		1.00	
Flpb, ped/bikes	0.99	1.00	1.00					1.00	1.00		1.00	
Frt	1.00	1.00	0.85					1.00	0.85		1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00		1.00	
Satd. Flow (prot)	1785	3579	1580					3614	1567		3603	
Flt Permitted	0.95	1.00	1.00					1.00	1.00		0.73	
Satd. Flow (perm)	1785	3579	1580					3614	1567		2627	
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)	92	495	138	0	0	0	0	855	470	123	1614	0
RTOR Reduction (vph)	0	0	56	0	0	0	0	0	157	0	0	0
Lane Group Flow (vph)	92	495	82	0	0	0	0	855	313	0	1737	0
Confl. Peds. (#/hr)	12		21						8	8		
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Actuated Green, G (s)	25.0	25.0	25.0					34.0	34.0		47.0	
Effective Green, g (s)	25.0	25.0	25.0					34.0	34.0		47.0	
Actuated g/C Ratio	0.31	0.31	0.31					0.42	0.42		0.59	
Clearance Time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lane Grp Cap (vph)	557	1118	493					1535	665		1640	
v/s Ratio Prot		c0.14						0.24			c0.11	
v/s Ratio Perm	0.05		0.05						0.20		c0.52	
v/c Ratio	0.17	0.44	0.17					0.56	0.47		1.06	
Uniform Delay, d1	19.9	21.9	19.9					17.3	16.5		16.5	
Progression Factor	1.00	1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2	0.6	1.3	0.7					1.5	2.4		39.8	
Delay (s)	20.6	23.2	20.7					18.8	18.9		56.3	
Level of Service	C	C	C					B	B		E	
Approach Delay (s)		22.4			0.0			18.8			56.3	
Approach LOS		C			A			B			E	

Intersection Summary

HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	101.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑↑	↱	↰		↱↱	↰↱			
Traffic Volume (vph)	24	859	0	0	0	1001	0	0	0	0
Future Volume (vph)	24	859	0	0	0	1001	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		22.0	48.0		0.0	0.0	0.0	0.0	0.0
Storage Lanes	1		1	1		2	1	0	0	0
Taper Length (m)	7.5			7.5			7.5		7.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00	1.00
Frt						0.850				
Flt Protected	0.950									
Satd. Flow (prot)	1789	3579	1883	1883	0	2818	1883	0	0	0
Flt Permitted	0.950									
Satd. Flow (perm)	1789	3579	1883	1883	0	2818	1883	0	0	0
Right Turn on Red	Yes		Yes			Yes		Yes		
Satd. Flow (RTOR)	31					1848				
Link Speed (k/h)		48			48		48		48	
Link Distance (m)		1204.0			112.9		111.0		175.7	
Travel Time (s)		90.3			8.5		8.3		13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	934	0	0	0	1088	0	0	0	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	26	934	0	0	0	1088	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Right	Left	Right
Median Width(m)		3.7			3.7		3.7		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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24	14	24	14
Number of Detectors	1	2	1	1		1	1			
Detector Template	Left	Thru	Right	Left		Right	Left			
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0	2.0			
Trailing Detector (m)	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			
Detector 1 Size(m)	2.0	0.6	2.0	2.0		2.0	2.0			
Detector 1 Type	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			
Detector 1 Queue (s)	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			
Detector 2 Position(m)		9.4								
Detector 2 Size(m)		0.6								
Detector 2 Type		Cl+Ex								
Detector 2 Channel										
Detector 2 Extend (s)		0.0								
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				

Lanes, Volumes, Timings

7: Canadian Tire Entrance & Colborne St & Dalhousie Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Detector Phase	2	2	2	2			8			
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0			3.0			
Minimum Split (s)	21.6	21.6	21.6	21.6			8.3			
Total Split (s)	64.0	64.0	64.0	64.0			16.0			
Total Split (%)	80.0%	80.0%	80.0%	80.0%			20.0%			
Maximum Green (s)	58.4	58.4	58.4	58.4			10.7			
Yellow Time (s)	3.3	3.3	3.3	3.3			3.3			
All-Red Time (s)	2.3	2.3	2.3	2.3			2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			0.0			
Total Lost Time (s)	5.6	5.6	5.6	5.6			5.3			
Lead/Lag										
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			
Recall Mode	C-Max	C-Max	C-Max	C-Max			None			
Walk Time (s)	5.0	5.0	5.0	5.0			5.0			
Flash Dont Walk (s)	11.0	11.0	11.0	11.0			11.0			
Pedestrian Calls (#/hr)	0	0	0	0			0			
Act Effct Green (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
v/c Ratio	0.01	0.26				0.39				
Control Delay	0.0	0.2				0.4				
Queue Delay	0.0	0.0				0.0				
Total Delay	0.0	0.2				0.4				
LOS	A	A				A				
Approach Delay		0.2			0.4					
Approach LOS		A			A					
Queue Length 50th (m)	0.0	0.0				0.0				
Queue Length 95th (m)	m0.0	m0.0				0.0				
Internal Link Dist (m)		1180.0			88.9		87.0		151.7	
Turn Bay Length (m)										
Base Capacity (vph)	1789	3579				2818				
Starvation Cap Reductn	0	0				0				
Spillback Cap Reductn	0	0				0				
Storage Cap Reductn	0	0				0				
Reduced v/c Ratio	0.01	0.26				0.39				

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.39
Intersection Signal Delay: 0.3 Intersection LOS: A
Intersection Capacity Utilization 28.4% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings

7: Canadian Tire Entrance & Colborne St & Dalhousie Street

Splits and Phases: 7: Canadian Tire Entrance & Colborne St & Dalhousie Street

HCM Signalized Intersection Capacity Analysis

7: Canadian Tire Entrance & Colborne St & Dalhousie Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑↑	↱	↰		↱↱	↰↱			
Traffic Volume (vph)	24	859	0	0	0	1001	0	0	0	0
Future Volume (vph)	24	859	0	0	0	1001	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6				4.0				
Lane Util. Factor	1.00	0.95				0.88				
Frt	1.00	1.00				0.85				
Flt Protected	0.95	1.00				1.00				
Satd. Flow (prot)	1789	3579				2818				
Flt Permitted	0.95	1.00				1.00				
Satd. Flow (perm)	1789	3579				2818				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	934	0	0	0	1088	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	26	934	0	0	0	1088	0	0	0	0
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				
Actuated Green, G (s)	80.0	80.0				80.0				
Effective Green, g (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
Clearance Time (s)	5.6	5.6								
Vehicle Extension (s)	3.0	3.0								
Lane Grp Cap (vph)	1789	3579				2818				
v/s Ratio Prot		0.26								
v/s Ratio Perm	0.01					c0.39				
v/c Ratio	0.01	0.26				0.39				
Uniform Delay, d1	0.0	0.0				0.0				
Progression Factor	1.00	1.00				1.00				
Incremental Delay, d2	0.0	0.1				0.4				
Delay (s)	0.0	0.1				0.4				
Level of Service	A	A				A				
Approach Delay (s)		0.1			0.4		0.0		0.0	
Approach LOS		A			A		A		A	

Intersection Summary			
HCM 2000 Control Delay	0.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings

8: Clarence Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	381	503	122	36	836	0	0	1217	36
Future Volume (vph)	0	0	0	381	503	122	36	836	0	0	1217	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		50.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.97		0.97					1.00	
Frt						0.850					0.996	
Flt Protected				0.950				0.998				
Satd. Flow (prot)	0	0	0	1825	3614	1585	0	3574	0	0	3598	0
Flt Permitted				0.950				0.701				
Satd. Flow (perm)	0	0	0	1774	3614	1534	0	2511	0	0	3598	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						119					4	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		139.0			1069.0			109.9			102.5	
Travel Time (s)		10.4			80.2			8.2			7.7	
Confl. Peds. (#/hr)				23		17	8					8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	414	547	133	39	909	0	0	1323	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	414	547	133	0	948	0	0	1362	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA	Perm	pm+pt	NA			NA	
Protected Phases					2		7	4			8	
Permitted Phases				2		2	4					
Minimum Split (s)				28.1	28.1	28.1	8.0	31.1			31.1	
Total Split (s)				35.0	35.0	35.0	11.0	55.0			44.0	
Total Split (%)				38.9%	38.9%	38.9%	12.2%	61.1%			48.9%	
Maximum Green (s)				29.0	29.0	29.0	7.0	49.0			38.0	
Yellow Time (s)				4.0	4.0	4.0	3.5	4.0			4.0	
All-Red Time (s)				2.0	2.0	2.0	0.5	2.0			2.0	
Lost Time Adjust (s)				0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)				6.0	6.0	6.0		6.0			6.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)				15.0	15.0	15.0		18.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	

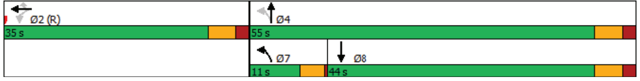
Lanes, Volumes, Timings — Base PM Peak Hour.syn
8: Clarence Street & Dalhousie St — 04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)				29.0	29.0	29.0		49.0			38.0	
Actuated g/C Ratio				0.32	0.32	0.32		0.54			0.42	
v/c Ratio				0.73	0.47	0.23		0.66			0.90	
Control Delay				35.6	26.0	6.7		16.6			33.4	
Queue Delay				0.0	0.0	0.0		8.2			0.0	
Total Delay				35.6	26.0	6.7		24.9			33.4	
LOS				D	C	A		C			C	
Approach Delay					27.3			24.9			33.4	
Approach LOS					C			C			C	
Queue Length 50th (m)				62.7	39.3	1.7		50.3			111.6	
Queue Length 95th (m)				95.7	54.1	13.6		65.2			#154.9	
Internal Link Dist (m)		115.0			1045.0			85.9			78.5	
Turn Bay Length (m)						50.0						
Base Capacity (vph)				571	1164	574		1426			1521	
Starvation Cap Reductn				0	0	0		440			0	
Spillback Cap Reductn				0	0	0		0			0	
Storage Cap Reductn				0	0	0		0			0	
Reduced v/c Ratio				0.73	0.47	0.23		0.96			0.90	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 10 (11%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 70
Control Type: Pretimed
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 29.1 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: 8: Clarence Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis — Base PM Peak Hour.syn
8: Clarence Street & Dalhousie St — 04-20-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	381	503	122	36	836	0	0	1217	36
Future Volume (vph)	0	0	0	381	503	122	36	836	0	0	1217	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0		6.0			6.0	
Lane Util. Factor				1.00	0.95	1.00		0.95			0.95	
Frpb, ped/bikes				1.00	1.00	0.97		1.00			1.00	
Flpb, ped/bikes				0.97	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	1.00	1.00		1.00			1.00	
Satd. Flow (prot)				1774	3614	1534		3574			3597	
Flt Permitted				0.95	1.00	1.00		0.70			1.00	
Satd. Flow (perm)				1774	3614	1534		2511			3597	
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)	0	0	0	414	547	133	39	909	0	0	1323	39
RTOR Reduction (vph)	0	0	0	0	0	81	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	414	547	52	0	948	0	0	1360	0
Confl. Peds. (#/hr)				23		17	8					8
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA			NA	
Protected Phases					2		7	4			8	
Permitted Phases				2		2	4					
Actuated Green, G (s)				29.0	29.0	29.0		49.0			38.0	
Effective Green, g (s)				29.0	29.0	29.0		49.0			38.0	
Actuated g/C Ratio				0.32	0.32	0.32		0.54			0.42	
Clearance Time (s)				6.0	6.0	6.0		6.0			6.0	
Lane Grp Cap (vph)				571	1164	494		1449			1518	
v/s Ratio Prot					0.15			c0.05			c0.38	
v/s Ratio Perm				c0.23		0.03		0.31				
v/c Ratio				0.73	0.47	0.11		0.65			0.90	
Uniform Delay, d1				27.0	24.4	21.4		14.5			24.2	
Progression Factor				1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2				7.8	1.4	0.4		2.3			8.6	
Delay (s)				34.8	25.7	21.8		16.8			32.8	
Level of Service				C	C	C		B			C	
Approach Delay (s)		0.0			28.7			16.8			32.8	
Approach LOS		A			C			B			C	

Intersection Summary

HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings — Base PM Peak Hour.syn
9: Charlotte Street & Dalhousie St — 04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↱	
Traffic Volume (vph)	0	0	0	54	505	16	72	76	0	0	59	23
Future Volume (vph)	0	0	0	54	505	16	72	76	0	0	59	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.996						0.962	
Flt Protected					0.995			0.976				
Satd. Flow (prot)	0	0	0	0	3546	0	0	1838	0	0	1812	0
Flt Permitted					0.995			0.976				
Satd. Flow (perm)	0	0	0	0	3546	0	0	1838	0	0	1812	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		241.1			139.0			32.3			102.3	
Travel Time (s)		18.1			10.4			2.4			7.7	
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
Adj. Flow (vph)	0	0	0	59	549	17	78	83	0	0	64	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	625	0	0	161	0	0	89	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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 37.4% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis — Base PM Peak Hour.syn
9: Charlotte Street & Dalhousie St — 04-20-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↱	
Traffic Volume (veh/h)	0	0	0	54	505	16	72	76	0	0	59	23
Future Volume (Veh/h)	0	0	0	54	505	16	72	76	0	0	59	23
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	0	0	59	549	17	78	83	0	0	64	25
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		241			139							
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	566			0			450	684	0	717	676	283
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	242			0			110	376	0	413	366	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			96			88	82	100	100	87	97
cM capacity (veh/h)	1166			1622			643	471	1084	389	477	957

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	334	292	161	89
Volume Left	59	0	78	0
Volume Right	0	17	0	25
cSH	1622	1700	541	555
Volume to Capacity	0.04	0.17	0.30	0.16
Queue Length 95th (m)	0.9	0.0	9.4	4.3
Control Delay (s)	1.6	0.0	14.4	12.7
Lane LOS	A		B	B
Approach Delay (s)	0.8		14.4	12.7
Approach LOS			B	B

Intersection Summary

Average Delay	4.5		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

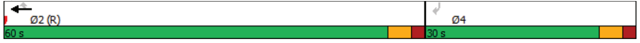
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↱		↱
Traffic Volume (vph)	0	0	516	84	0	130
Future Volume (vph)	0	0	516	84	0	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0			10.0	0.0	0.0
Storage Lanes	0			1	0	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00
Ped Bike Factor				0.81		0.74
Frt				0.850		0.865
Flt Protected						
Satd. Flow (prot)	0	0	3614	1617	0	1645
Flt Permitted						
Satd. Flow (perm)	0	0	3614	1305	0	1217
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				73		218
Link Speed (k/h)		48	48		48	
Link Distance (m)		182.0	241.1		101.1	
Travel Time (s)		13.7	18.1		7.6	
Confl. Peds. (#/hr)				94		216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Adj. Flow (vph)	0	0	561	91	0	141
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	561	91	0	141
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Turn Type			NA	Perm		Perm
Protected Phases			2			
Permitted Phases				2		4
Minimum Split (s)			29.3	29.3		28.3
Total Split (s)			60.0	60.0		30.0
Total Split (%)			66.7%	66.7%		33.3%
Maximum Green (s)			54.7	54.7		24.7
Yellow Time (s)			3.3	3.3		3.3
All-Red Time (s)			2.0	2.0		2.0
Lost Time Adjust (s)			0.0	0.0		0.0
Total Lost Time (s)			5.3	5.3		5.3
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)			7.0	7.0		7.0
Flash Dont Walk (s)			17.0	17.0		16.0
Pedestrian Calls (#/hr)			0	0		0

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)			54.7	54.7		24.7
Actuated g/C Ratio			0.61	0.61		0.27
v/c Ratio			0.26	0.11		0.29
Control Delay			2.9	0.2		2.1
Queue Delay			0.0	0.0		0.0
Total Delay			2.9	0.2		2.1
LOS			A	A		A
Approach Delay			2.5		2.1	
Approach LOS			A		A	
Queue Length 50th (m)			6.5	0.0		0.0
Queue Length 95th (m)			m9.0	m0.0		2.7
Internal Link Dist (m)		158.0	217.1		77.1	
Turn Bay Length (m)				10.0		
Base Capacity (vph)			2196	821		492
Starvation Cap Reductn			0	0		0
Spillback Cap Reductn			0	0		0
Storage Cap Reductn			0	0		0
Reduced v/c Ratio			0.26	0.11		0.29

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 37 (41%), Referenced to phase 2:WBT and 6:, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.29
Intersection Signal Delay: 2.5 Intersection LOS: A
Intersection Capacity Utilization 48.0% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Dalhousie St & Market St



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↱		↱
Traffic Volume (vph)	0	0	516	84	0	130
Future Volume (vph)	0	0	516	84	0	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			5.3	5.3		5.3
Lane Util. Factor			0.95	1.00		1.00
Frpb, ped/bikes			1.00	0.81		0.74
Flpb, ped/bikes			1.00	1.00		1.00
Frt			1.00	0.85		0.86
Flt Protected			1.00	1.00		1.00
Satd. Flow (prot)			3614	1305		1217
Flt Permitted			1.00	1.00		1.00
Satd. Flow (perm)			3614	1305		1217
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	561	91	0	141
RTOR Reduction (vph)	0	0	0	29	0	102
Lane Group Flow (vph)	0	0	561	62	0	39
Confl. Peds. (#/hr)				94		216
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Turn Type			NA	Perm		Perm
Protected Phases			2			
Permitted Phases				2		4
Actuated Green, G (s)			54.7	54.7		24.7
Effective Green, g (s)			54.7	54.7		24.7
Actuated g/C Ratio			0.61	0.61		0.27
Clearance Time (s)			5.3	5.3		5.3
Lane Grp Cap (vph)			2196	793		333
v/s Ratio Prot			c0.16			
v/s Ratio Perm				0.05		c0.03
v/c Ratio			0.26	0.08		0.12
Uniform Delay, d1			8.2	7.3		24.5
Progression Factor			0.32	0.00		1.00
Incremental Delay, d2			0.3	0.2		0.7
Delay (s)			2.9	0.2		25.2
Level of Service			A	A		C
Approach Delay (s)		0.0	2.5		25.2	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	6.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↱			↰↑			↑	↱
Traffic Volume (vph)	0	0	0	54	560	32	8	26	0	0	28	51
Future Volume (vph)	0	0	0	54	560	32	8	26	0	0	28	51
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	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.95	1.00			0.99				0.97
Frt					0.992							0.850
Flt Protected				0.950				0.988				
Satd. Flow (prot)	0	0	0	1825	3605	0	0	1898	0	0	1921	1601
Flt Permitted				0.950				0.953				
Satd. Flow (perm)	0	0	0	1727	3605	0	0	1821	0	0	1921	1547
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					12							55
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	0	0	0	59	609	35	9	28	0	0	30	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	59	644	0	0	37	0	0	30	55
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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Minimum Split (s)				26.3	26.3		26.3	26.3			26.3	26.3
Total Split (s)				61.0	61.0		29.0	29.0			29.0	29.0
Total Split (%)				67.8%	67.8%		32.2%	32.2%			32.2%	32.2%
Maximum Green (s)				55.7	55.7		23.7	23.7			23.7	23.7
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	3.3
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	2.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				5.3	5.3			5.3			5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)				14.0	14.0		14.0	14.0			14.0	14.0
Pedestrian Calls (#/hr)				0	0		0	0			0	0
Act Effct Green (s)				55.7	55.7			23.7			23.7	23.7
Actuated g/C Ratio				0.62	0.62			0.26			0.26	0.26
v/c Ratio				0.06	0.29			0.08			0.06	0.12

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

Base PM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay				2.1	4.2			25.6			25.3	8.2
Queue Delay				0.0	0.0			0.0			0.0	0.0
Total Delay				2.1	4.2			25.6			25.3	8.2
LOS				A	A			C			C	A
Approach Delay					4.0			25.6			14.3	
Approach LOS					A			C			B	
Queue Length 50th (m)				0.7	3.8			4.8			3.9	0.0
Queue Length 95th (m)				1.8	5.9			12.1			10.4	8.5
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)				1068	2235			479			505	447
Starvation Cap Reductn				0	0			0			0	0
Spillback Cap Reductn				0	0			0			0	0
Storage Cap Reductn				0	0			0			0	0
Reduced v/c Ratio				0.06	0.29			0.08			0.06	0.12

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 54 (60%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.29
Intersection Signal Delay: 6.0 Intersection LOS: A
Intersection Capacity Utilization 65.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

Base PM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↱	
Traffic Volume (vph)	0	0	0	22	560	37	48	48	0	0	18	80
Future Volume (vph)	0	0	0	22	560	37	48	48	0	0	18	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00			1.00			0.99	
Frt					0.991						0.890	
Flt Protected					0.998			0.976				
Satd. Flow (prot)	0	0	0	0	3567	0	0	1875	0	0	1556	0
Flt Permitted					0.998			0.815				
Satd. Flow (perm)	0	0	0	0	3565	0	0	1562	0	0	1556	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					14						87	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		172.6			119.6			114.7			99.2	
Travel Time (s)		12.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	0	0	0	24	609	40	52	52	0	0	20	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	673	0	0	104	0	0	107	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Minimum Split (s)				27.3	27.3		27.3	27.3			27.3	
Total Split (s)				62.0	62.0		28.0	28.0			28.0	
Total Split (%)				68.9%	68.9%		31.1%	31.1%			31.1%	
Maximum Green (s)				56.7	56.7		22.7	22.7			22.7	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				15.0	15.0		15.0	15.0			15.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					56.7			22.7			22.7	
Actuated g/C Ratio					0.63			0.25			0.25	
v/c Ratio					0.30			0.26			0.23	

HCM Signalized Intersection Capacity Analysis
11: Queen St/Queen Street & Dalhousie St

Base PM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↱			↰			↑	↱
Traffic Volume (vph)	0	0	0	54	560	32	8	26	0	0	28	51
Future Volume (vph)	0	0	0	54	560	32	8	26	0	0	28	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.3	5.3			5.3			5.3	5.3
Lane Util. Factor				1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00			1.00			1.00	0.97
Flpb, ped/bikes				0.95	1.00			0.99			1.00	1.00
Frt				1.00	0.99			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.99			1.00	1.00
Satd. Flow (prot)				1727	3604			1888			1921	1547
Flt Permitted				0.95	1.00			0.95			1.00	1.00
Satd. Flow (perm)				1727	3604			1821			1921	1547
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)	0	0	0	59	609	35	9	28	0	0	30	55
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	0	41
Lane Group Flow (vph)	0	0	0	59	639	0	0	37	0	0	30	14
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Actuated Green, G (s)				55.7	55.7			23.7			23.7	23.7
Effective Green, g (s)				55.7	55.7			23.7			23.7	23.7
Actuated g/C Ratio				0.62	0.62			0.26			0.26	0.26
Clearance Time (s)				5.3	5.3			5.3			5.3	5.3
Lane Grp Cap (vph)				1068	2230			479			505	407
v/s Ratio Prot					c0.18						0.02	
v/s Ratio Perm				0.03				c0.02				0.01
v/c Ratio				0.06	0.29			0.08			0.06	0.04
Uniform Delay, d1				6.8	7.9			24.9			24.8	24.7
Progression Factor				0.30	0.49			1.00			1.00	1.00
Incremental Delay, d2				0.1	0.3			0.3			0.2	0.2
Delay (s)				2.1	4.2			25.2			25.0	24.8
Level of Service				A	A			C			C	C
Approach Delay (s)		0.0			4.0			25.2			24.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

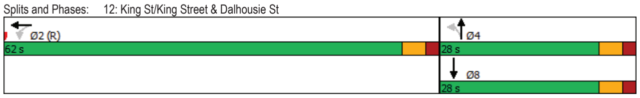
Base PM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					1.6			29.2			10.1	
Queue Delay					0.1			0.0			0.0	
Total Delay					1.7			29.2			10.1	
LOS					A			C			B	
Approach Delay					1.7			29.2			10.1	
Approach LOS					A			C			B	
Queue Length 50th (m)					2.5			14.4			2.6	
Queue Length 95th (m)					5.7			27.8			14.9	
Internal Link Dist (m)		148.6			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)					2251			393			457	
Starvation Cap Reductn					583			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.40			0.26			0.23	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 62 (69%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.30
Intersection Signal Delay: 6.0 Intersection LOS: A
Intersection Capacity Utilization 45.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 12: King St/King Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis
12: King St/King Street & Dalhousie St

Base PM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↑↱			↰↑			↱	
Traffic Volume (vph)	0	0	0	22	560	37	48	48	0	0	18	80
Future Volume (vph)	0	0	0	22	560	37	48	48	0	0	18	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	
Lane Util. Factor					0.95			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.99	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.99			1.00			0.89	
Flt Protected					1.00			0.98			1.00	
Satd. Flow (prot)					3567			1870			1557	
Flt Permitted					1.00			0.81			1.00	
Satd. Flow (perm)					3567			1562			1557	
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)	0	0	0	24	609	40	52	52	0	0	20	87
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	65	0
Lane Group Flow (vph)	0	0	0	0	668	0	0	104	0	0	42	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Actuated Green, G (s)					56.7			22.7			22.7	
Effective Green, g (s)					56.7			22.7			22.7	
Actuated g/C Ratio					0.63			0.25			0.25	
Clearance Time (s)					5.3			5.3			5.3	
Lane Grp Cap (vph)					2247			393			392	
v/s Ratio Prot											0.03	
v/s Ratio Perm					0.19			c0.07				
v/c Ratio					0.30			0.26			0.11	
Uniform Delay, d1					7.6			27.0			25.9	
Progression Factor					0.17			1.00			1.00	
Incremental Delay, d2					0.3			1.6			0.5	
Delay (s)					1.6			28.6			26.4	
Level of Service					A			C			C	
Approach Delay (s)		0.0			1.6			28.6			26.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

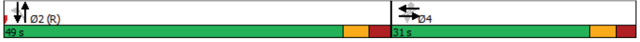
Lanes, Volumes, Timings
13: Brant Ave & Armoury/Dalhousie St

Base PM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio		0.12		0.66	0.01	0.34		0.60			0.62	
Control Delay		9.2		26.9	17.8	14.4		13.3			13.4	
Queue Delay		0.0		0.0	0.0	0.0		1.0			0.0	
Total Delay		9.2		26.9	17.8	14.4		14.4			13.4	
LOS		A		C	B	B		B			B	
Approach Delay		9.2			23.8			14.4			13.4	
Approach LOS		A			C			B			B	
Queue Length 50th (m)		1.7		38.7	0.9	13.3		55.9			61.9	
Queue Length 95th (m)		0.0		55.6	2.4	28.9		74.2			80.8	
Internal Link Dist (m)		30.4			148.6			101.8			311.3	
Turn Bay Length (m)												
Base Capacity (vph)		546		889	650	568		1894			2028	
Starvation Cap Reductn		0		0	0	0		459			0	
Spillback Cap Reductn		0		0	0	0		0			0	
Storage Cap Reductn		0		0	0	0		0			0	
Reduced v/c Ratio		0.12		0.66	0.01	0.34		0.80			0.62	

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 12 (15%), Referenced to phase 2:NBSB, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 61.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 13: Brant Ave & Armoury/Dalhousie St



Lanes, Volumes, Timings
13: Brant Ave & Armoury/Dalhousie St

Base PM Peak Hour.syn
04-20-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱		↰↰	↑	↱		↰↑↑			↑↑↱	
Traffic Volume (vph)	4	0	12	553	5	180	3	1055	0	0	1176	0
Future Volume (vph)	4	0	12	553	5	180	3	1055	0	0	1176	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.99		0.96		1.00				
Frt		0.899				0.850						
Flt Protected		0.988		0.950								
Satd. Flow (prot)	0	1706	0	3506	1921	1617	0	3579	0	0	3614	0
Flt Permitted		0.947		0.715				0.943				
Satd. Flow (perm)	0	1636	0	2625	1921	1546	0	3375	0	0	3614	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48				68						
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		54.4			172.6			125.8			335.3	
Travel Time (s)		4.1			12.9			9.1			24.1	
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Peak Hour Factor	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	16	0	48	588	9	191	9	1134	0	0	1251	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	64	0	588	9	191	0	1143	0	0	1251	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)		7.4			7.4			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2					
Minimum Split (s)	28.0	28.0		28.0	28.0	28.0	29.1	29.1			29.1	
Total Split (s)	31.0	31.0		31.0	31.0	31.0	49.0	49.0			49.0	
Total Split (%)	38.8%	38.8%		38.8%	38.8%	38.8%	61.3%	61.3%			61.3%	
Maximum Green (s)	25.1	25.1		25.1	25.1	25.1	42.9	42.9			42.9	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3			3.3	
All-Red Time (s)	2.6	2.6		2.6	2.6	2.6	2.8	2.8			2.8	
Lost Time Adjust (s)		0.0		-2.0	-2.0	-2.0		-2.0			-2.0	
Total Lost Time (s)		5.9		3.9	3.9	3.9		4.1			4.1	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0	14.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0			0	
Act Effct Green (s)		25.1		27.1	27.1	27.1		44.9			44.9	
Actuated g/C Ratio		0.31		0.34	0.34	0.34		0.56			0.56	

HCM Signalized Intersection Capacity Analysis
13: Brant Ave & Armoury/Dalhousie St

Base PM Peak Hour.syn
04-20-2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱		↰↰	↑	↱		↰↑↑			↑↑↱	
Traffic Volume (vph)	4	0	12	553	5	180	3	1055	0	0	1176	0
Future Volume (vph)	4	0	12	553	5	180	3	1055	0	0	1176	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.9		3.9	3.9	3.9		4.1			4.1	
Lane Util. Factor		1.00		0.97	1.00	1.00		0.95			0.95	
Frpb, ped/bikes		1.00		1.00	1.00	0.96		1.00			1.00	
Flpb, ped/bikes		1.00		0.99	1.00	1.00		1.00			1.00	
Frt		0.90		1.00	1.00	0.85		1.00			1.00	
Flt Protected		0.99		0.95	1.00	1.00		1.00			1.00	
Satd. Flow (prot)		1705		3487	1921	1546		3578			3614	
Flt Permitted		0.95		0.72	1.00	1.00		0.94			1.00	
Satd. Flow (perm)		1635		2626	1921	1546		3374			3614	
Peak-hour factor, PHF	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Adj. Flow (vph)	16	0	48	588	9	191	9	1134	0	0	1251	0
RTOR Reduction (vph)	0	33	0	0	0	45	0	0	0	0	0	0
Lane Group Flow (vph)	0	31	0	588	9	146	0	1143	0	0	1251	0
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2					
Actuated Green, G (s)		25.1		25.1	25.1	25.1		42.9			42.9	
Effective Green, g (s)		25.1		27.1	27.1	27.1		44.9			44.9	
Actuated g/C Ratio		0.31		0.34	0.34	0.34		0.56			0.56	
Clearance Time (s)		5.9		5.9	5.9	5.9		6.1			6.1	
Lane Grp Cap (vph)		512		889	650	523		1893			2028	
v/s Ratio Prot					0.00						c0.35	
v/s Ratio Perm		0.02		c0.22		0.09		0.34				
v/c Ratio		0.06		0.66	0.01	0.28		0.60			0.62	
Uniform Delay, d1		19.2		22.5	17.6	19.3		11.6			11.8	
Progression Factor		1.00		1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.2		3.9	0.0	1.3		1.4			1.4	
Delay (s)		19.4		26.4	17.6	20.6		13.1			13.2	
Level of Service		B		C	B	C		B			B	
Approach Delay (s)		19.4			24.9			13.1			13.2	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Appendix C

Collision Information

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... COLBORNE ST W @ ICOMM DR **Municipality........** BRANTFORD

Traffic Control.... Traffic signal **Total Collisions....** 48

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
008454	2017-Mar-09, Thu,18:43	Clear	Sideswipe	P.D. only	South	Dry	Changing lanes	Delivery van	Other motor vehicle	Failed to yield right-of-way	
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
010738	2017-Mar-27, Mon,20:55	Fog, mist, smoke, dust	Rear end		East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Speed too fast for condition	
Comments:					East	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
015538	2017-May-01, Mon,20:00	Rain	Rear end		South	Wet	Slowing or stopping	Truck - tractor	Other motor vehicle	Following too close	
Comments:					South	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
024309	2017-Jun-30, Fri,15:15	Clear	Sideswipe		South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
17-003680	2017-Jan-31, Tue,08:45	Snow	Rear end		South	Slush	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Speed too fast for condition	
Comments:					South	Slush	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-008270	2017-Mar-07, Tue,14:30	Clear	Other		East	Wet	Changing lanes	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					West	Wet	Reversing	Tow truck	Other motor vehicle	Driving properly	
17-008290	2017-Mar-07, Tue,14:20	Clear	Sideswipe		East	Wet	Stopped	Pick-up truck	Other motor vehicle	Failed to yield right-of-way	
Comments:					East	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
17-008454	2017-Mar-09, Thu,06:43	Clear	Sideswipe	P.D. only	South	Dry	Changing lanes	Delivery van	Other motor vehicle	Failed to yield right-of-way	
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
17-014720	2017-Apr-25, Tue,08:10	Rain	Turning movement		North	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn	
Comments:					South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	

17-020139	2017-May-31, Wed,21:51	Clear	Sideswipe		South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
17-024229	2017-Jun-30, Fri,04:02	Rain	Angle	Non-fatal injury	South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Speed too fast for condition
Comments:					East	Wet	Going ahead	Pick-up truck	Other motor vehicle	Speed too fast for condition
17-028382	2017-Jul-27, Thu,00:00	Clear	SMV other	Non-reportable	East	Dry	Going ahead	Passenger van	Pedestrian	Driving properly
Comments:						Dry				
17-032515	2017-Aug-24, Thu,12:15	Clear	Sideswipe		West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
17-033123	2017-Aug-28, Mon,14:10	Clear	Rear end		South	Dry	Going ahead	Passenger van	Other motor vehicle	Following too close
Comments:					South					
17-035371	2017-Sep-14, Thu,15:20	Clear	SMV other	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other	Other
Comments:					West	Dry	Turning left	Automobile, station wagon	Curb	Other
17-036978	2017-Sep-25, Mon,16:16	Clear	Rear end	P.D. only	East	Dry	Going ahead	Passenger van	Other motor vehicle	Driving properly
Comments:					East	Dry	Stopped	Passenger van	Other motor vehicle	Driving properly
17-038219	2017-Oct-03, Tue,20:00	Clear	Sideswipe		South	Dry	Going ahead	Motorcycle	Other motor vehicle	Improper lane change
Comments:					South	Dry	Stopped	Automobile, station wagon		Driving properly
17-038274	2017-Oct-03, Tue,15:30	Clear	Rear end		South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South					
17-039940	2017-Oct-14, Sat,15:55	Clear	Rear end		South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South					
17-040562	2017-Oct-20, Fri,16:00	Clear	Rear end		South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
17-45990	2017-Nov-30, Thu,16:13	Clear	Sideswipe	P.D. only	East	Wet	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

17-47898	2017-Dec-15, Fri,14:30	Snow	Rear end		South	Slush	Going ahead	Automobile, station wagon	Skidding/sliding	Speed too fast for condition
Comments:					South	Loose snow	Stopped	Truck-other	Other motor vehicle	Driving properly
17-49568	2017-Dec-29, Fri,14:45	Clear	Sideswipe	P.D. only	South	Wet	Changing lanes	Truck - closed	Other motor vehicle	Improper lane change
Comments:					South	Wet	Going ahead	Truck - closed	Other motor vehicle	Driving properly
18-019273	2018-May-22, Tue,15:35	Clear	SMV other	Non-fatal injury	South	Dry	Turning right	Truck - closed		Driving properly
Comments:						Dry	Overtaking			
18-033785	2018-Aug-29, Wed,12:05	Clear	Turning movement	P.D. only	North	Dry	Turning left	Pick-up truck	Other motor vehicle	Improper turn
Comments:					South	Dry	Going ahead	Truck - dump	Other motor vehicle	Driving properly
18-03880	2018-Jan-29, Mon,15:36	Snow	Rear end		South	Ice	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Following too close
Comments:					South	Ice	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
18-040099	2018-Oct-10, Wed,18:30	Clear	Turning movement	Non-fatal injury	West	Dry	Turning right	Automobile, station wagon	Cyclist	Failed to yield right-of-way
Comments:					East	Dry	Going ahead	Bicycle	Other motor vehicle	Other
18-044078	2018-Nov-06, Tue,11:42	Clear			South	Dry	Stopped	Pick-up truck	Other motor vehicle	Driving properly
Comments:										
18-04774	2018-Feb-05, Mon,06:20	Clear	Rear end	Non-fatal injury	East	Ice	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Other
Comments:					East	Ice	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
18-04794	2018-Feb-05, Mon,08:40	Clear	Rear end		South	Ice	Slowing or stopping	Pick-up truck	Skidding/sliding	Speed too fast for condition
Comments:					South	Ice	Stopped	Passenger van	Other motor vehicle	Driving properly
18-049236	2018-Dec-13, Thu,23:30	Clear	Rear end		South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South					
18-10196	2018-Mar-18, Sun,16:30	Clear	Sideswipe		South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-001563	2019-Jan-11, Fri,19:00	Clear	Rear end		South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly

19-002482	2019-Jan-19, Sat,19:24	Snow	Rear end	P.D. only	South	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Lost control
Comments:					South	Loose snow	Stopped	Pick-up truck	Other motor vehicle	Driving properly
19-003490	2019-Jan-19, Sat,16:45	Snow	Rear end		South	Loose snow	Slowing or stopping	Pick-up truck	Skidding/sliding	Speed too fast for condition
Comments:					South	Loose snow	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
19-003515	2019-Jan-26, Sat,19:30	Clear	Sideswipe		South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-004059	2019-Feb-01, Fri,06:30	Clear	SMV other		East	Ice	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Driving properly
Comments:										
19-11230	2019-Mar-29, Fri,08:45	Clear	Rear end	P.D. only	South	Dry	Going ahead	Passenger van	Other motor vehicle	Following too close
Comments:					South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
19-15369	2019-Apr-29, Mon,15:00	Rain	Rear end	P.D. only	North	Wet	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Following too close
Comments:					North	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
19-19902	2019-May-25, Sat,14:00	Clear	Turning movement	P.D. only	East	Dry	Turning left	Delivery van	Other motor vehicle	Driving properly
Comments:					East	Dry	Turning left	Passenger van	Other motor vehicle	Driving properly
19-22151	2019-Jun-14, Fri,09:40	Clear	Sideswipe	P.D. only	West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					North	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
19-22812	2019-Jun-18, Tue,19:40	Clear	Sideswipe	P.D. only	South	Dry	Changing lanes	Passenger van	Other motor vehicle	Improper lane change
Comments:					South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
19-34993	2019-Sep-10, Tue,16:10	Clear	Sideswipe	P.D. only	East	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-40450	2019-Oct-17, Thu,19:18	Clear	Rear end	P.D. only	East	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					East	Dry				

19-44755	2019-Nov-20, Wed,13:45	Clear	Rear end	P.D. only	South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					South	Dry	Stopped		Other motor vehicle	
19-44994	2019-Nov-21, Thu,08:30	Clear	Rear end	P.D. only	East	Wet	Slowing or stopping	Pick-up truck	Other motor vehicle	Following too close
Comments:					East	Wet	Stopped		Other motor vehicle	
19-47373	2019-Dec-10, Tue,14:40	Clear	Sideswipe	P.D. only	South	Dry	Changing lanes	Pick-up truck	Other motor vehicle	Improper lane change
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-49785	2019-Dec-30, Mon,00:17	Rain	Angle	P.D. only	South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments: D1 HTA 200(1)(A) PART3, D1 HTA 144(18) PART 3					East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... COLBORNE ST btwn BRANT AVE & KING ST

Municipality........ BRANTFORD

Traffic Control....

Total Collisions.... 7

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
019741	2017-May-30, Tue,20:48	Clear	Rear end	Non-fatal injury	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					East		Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-003355	2017-Jan-28, Sat,16:30	Clear	Turning movement		East	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn	
Comments:					East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly	
17-006737	2017-May-02, Tue,13:47	Clear	SMV unattended vehicle		West	Dry	Reversing	Automobile, station wagon		Other	
Comments:					East	Dry	Parked	Automobile, station wagon	Other motor vehicle		
18-034098	2018-Aug-30, Thu,11:15	Clear	Turning movement		South	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
19-07137	2019-Feb-23, Sat,20:20	Clear	Sideswipe	P.D. only	East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly	
Comments:	Vehicle 2 info missing										
19-15349	2019-Apr-28, Sun,11:30	Clear	Sideswipe	P.D. only	East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Improper lane change	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
19-20492	2019-Jun-01, Sat,10:40	Clear	Sideswipe	P.D. only	East	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Other	
Comments:					East		Going ahead	Pick-up truck		Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... KING ST @ COLBORNE ST

Municipality........ BRANTFORD

Traffic Control....

Total Collisions.... 10

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
017034	2017-May-12, Fri,08:00	Clear	SMV unattended vehicle	P.D. only	East	Dry		Automobile, station wagon	Unattended vehicle		
Comments:						Dry	Parked	Automobile, station wagon	Other motor vehicle		
019260	2017-May-26, Fri,21:00	Clear	Sideswipe	Non-reportable	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
023191	2017-Jun-22, Thu,21:30	Clear	Turning movement		East	Dry	Turning left	Pick-up truck	Other motor vehicle	Failed to yield right-of-way	
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
17-014740	2017-Apr-25, Tue,12:10	Clear	Turning movement		East	Dry	Turning left	Passenger van	Other motor vehicle	Improper lane change	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-020978	2018-Jun-02, Sat,17:37	Clear	Turning movement	P.D. only	South	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-025635	2018-Jul-03, Tue,08:05	Clear	Sideswipe		East	Dry	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-026049	2018-Jul-06, Fri,13:30	Clear	Sideswipe		East	Dry	Changing lanes	Truck - closed	Other motor vehicle	Driving properly	
Comments:					East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly	
18-034021	2018-Aug-31, Fri,02:29	Clear	Turning movement	P.D. only	West	Dry	Going ahead	Pick-up truck	Other motor vehicle	Wrong way on one-way road	
Comments:					East	Dry	Turning left	Pick-up truck		Driving properly	
19-06355	2019-Feb-19, Tue,13:50	Clear	Turning movement	P.D. only	East	Dry	Turning left	Passenger van		Improper turn	
Comments:					East	Dry	Going ahead	Automobile, station wagon		Driving properly	

19-16123	2019-May-04, Sat,15:00	Clear	Sideswipe	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					East	Dry	Going ahead	Automobile, station wagon		Driving properly

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... QUEEN ST @ COLBORNE ST **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 8

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-45983	2017-Nov-30, Thu,15:19	Rain	Angle	P.D. only	South	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					East	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly	
17-48925	2017-Dec-23, Sat,14:35	Clear	Sideswipe	P.D. only	East	Wet	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-024582	2018-Jun-26, Tue,16:52	Clear	SMV other	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Pole (utility, power)	Lost control	
Comments:						Dry					
18-03966	2018-Jan-30, Tue,08:00	Clear	SMV other	P.D. only	East	Ice	Going ahead	Truck - tractor	Pole (sign, parking meter)	Driving properly	
Comments:						Packed snow					
18-10960	2018-Mar-03, Sat,16:15		Rear end	P.D. only	East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Lost control	
Comments:					East	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
19-12329	2019-Apr-06, Sat,14:34	Clear	SMV other	Non-fatal injury	South	Dry	Turning left	Automobile, station wagon	Pedestrian	Improper turn	
Comments: HTA 142(1) 9106017Z											
19-32787	2019-Aug-26, Mon,09:09	Clear	SMV other	Non-fatal injury	East	Dry	Turning left	Automobile, station wagon	Pedestrian	Failed to yield right-of-way	
Comments:											
19-33701	2019-Sep-01, Sun,16:18	Rain	Rear end	P.D. only	East	Wet	Slowing or stopping	Police vehicle	Other motor vehicle	Following too close	
Comments:					East	Wet	Stopped	Police vehicle	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... COLBORNE ST btwn MARKET ST WALKWAY & QUEEN ST **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 5

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
18-015644	2018-Apr-10, Tue,12:30	Clear	SMV unattended vehicle	P.D. only	West	Dry	Reversing	Automobile, station wagon	Unattended vehicle	Other	
Comments:					East		Parked	Pick-up truck	Other motor vehicle		
18-042026	2018-Oct-23, Tue,13:30	Clear	SMV unattended vehicle	P.D. only	East	Dry	Reversing	Pick-up truck	Unattended vehicle	Other	
Comments:							Parked	Automobile, station wagon	Other motor vehicle		
19-07558	2019-Feb-28, Thu,17:25	Clear	Rear end	P.D. only	East	Ice	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					East		Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
19-10232	2019-Mar-21, Thu,22:55	Clear	Sideswipe	P.D. only	East	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
19-11614	2019-Apr-01, Mon,10:20	Clear	Sideswipe	P.D. only	East	Dry	Changing lanes	Pick-up truck	Other motor vehicle	Improper lane change	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... COLBORNE ST btwn BECKETT BLDG & MARKET ST WALKWAY

Municipality........ BRANTFORD

Traffic Control....

Total Collisions.... 4

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-47897	2017-Dec-15, Fri,14:30	Snow	Rear end		East	Loose snow	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Following too close	
Comments:					East	Slush	Stopped	Pick-up truck	Other motor vehicle	Driving properly	
18-00580	2018-Jan-05, Fri,12:15	Clear	Sideswipe		East	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-04127	2018-Jan-31, Wed,09:15	Clear	Sideswipe		East	Dry	Stopped	Delivery van	Other motor vehicle	Driving properly	
Comments:					East						
19-33558	2019-Aug-31, Sat,12:45	Clear	Sideswipe	P.D. only	East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly	
Comments:					East						

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... COLBORNE ST btwn BAIN ST & BECKETT BLDG **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 3

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
013798	2017-Apr-18, Tue,12:00	Clear	SMV unattended vehicle		West	Dry	Reversing	Automobile, station wagon	Unattended vehicle	Other	
Comments:					East	Dry	Parked	Pick-up truck	Other motor vehicle		
19-21727	2019-Jun-11, Tue,15:28	Clear	SMV other	Non-fatal injury	East	Dry	Going ahead	Pick-up truck	Pedestrian	Driving properly	
Comments:											
19-23633	2019-Jun-23, Sun,13:00	Clear	Sideswipe	P.D. only	East	Dry	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... COLBORNE ST btwn BAIN ST & CHARLOTTE ST **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 2

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
19-36462	2019-Sep-20, Fri,10:02	Clear	Sideswipe	Fatal injury	East	Dry	Going ahead	Bicycle	Other motor vehicle	Failed to yield right-of-way	
Comments:					East	Dry	Changing lanes	Truck - closed	Cyclist	Driving properly	
19-45802	2019-Nov-27, Wed,09:00	Clear	SMV unattended vehicle	P.D. only	East	Dry	Parked	Automobile, station wagon	Other motor vehicle		
Comments:									Unattended vehicle		

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... CHARLOTTE ST @ COLBORNE ST

Municipality........ BRANTFORD

Traffic Control....

Total Collisions.... 5

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
18-016954	2018-May-07, Mon,13:34	Clear	SMV unattended vehicle	Non-fatal injury	South	Dry	Going ahead	Automobile, station wagon	Unattended vehicle	Lost control	
Comments:					South	Dry	Parked	Automobile, station wagon	Other motor vehicle		
18-044633	2018-Nov-09, Fri,21:00	Rain	Turning movement		East	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-07670	2018-Feb-26, Mon,18:50	Clear	Other		South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:											
19-003516	2019-Jan-28, Mon,12:20	Snow	Turning movement		East	Loose snow	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn	
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
19-48521	2019-Dec-19, Thu,15:40	Clear	Turning movement	P.D. only	East	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn	
Comments:	D1 HTA 142(1) 9108930Z				East	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... COLBORNE ST btwn CHARLOTTE ST & ECHO ST **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 4

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
18-014525	2018-Apr-16, Mon,17:30	Clear	SMV unattended vehicle		South	Dry	Parked	Automobile, station wagon	Other motor vehicle		
Comments:											
19-03329	2019-Jan-27, Sun,00:17	Snow	SMV unattended vehicle	P.D. only	West	Loose snow	Reversing	Automobile, station wagon	Unattended vehicle	Improper lane change	
Comments:					East		Parked		Other motor vehicle		
19-36517	2019-Sep-19, Thu,17:45	Clear	Sideswipe	P.D. only	East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					East		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
19-38185	2019-Oct-01, Tue,16:20	Rain	Sideswipe	P.D. only	East	Wet	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					East		Going ahead	Passenger van	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... COLBORNE ST btwn CLARENCE ST & ECHO ST **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 1

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
BR-18047514	2018-Dec-01, Sat,00:37	Clear	SMV unattended vehicle	P.D. only	East	Dry	Going ahead	Pick-up truck	Unattended vehicle		
Comments:					East	Dry	Parked	Automobile, station wagon	Other motor vehicle		

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... CLARENCE ST @ COLBORNE ST **Municipality........** BRANTFORD

Traffic Control.... Traffic signal **Total Collisions....** 47

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
009613	2017-Mar-18, Sat,13:00	Clear	Sideswipe		South	Wet	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
017748	2017-May-16, Tue,17:15	Clear	Angle		East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control	
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
019109	2017-May-26, Fri,00:13	Clear	SMV other	Non-fatal injury	North	Wet	Going ahead	Motorcycle	Curb	Driving properly	
Comments:						Wet					
020435	2017-Jun-03, Sat,18:19	Clear	Turning movement	P.D. only	North	Dry	Turning right	Truck - open	Other motor vehicle	Failed to yield right-of-way	
Comments:					North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
022761	2017-Jun-19, Mon,08:30	Clear	Rear end		East	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					East	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-001655	2017-Jan-14, Sat,23:45	Clear	Sideswipe		South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
17-007603	2017-Mar-02, Thu,10:53	Clear	Sideswipe	P.D. only	North	Dry	Turning left	Delivery van	Other motor vehicle	Improper turn	
Comments:					North	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly	
17-022761	2017-Jun-19, Mon,08:30	Clear	Rear end		South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					South						
17-031018	2017-Aug-14, Mon,12:40	Clear	SMV other	Non-fatal injury	North	Dry	Turning right	Motorcycle	Other	Driving properly	
Comments:						Dry					

17-032739	2017-Aug-25, Fri,20:52	Clear	SMV other	Non-fatal injury	South	Dry	Going ahead	Automobile, station wagon	Pedestrian	Driving properly
Comments:						Dry				
17-035615	2017-Sep-16, Sat,02:00	Clear	Angle		East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South					
17-038390	2017-Oct-05, Thu,07:50	Clear	SMV other	P.D. only	East	Dry	Turning right	Truck - open	Pole (utility, power)	Improper turn
Comments:						Dry				
17-040228	2017-Oct-17, Tue,16:25	Clear	Sideswipe		South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
17-040239	2017-Oct-18, Wed,23:20	Clear	Sideswipe		South	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South					
17-041274	2017-Oct-23, Mon,18:30	Rain	Rear end		South	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South					
17-43895	2017-Nov-14, Tue,20:10	Clear	Rear end		South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
17-47145	2017-Dec-09, Sat,10:00	Clear	Sideswipe		South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
17-47529	2017-Dec-12, Tue,15:30	Snow	Sideswipe	Non-reportable	North	Loose snow	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Speed too fast for condition
Comments:					North	Loose snow	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
18-017342	2018-May-09, Wed,17:16	Clear	Rear end	Non-fatal injury	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					North	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
18-019727	2018-May-25, Fri,15:25	Clear	Turning movement		East	Dry	Turning left	Pick-up truck	Other motor vehicle	Improper turn
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-024996	2018-Jun-29, Fri,11:20	Clear	Sideswipe		North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Other
Comments:					North	Dry	Going ahead	Pick-up truck	Other motor vehicle	Other

18-025715	2018-Jul-04, Wed,10:37	Clear	SMV other	Non-fatal injury	North	Dry	Going ahead	Motorcycle	Other	Lost control
Comments:						Dry				
18-028234	2018-Jul-21, Sat,10:00	Clear	Angle	P.D. only	South	Dry	Going ahead	Pick-up truck	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Going ahead	Automobile, station wagon		Driving properly
18-028814	2018-Jul-25, Wed,16:45	Clear	Rear end	P.D. only	South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					South	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
18-038957	2018-Oct-03, Wed,09:00	Clear	Sideswipe	P.D. only	North	Dry	Going ahead	Pick-up truck	Other motor vehicle	Improper lane change
Comments:					North	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
18-040186	2018-Oct-10, Wed,18:00	Clear	Rear end		East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					East	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
18-043001	2018-Oct-30, Tue,06:30	Clear	Turning movement		North	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-046908	2018-Nov-26, Mon,12:39	Rain	SMV other	Non-fatal injury	East	Wet	Turning left	Automobile, station wagon	Pedestrian	Failed to yield right-of-way
Comments:						Wet				
18-047764	2018-Dec-02, Sun,21:20	Rain	Angle	P.D. only	South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					East	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-05014	2018-Feb-07, Wed,07:47	Snow	Sideswipe	Non-reportable	North	Packed snow	Going ahead	Pick-up truck	Other motor vehicle	Improper passing
Comments:					North	Packed snow	Going ahead	Municipal transit bus	Other motor vehicle	Driving properly
18-05036	2018-Feb-07, Wed,10:15	Snow	Rear end		South	Loose snow	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Speed too fast for condition
Comments:					South	Loose snow	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
18-050678	2018-Dec-24, Mon,14:00	Clear	Turning movement		South	Wet	Turning left	Automobile, station wagon	Other motor vehicle	
Comments:					North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-09104	2018-Mar-10, Sat,11:55	Clear	Other		East	Dry	Stopped	Pick-up truck	Other motor vehicle	Driving properly
Comments:										

18-10395	2018-Mar-21, Wed,02:25	Clear	SMV other	P.D. only	South	Dry	Going ahead	Motorcycle	Skidding/sliding	Lost control
Comments:						Dry				
18-13629	2018-Apr-13, Fri,13:00	Clear	Sideswipe		East	Dry	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					East	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-05604	2019-Feb-13, Wed,16:50	Snow	Sideswipe	P.D. only	North	Slush	Changing lanes	Automobile, station wagon		Failed to yield right-of-way
Comments:					North	Slush	Stopped	Automobile, station wagon		Driving properly
19-06744	2019-Feb-21, Thu,17:05	Clear	Sideswipe	P.D. only	South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-06915	2019-Feb-22, Fri,18:30	Clear	Turning movement	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	Vehicle 2 info missing from collision report.					Dry		Automobile, station wagon		
19-10613	2019-Mar-25, Mon,08:05	Clear	SMV other	Non-fatal injury	East	Dry	Going ahead	Pick-up truck	Pedestrian	Disobeyed traffic control
Comments:	CCC 320(13)(2) PTA									
19-18562	2019-May-21, Tue,17:21	Clear	Rear end	Non-fatal injury	South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
19-22650	2019-Jun-17, Mon,18:45	Clear	Rear end	P.D. only	North	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					North	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
19-29415	2019-Aug-02, Fri,13:55	Clear	Rear end	P.D. only	South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South		Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
19-42000	2019-Oct-29, Tue,20:03	Clear	Turning movement	Non-fatal injury	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Exceeding speed limit
Comments:	D1 CCC 320(14)(1)(B)				South	Dry	Turning left	Pick-up truck	Other motor vehicle	Driving properly
19-42088	2019-Oct-30, Wed,13:10	Rain	Rear end	P.D. only	South	Wet	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Speed too fast for condition
Comments:					South	Wet	Stopped	Pick-up truck	Other motor vehicle	Driving properly

19-43639	2019-Nov-11, Mon,12:10	Snow	Angle	P.D. only	South	Slush	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					East	Slush	Slowing or stopping	Delivery van	Other motor vehicle	Driving properly
19-44616	2019-Nov-15, Fri,19:30	Clear	Rear end	P.D. only	North	Ice	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Driving properly
Comments:					North	Wet	Stopped	Pick-up truck	Other motor vehicle	Driving properly
19-49472	2019-Dec-24, Tue,13:00	Clear	Rear end	P.D. only	East	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					East	Wet		Pick-up truck	Other motor vehicle	Following too close

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... CLARENCE ST @ DALHOUSIE ST **Municipality........** BRANTFORD

Traffic Control.... Traffic signal **Total Collisions....** 60

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
016572	2017-May-09, Tue,08:33	Clear	Angle	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
024148	2017-Jun-29, Thu,14:00	Clear	Sideswipe		South	Dry	Changing lanes	Truck-other	Other motor vehicle	Improper lane change	
Comments:					South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
024318	2017-Jun-30, Fri,16:10	Clear	Sideswipe		North	Dry	Changing lanes	Pick-up truck	Other motor vehicle	Improper lane change	
Comments:					North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
025865	2017-Jul-10, Mon,18:22	Clear	Rear end	Non-fatal injury	South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					South	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
17-002375	2017-Jan-20, Fri,14:45	Rain	Rear end		South	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					South						
17-003660	2017-Jan-31, Tue,14:45	Snow	Rear end		South	Slush	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					South						
17-004699	2017-Feb-08, Wed,09:30	Clear	Angle	Non-fatal injury	North	Dry	Going ahead	Passenger van	Other motor vehicle	Disobeyed traffic control	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
17-007725	2017-Mar-03, Fri,08:45	Clear	Rear end		West	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					West	Loose snow	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-020095	2017-May-30, Tue,14:47	Clear	Angle		North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					West						

17-029471	2017-Jul-24, Mon,13:00	Clear	Rear end		North	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					North	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
17-030694	2017-Aug-12, Sat,02:17	Rain	Sideswipe	P.D. only	West	Wet	Turning right	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:					West	Wet	Stopped	Pick-up truck	Other motor vehicle	Driving properly
17-038037	2017-Sep-30, Sat,21:30	Clear	Turning movement		North	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					North	Dry	Going ahead	Automobile, station wagon		Driving properly
17-040434	2017-Oct-19, Thu,16:50	Clear	Angle		North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
17-040987	2017-Oct-23, Mon,16:10	Rain	Rear end		North	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					North	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
17-42191	2017-Nov-01, Wed,09:24	Clear	Angle	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
17-44845	2017-Nov-21, Tue,22:36	Rain	SMV other	Non-fatal injury	South	Wet	Turning left	Automobile, station wagon	Skidding/sliding	Lost control
Comments:						Wet				
17-47001	2017-Dec-07, Thu,18:20	Clear	Sideswipe		North	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-01337	2018-Jan-10, Wed,19:00	Rain	Angle		South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-018534	2018-May-17, Thu,14:30	Clear	Sideswipe		West	Dry	Changing lanes	Passenger van	Other motor vehicle	Other
Comments:					West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
18-021248	2018-Jun-03, Sun,17:30	Rain	Rear end		South	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South	Dry	Stopped		Other motor vehicle	Driving properly

18-02164	2018-Jan-13, Sat,20:30	Clear	Rear end		South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South					
18-022461	2018-Jun-12, Tue,13:20	Clear	Turning movement		West	Dry	Turning left	Truck - tractor	Other motor vehicle	Driving properly
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-025006	2018-Jun-28, Thu,20:45	Clear	Rear end		South	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
18-029453	2018-Jul-27, Fri,21:30	Clear	Sideswipe		North	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-033944	2018-Aug-30, Thu,15:50	Clear	Angle		North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-034696	2018-Sep-04, Tue,23:30	Clear	Rear end		North	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					North					
18-034738	2018-Sep-04, Tue,15:35	Clear	Angle	P.D. only	North	Dry	Going ahead	Pick-up truck	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
18-037579	2018-Sep-23, Sun,12:25	Clear	Angle	P.D. only	North	Dry	Going ahead	Pick-up truck	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-038450	2018-Sep-29, Sat,17:10	Clear	SMV other	Non-fatal injury	South	Dry	Turning left	Automobile, station wagon	Pedestrian	Other
Comments:						Dry				
18-04114	2018-Jan-31, Wed,12:00	Clear	SMV other	Non-fatal injury	West	Wet	Turning right	Automobile, station wagon	Pedestrian	Failed to yield right-of-way
Comments:						Wet				
18-046528	2018-Nov-23, Fri,15:20	Clear	Angle	Non-fatal injury	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-04686	2018-Feb-04, Sun,13:20	Snow	Angle	P.D. only	South	Wet	Going ahead	Pick-up truck	Other motor vehicle	Disobeyed traffic control
Comments:					West	Wet	Going ahead	Pick-up truck	Other motor vehicle	Driving properly

18-047820	2018-Dec-02, Sun,20:50	Rain	Angle		South	Wet	Going ahead	Pick-up truck	Other motor vehicle	Disobeyed traffic control
Comments:					West	Wet	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
18-049748	2018-Dec-17, Mon,12:25	Clear	Angle		North	Wet	Going ahead	Pick-up truck	Other motor vehicle	
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-07728	2018-Feb-27, Tue,16:55	Clear	Angle	Non-fatal injury	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-07912	2018-Feb-28, Wed,20:50	Clear	SMV other	Non-fatal injury	West	Dry	Turning left	Automobile, station wagon	Pedestrian	Failed to yield right-of-way
Comments:						Dry				
18-10203	2018-Mar-19, Mon,10:15	Clear	Sideswipe		South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-10833	2018-Mar-23, Fri,23:14	Clear	Angle	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Other
Comments:					North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Other
18-11925	2018-Mar-30, Fri,11:30	Clear	Sideswipe		South	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-02808	2019-Jan-22, Tue,14:15	Clear	Turning movement		West	Wet	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-03281	2019-Jan-26, Sat,13:10	Clear	Turning movement		South	Dry	Going ahead	Truck - closed	Other motor vehicle	Improper lane change
Comments:					South	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Driving properly
19-03908	2019-Jan-31, Thu,12:58	Clear	Angle	Non-fatal injury	West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:	HTA 130 9105224Z traffic signal			Failed to stop for	North	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-05089	2019-Feb-08, Fri,19:00	Snow	Rear end	P.D. only	North	Ice	Stopped	Automobile, station wagon	Other motor vehicle	Speed too fast for condition
Comments:					North	Ice	Going ahead	Truck - closed	Skidding/sliding	Driving properly

19-05097	2019-Feb-08, Fri,20:30	Snow	Rear end	P.D. only	South	Ice	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Driving properly
Comments:					South	Ice	Stopped	Passenger van	Other motor vehicle	Other
19-06174	2019-Feb-17, Sun,23:00	Snow	Angle	P.D. only	West	Ice	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Speed too fast for condition
Comments:					North	Slush	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-07413	2019-Feb-27, Wed,17:38	Clear	Angle	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-07589	2019-Feb-28, Thu,22:31	Clear	Angle	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					South	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
19-08782	2019-Mar-10, Sun,12:00	Clear	Angle	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Other
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-13168	2019-Apr-13, Sat,01:56	Clear	Rear end	Non-fatal injury	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Other
Comments:	HTA 130(1) TC1166831				West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
19-13799	2019-Apr-18, Thu,01:22	Rain	Angle	P.D. only	West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:	vehicle 2 info mmising from collision report				North	Wet				
19-21771	2019-Jun-11, Tue,20:51	Clear	Angle	Non-fatal injury	North	Dry	Going ahead	Pick-up truck	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-27585	2019-Jul-21, Sun,14:41	Clear	Angle	Non-fatal injury	North	Dry	Going ahead	Truck-other	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
19-38239	2019-Oct-02, Wed,15:50	Rain	Sideswipe	P.D. only	South	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-43790	2019-Nov-12, Tue,14:50	Clear	Angle	P.D. only	West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

19-43822	2019-Nov-12, Tue,20:30	Clear	SMV other	Non-fatal injury	West	Packed snow	Turning left	Automobile, station wagon	Pedestrian	Failed to yield right-of-way
Comments:										
19-46505	2019-Dec-03, Tue,19:48	Clear	Angle	Non-fatal injury	South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	
19-47232	2019-Dec-09, Mon,13:52	Rain	Angle	P.D. only	North	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-47238	2019-Dec-09, Mon,14:30	Rain	Rear end	P.D. only	North	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Speed too fast for condition
Comments:					North	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-47357	2019-Dec-10, Tue,12:50	Clear	SMV other	Non-fatal injury	North	Dry	Turning left	Other school vehicle/bus	Pedestrian	Driving properly
Comments:										
19-49251	2019-Dec-25, Wed,00:00	Clear	SMV other	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Pole (sign, parking meter)	Lost control
Comments:	D1 CCC 320(14)(1)(A)									

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST btwn CHARLOTTE ST & CLARENCE ST **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 1

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-005768	2017-Feb-15, Wed,14:45	Clear	SMV unattended vehicle		East	Dry	Reversing	Passenger van	Unattended vehicle	Driving properly	
Comments:					West	Dry	Parked	Automobile, station wagon			

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... CHARLOTTE ST @ DALHOUSIE ST **Municipality........** BRANTFORD

Traffic Control.... Stop sign **Total Collisions....** 22

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-019640	2017-May-29, Mon,14:30	Clear	Angle		South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
009221	2017-Mar-15, Wed,16:00	Clear	Rear end	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle		
Comments:					North	Dry	Stopped	Automobile, station wagon	Other motor vehicle		
015580	2017-May-01, Mon,17:00	Rain	Angle		North	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					West	Wet	Going ahead	Pick-up truck	Other motor vehicle	Driving properly	
17-004124	2017-Feb-03, Fri,18:00	Drifting Snow	Rear end	P.D. only	West	Loose snow	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					West	Loose snow	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-021654	2017-Jun-12, Mon,14:00	Clear	Rear end		West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-039820	2017-Oct-15, Sun,16:00	Rain	Angle		North	Wet	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Disobeyed traffic control	
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
17-48243	2017-Dec-17, Sun,11:25	Clear	Rear end		West	Dry	Overtaking	Automobile, station wagon	Skidding/sliding	Following too close	
Comments:					West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
18-01364	2018-Jan-11, Thu,14:29	Rain	Angle	Non-fatal injury	West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					North	Wet	Going ahead	Passenger van	Other motor vehicle	Driving properly	
18-02846	2018-Jan-22, Mon,16:10	Rain	Angle	P.D. only	West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	

18-041275	2018-Oct-18, Thu,17:25	Clear	Turning movement	Non-fatal injury	North	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-05060	2018-Jan-31, Wed,18:45	Clear	Sideswipe		West	Slush	Changing lanes	Automobile, station wagon	Other motor vehicle	Other
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-05418	2018-Feb-09, Fri,16:30	Snow	Angle		North	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					East					
18-08391	2018-Mar-04, Sun,14:51	Clear	Sideswipe	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-09313	2018-Mar-12, Mon,11:47	Snow	Angle	P.D. only	North	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					West	Loose snow	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-10236	2018-Mar-19, Mon,15:20	Clear	Turning movement		West	Dry	Turning left	Pick-up truck	Other motor vehicle	Driving properly
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-001824	2019-Jan-14, Mon,15:30	Clear	Angle		North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-19724	2019-May-29, Wed,10:30	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-23177	2019-Jun-21, Fri,15:45	Clear	Angle	P.D. only	South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-26723	2019-Jul-15, Mon,12:20	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-32101	2019-Aug-21, Wed,09:38	Clear	Angle	Non-fatal injury	South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

19-46726	2019-Dec-05, Thu,10:15	Clear	Angle	P.D. only	South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-48125	2019-Dec-16, Mon,14:19	Clear	Angle	Non-fatal injury	South	Dry	Going ahead	Pick-up truck	Other motor vehicle	Failed to yield right-of-way
Comments:	d1 hta 136(1)(B)				West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST btwn GEORGE ST & CHARLOTTE ST **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 3

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-39514	2017-Oct-13, Fri,12:00	Rain		P.D. only	West	Wet	Going ahead		Pole (utility, power)		
Comments:						Wet					
18-038165	2018-Sep-27, Thu,12:50	Clear	SMV unattended vehicle		West	Dry	Reversing	Automobile, station wagon	Unattended vehicle	Driving properly	
Comments:					East	Dry	Parked	Automobile, station wagon	Other motor vehicle		
18-045929	2018-Nov-16, Fri,13:15	Clear	Turning movement		West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:							Turning left				

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... GEORGE ST @ DALHOUSIE ST **Municipality........** BRANTFORD

Traffic Control.... Stop sign **Total Collisions....** 3

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
020432	2017-Jun-03, Sat,18:05	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-10647	2018-Mar-22, Thu,18:58	Clear	Rear end	Non-fatal injury	West	Dry	Going ahead	Pick-up truck	Other motor vehicle	Other	
Comments:					West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
18-11489	2018-Mar-28, Wed,11:22	Clear	Sideswipe	P.D. only	West	Dry	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST btwn MARKET ST & GEORGE ST **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 4

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-009506	2017-Mar-15, Wed,17:00	Clear	Sideswipe	P.D. only	West	Dry	Merging	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-00286	2018-Jan-03, Wed,10:00	Clear	SMV unattended vehicle		West	Dry	Parked	Truck - closed	Other motor vehicle		
Comments:											
18-04137	2018-Jan-31, Wed,13:30	Clear	SMV unattended vehicle		West	Dry	Parked	Pick-up truck	Other motor vehicle		
Comments:											
19-36470	2019-Sep-20, Fri,09:30	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Passenger van	Other motor vehicle	Improper lane change	
Comments:					West		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST @ MARKET ST

Municipality........ BRANTFORD

Traffic Control.... Traffic signal

Total Collisions.... 7

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
008950	2017-Mar-10, Fri,17:45	Snow			West	Ice	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:											
009684	2017-Mar-19, Sun,02:19	Clear	Angle	P.D. only	East	Wet	Going ahead	Truck - dump	Other	Other	
Comments:					South	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
020992	2017-Jun-07, Wed,17:07	Clear	SMV unattended vehicle	P.D. only	West	Dry	Slowing or stopping	Pick-up truck	Unattended vehicle	Driving properly	
Comments:					West	Dry	Parked	Automobile, station wagon	Other motor vehicle		
17-48894	2017-Dec-22, Fri,17:03	Clear	Turning movement		West	Dry	Turning right	Pick-up truck	Other motor vehicle	Driving properly	
Comments:							Going ahead				
18-035924	2018-Sep-10, Mon,10:25	Clear			West	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:											
19-27808	2019-Jul-22, Mon,18:15	Clear	SMV other	Non-fatal injury	North	Dry	Turning right	Automobile, station wagon	Pole (sign, parking meter)	Improper turn	
Comments:											
19-41009	2019-Oct-22, Tue,09:28	Rain	SMV other	Non-fatal injury	West	Wet	Going ahead	Automobile, station wagon	Pedestrian	Lost control	
Comments:											

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST btwn QUEEN ST & MARKET ST

Municipality........ BRANTFORD

Traffic Control....

Total Collisions.... 16

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
012327	2017-Apr-07, Fri,14:00	Clear	SMV unattended vehicle		West	Dry	Parked	Automobile, station wagon	Other motor vehicle		
Comments:											
17-007541	2017-Mar-01, Wed,20:53	Clear	Sideswipe	P.D. only	West	Wet	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
17-008138	2017-Mar-06, Mon,12:40	Clear	Sideswipe		West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
17-028568	2017-Jul-28, Fri,17:11	Clear	SMV unattended vehicle		East	Dry	Reversing	Automobile, station wagon	Unattended vehicle	Driving properly	
Comments:											
17-45003	2017-Nov-22, Wed,12:00	Clear	SMV unattended vehicle		West	Dry	Parked	Passenger van	Other motor vehicle		
Comments:											
18-038210	2018-Sep-27, Thu,22:20	Clear	Sideswipe		West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-042519	2018-Oct-26, Fri,19:28	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-08728	2018-Jan-15, Mon,13:00	Clear	SMV unattended vehicle		West	Dry	Parked	Passenger van	Other motor vehicle		
Comments:											
19-02971	2019-Jan-23, Wed,19:10	Rain	Sideswipe	P.D. only	West	Wet	Changing lanes	Police vehicle	Other motor vehicle	Improper lane change	
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	

19-05441	2019-Feb-08, Fri,02:30	Clear	Sideswipe	P.D. only	West	Wet	Changing lanes	Automobile, station wagon		
Comments:					West	Wet	Going ahead	Automobile, station wagon		
19-08137	2019-Feb-25, Mon,15:45	Clear	SMV unattended vehicle	P.D. only	West	Dry	Parked	Passenger van	Other motor vehicle	
Comments:	vehicle 2 info missing from collision report									
19-11384	2019-Mar-29, Fri,19:30	Clear	Sideswipe	P.D. only	West	Dry	Going ahead	Passenger van	Other motor vehicle	Failed to yield right-of-way
Comments:					West	Dry	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Driving properly
19-34282	2019-Sep-05, Thu,15:30	Clear	SMV unattended vehicle	P.D. only	West	Dry	Parked	Automobile, station wagon	Other motor vehicle	
Comments:										
19-41004	2019-Oct-22, Tue,15:00	Clear	Sideswipe	P.D. only	West	Dry	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					West		Going ahead		Other motor vehicle	
19-42486	2019-Nov-01, Fri,17:00	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					West		Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
BR-18047732	2018-Dec-02, Sun,16:54	Clear	Rear end	P.D. only	West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					West		Stopped	Automobile, station wagon	Other motor vehicle	Driving properly

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST @ QUEEN ST **Municipality........** BRANTFORD

Traffic Control.... Traffic signal **Total Collisions....** 7

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
18-024183	2018-Jun-24, Sun,15:00	Clear	Sideswipe	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					North	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
18-027688	2018-Jul-17, Tue,11:30	Clear	Turning movement		South	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-028514	2018-Jul-23, Mon,09:00	Clear	SMV unattended vehicle		West	Dry	Parked	Automobile, station wagon	Other motor vehicle		
Comments:											
18-038571	2018-Sep-30, Sun,12:50	Clear	Sideswipe		West	Dry	Changing lanes	Passenger van	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-09688	2018-Mar-15, Thu,12:28	Clear	Sideswipe		South	Dry	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
19-09855	2019-Mar-19, Tue,06:50	Clear	Turning movement	P.D. only	South	Dry	Turning right	Pick-up truck	Other motor vehicle	Improper turn	
Comments:					South	Dry	Turning right		Other motor vehicle	Driving properly	
19-20773	2019-Jun-04, Tue,17:30	Clear	Rear end	P.D. only	West	Dry	Slowing or stopping	Passenger van	Other motor vehicle	Following too close	
Comments:					West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST btwn KING ST & QUEEN ST **Municipality........** BRANTFORD

Traffic Control.... **Total Collisions....** 6

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-013149	2017-Apr-13, Thu,15:40	Clear	Turning movement		North	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-020159	2018-May-25, Fri,16:45	Clear	Sideswipe		West	Dry	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	Other	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-042700	2018-Oct-28, Sun,01:10	Rain	Sideswipe	Non-fatal injury	West	Wet	Changing lanes	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-047556	2018-Nov-30, Fri,16:55	Clear	Rear end		West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-05440	2018-Feb-09, Fri,17:45	Snow	Other		West	Slush	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:											
18-05892	2018-Feb-13, Tue,10:00	Clear	Rear end		North	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Speed too slow	
Comments:					North						

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST @ KING ST **Municipality........** BRANTFORD

Traffic Control.... Traffic signal **Total Collisions....** 18

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-000567	2017-Jan-04, Wed,20:57	Clear	Rear end		West	Dry	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Following too close	
Comments:					West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-031195	2017-Aug-15, Tue,12:20	Clear	Turning movement		West	Dry	Turning left	Pick-up truck	Other motor vehicle	Improper turn	
Comments:					West	Dry	Going ahead	Automobile, station wagon		Driving properly	
17-44435	2017-Nov-18, Sat,17:38	Rain	Sideswipe	P.D. only	West	Wet	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Wet	Going ahead	Pick-up truck	Other motor vehicle	Driving properly	
18-013335	2018-Apr-05, Thu,16:00	Clear	Other		West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					West	Dry	Stopped	Pick-up truck	Other motor vehicle	Driving properly	
18-022501	2018-Jun-12, Tue,15:15	Clear	SMV unattended vehicle		West	Dry	Unknown	Motor home	Unattended vehicle	Driving properly	
Comments:					West	Dry	Parked	Passenger van	Other		
18-11940	2018-Mar-31, Sat,12:30	Clear	Sideswipe		West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-12208	2018-Apr-02, Mon,12:50	Clear	Turning movement		North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:							Turning left				
18-13335	2018-Apr-05, Thu,16:00	Clear	Rear end		West	Dry	Stopped	Pick-up truck	Other motor vehicle	Driving properly	
Comments:					West						
19-07153	2019-Feb-25, Mon,15:15	Clear	Turning movement	P.D. only	West	Dry	Turning left	Passenger van	Other motor vehicle	Improper turn	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	

19-10114	2019-Mar-21, Thu,01:30	Rain	Angle	P.D. only	South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-10394	2019-Mar-22, Fri,20:10	Clear	Turning movement	P.D. only	West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Improper turn
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	
19-11277	2019-Mar-29, Fri,15:45	Clear	Rear end	P.D. only	West	Dry	Slowing or stopping	Pick-up truck	Other motor vehicle	Following too close
Comments:					West	Dry	Stopped	Pick-up truck	Other motor vehicle	Driving properly
19-18011	2019-May-17, Fri,14:10	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-25475	2019-Jul-06, Sat,13:27	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:	D1 CAI 2(1)(A) TC1166160, D1 HTA 130(1) TC1166161				West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
19-28518	2019-Jul-27, Sat,07:30	Clear	Angle	P.D. only	West	Dry	Going ahead	Passenger van	Other motor vehicle	Failed to yield right-of-way
Comments:					South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-38676	2019-Oct-04, Fri,11:15	Clear	SMV unattended vehicle	P.D. only	South	Dry	Parked	Automobile, station wagon	Other motor vehicle	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Unattended vehicle	Driving properly
19-42740	2019-Nov-04, Mon,15:00	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
19-49473	2019-Dec-25, Wed,17:20	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:					West	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST btwn BRIDGE ST & KING ST
Municipality........ BRANTFORD

Traffic Control....
Total Collisions.... 4

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-44917	2017-Nov-21, Tue,17:30	Clear	Sideswipe		West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
18-02081	2017-Dec-08, Fri,22:00	Snow	Rear end		West	Loose snow	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Lost control	
Comments:					West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Other	
19-08450	2019-Mar-07, Thu,13:20	Clear	Sideswipe	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
19-13491	2019-Apr-15, Mon,15:20	Clear	Rear end	P.D. only	West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... BRIDGE ST @ DALHOUSIE ST

Municipality........ BRANTFORD

Traffic Control....

Total Collisions.... 5

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
17-41806	2017-Oct-29, Sun,06:27	Clear	SMV other	P.D. only	South	Dry	Going ahead	Automobile, station wagon	Curb	Lost control	
Comments:						Dry					
18-02297	2018-Jan-18, Thu,16:00	Clear	Angle		South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly	
19-29144	2019-Jul-31, Wed,17:14	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Pick-up truck	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Going ahead	Passenger van	Other motor vehicle	Driving properly	
19-44886	2019-Nov-14, Thu,14:50	Rain	Turning movement	P.D. only	South	Wet	Turning right	Pick-up truck	Other motor vehicle	Improper turn	
Comments:											
BR-18047308	2018-Nov-29, Thu,16:59	Clear	Turning movement	P.D. only	West	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Failed to yield right-of-way	
Comments:					South	Dry	Turning right	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... DALHOUSIE ST btwn BRANT AVE & BRIDGE ST

Municipality........ BRANTFORD

Traffic Control....

Total Collisions.... 2

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
18-042356	2018-Oct-25, Thu,15:56	Clear	Rear end	Non-fatal injury	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Slowing or stopping	Passenger van	Other motor vehicle	Driving properly	
19-18860	2019-May-23, Thu,18:45	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:	There were three vehicles in this collision				West		Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	

Collision Details Report

From: January 1, 2017 **To:** December 31, 2019

Location .... BRANT AVE @ DALHOUSIE ST **Municipality........** BRANTFORD

Traffic Control.... Traffic signal **Total Collisions....** 24

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Direction	Surface Cond'n	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
014644	2017-Apr-24, Mon,16:27	Clear	SMV other	Non-fatal injury	West	Dry	Turning left	Pick-up truck	Pedestrian	Improper turn	
Comments:						Dry					
018303	2017-May-20, Sat,15:10	Clear	Rear end	P.D. only	West	Dry	Going ahead	Pick-up truck	Other motor vehicle	Following too close	
Comments:					West	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Driving properly	
022423	2017-Jun-16, Fri,15:30	Clear	Rear end		South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					South						
17-002987	2017-Jan-25, Wed,17:44	Clear	Rear end	P.D. only	South	Dry	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-005744	2017-Feb-16, Thu,10:40	Clear	Sideswipe	P.D. only	West	Dry	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper lane change	
Comments:					West	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly	
17-026429	2017-Jul-14, Fri,11:29	Clear	Rear end	P.D. only	West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Other	
Comments:					West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-030619	2017-Aug-10, Thu,16:50	Clear	Rear end		South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
Comments:					South						
17-035928	2017-Sep-17, Sun,10:15	Clear	Rear end		North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close	
Comments:					North	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	
17-39556	2017-Oct-13, Fri,17:00	Rain	Sideswipe	P.D. only	West	Wet	Changing lanes	Automobile, station wagon	Other motor vehicle	Improper passing	
Comments:					West	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly	

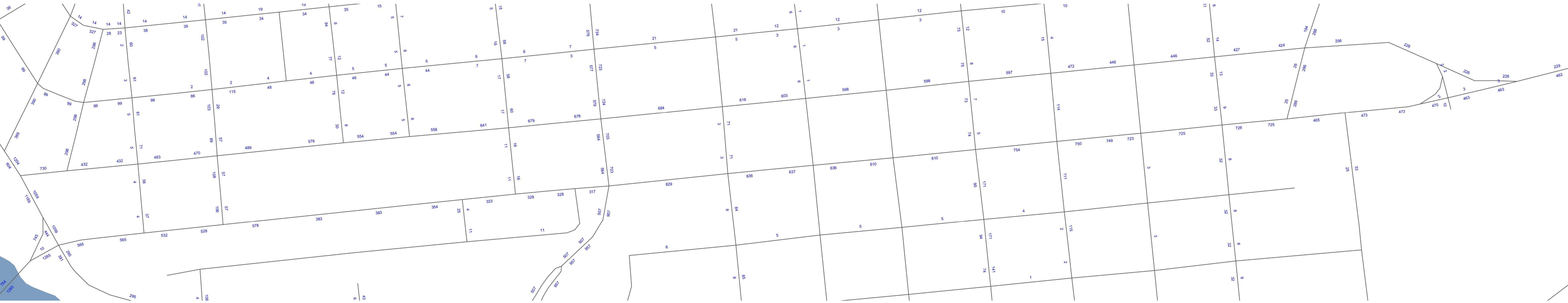
18003969	2018-Jan-30, Tue,09:19	Clear	Rear end	Non-fatal injury	South	Ice	Going ahead	Passenger van		Speed too fast for condition
Comments:					South	Ice		Automobile, station wagon	Other motor vehicle	Driving properly
18-023358	2018-Jun-15, Fri,23:00	Clear	Rear end		South	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					South					
18-023394	2018-Jun-17, Sun,18:45	Clear	Turning movement		West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:							Going ahead			
18-025033	2018-Jun-29, Fri,15:14	Clear	Rear end	P.D. only	West	Dry	Stopped	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					West	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-027135	2018-Jul-13, Fri,16:38	Clear	Turning movement	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
18-036635	2018-Sep-15, Sat,17:35	Rain	Turning movement		South	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Following too close
Comments:					West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
18-037801	2018-Sep-25, Tue,00:24	Rain	Angle	Non-fatal injury	North	Wet	Slowing or stopping	Automobile, station wagon	Other motor vehicle	Speed too fast for condition
Comments:					West	Wet	Going ahead	Automobile, station wagon	Other motor vehicle	Driving properly
18-045909	2018-Nov-19, Mon,09:30	Clear	Turning movement		North	Dry	Going ahead	Automobile, station wagon	Skidding/sliding	Disobeyed traffic control
Comments:					West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly
18-04792	2018-Feb-05, Mon,08:45	Clear	Rear end		South	Ice	Slowing or stopping	Automobile, station wagon	Skidding/sliding	Speed too fast for condition
Comments:					South					
18-06864	2018-Feb-20, Tue,13:15	Rain	Rear end		West	Wet	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
Comments:					West					
18-3969	2018-Jan-30, Tue,09:19	Clear	Rear end	Non-fatal injury	South	Ice	Going ahead	Passenger van	Other motor vehicle	Speed too fast for condition
Comments:					South	Ice	Stopped	Automobile, station wagon	Other motor vehicle	Driving properly
19-09893	2019-Mar-18, Mon,21:50	Clear	SMV other	Non-reportable	West	Dry	Turning right	Automobile, station wagon	Pedestrian	
Comments:										

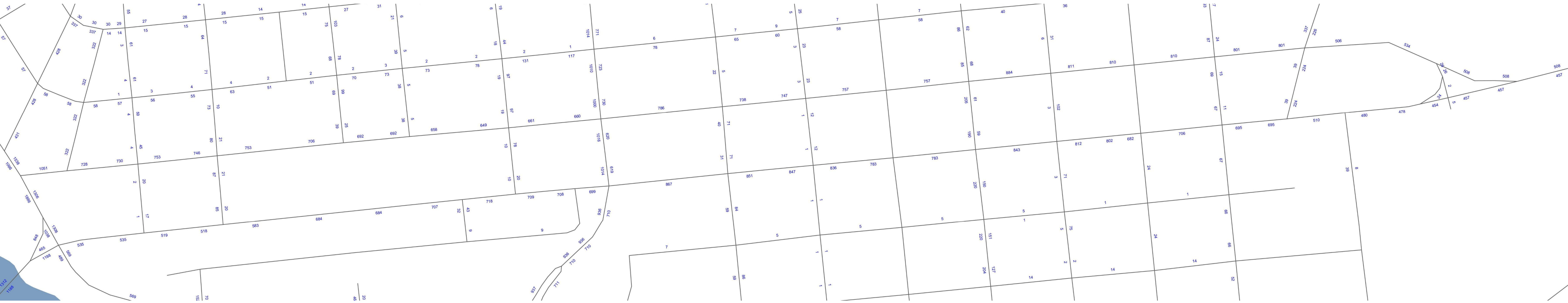
19-11223	2019-Mar-29, Fri,09:11	Clear	SMV other	P.D. only	West	Dry	Turning left	Motorcycle	Pole (utility, power)	Exceeding speed limit
Comments:										
19-20213	2019-Jun-01, Sat,12:30	Clear	Sideswipe	P.D. only	South	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Improper lane change
Comments:	Hit Median				South	Dry	Going ahead	Pick-up truck	Other motor vehicle	Driving properly
19-22827	2019-Jun-19, Wed,11:50	Clear	Angle	P.D. only	North	Dry	Going ahead	Automobile, station wagon	Other motor vehicle	Disobeyed traffic control
Comments:					West	Dry	Turning left	Automobile, station wagon	Other motor vehicle	Driving properly

Appendix D

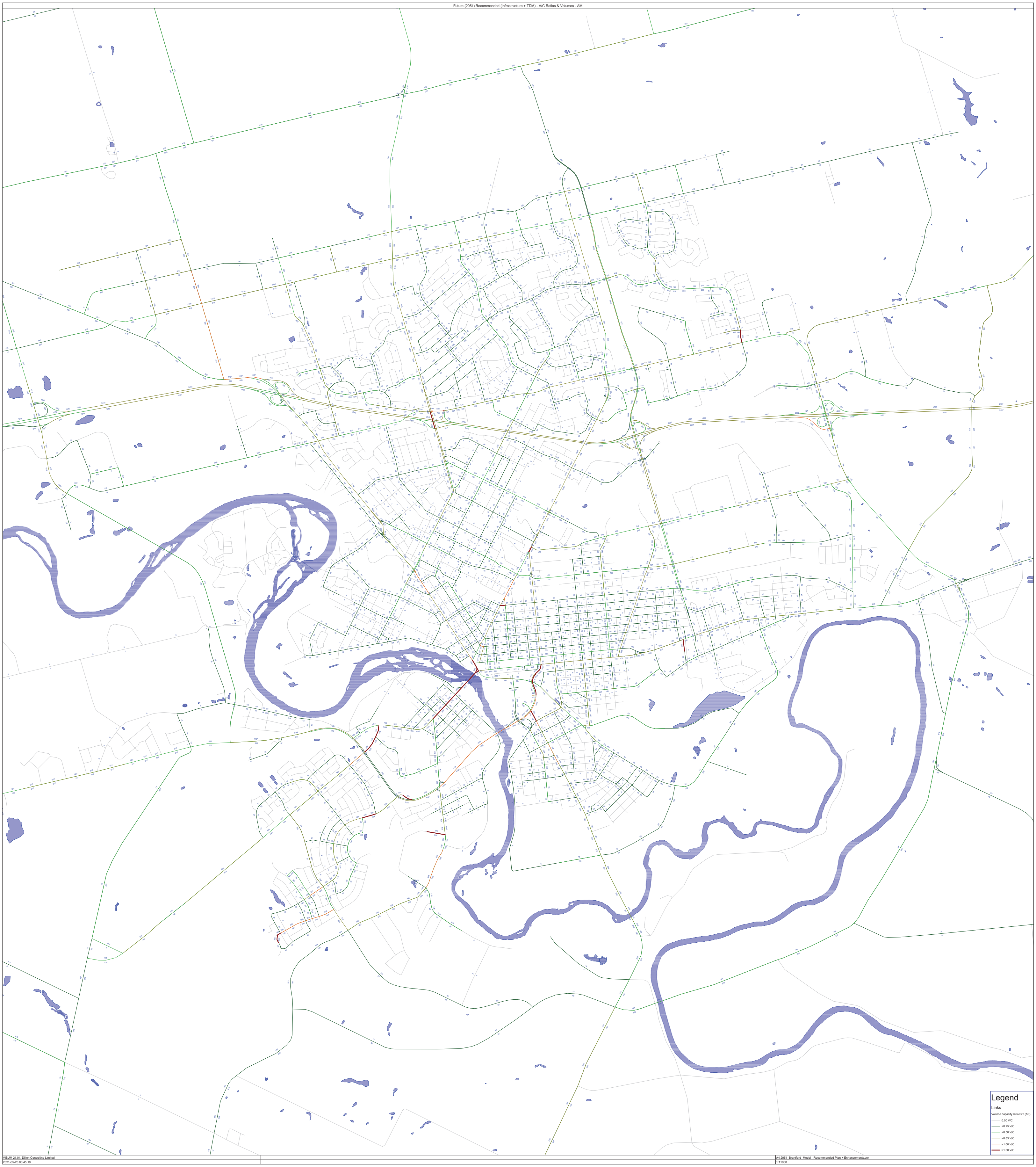
Model Projections


1 / 50km/h / 500
2 / 50km/h / 1600
2 / 60km/h / 1600
3 / 50km/h / 2400
3 / 60km/h / 2400
0 / 0km/h / 0
2 / 50km/h / 1000
2 / 60km/h / 1000
2 / 50km/h / 1200
2 / 50km/h / 800
1 / 60km/h / 500





Future (2051) Recommended (Infrastructure + TDM) - V/C Ratios & Volumes - AM



VISUM 21.01, Dillon Consulting Limited
2021-05-28 00:45:10

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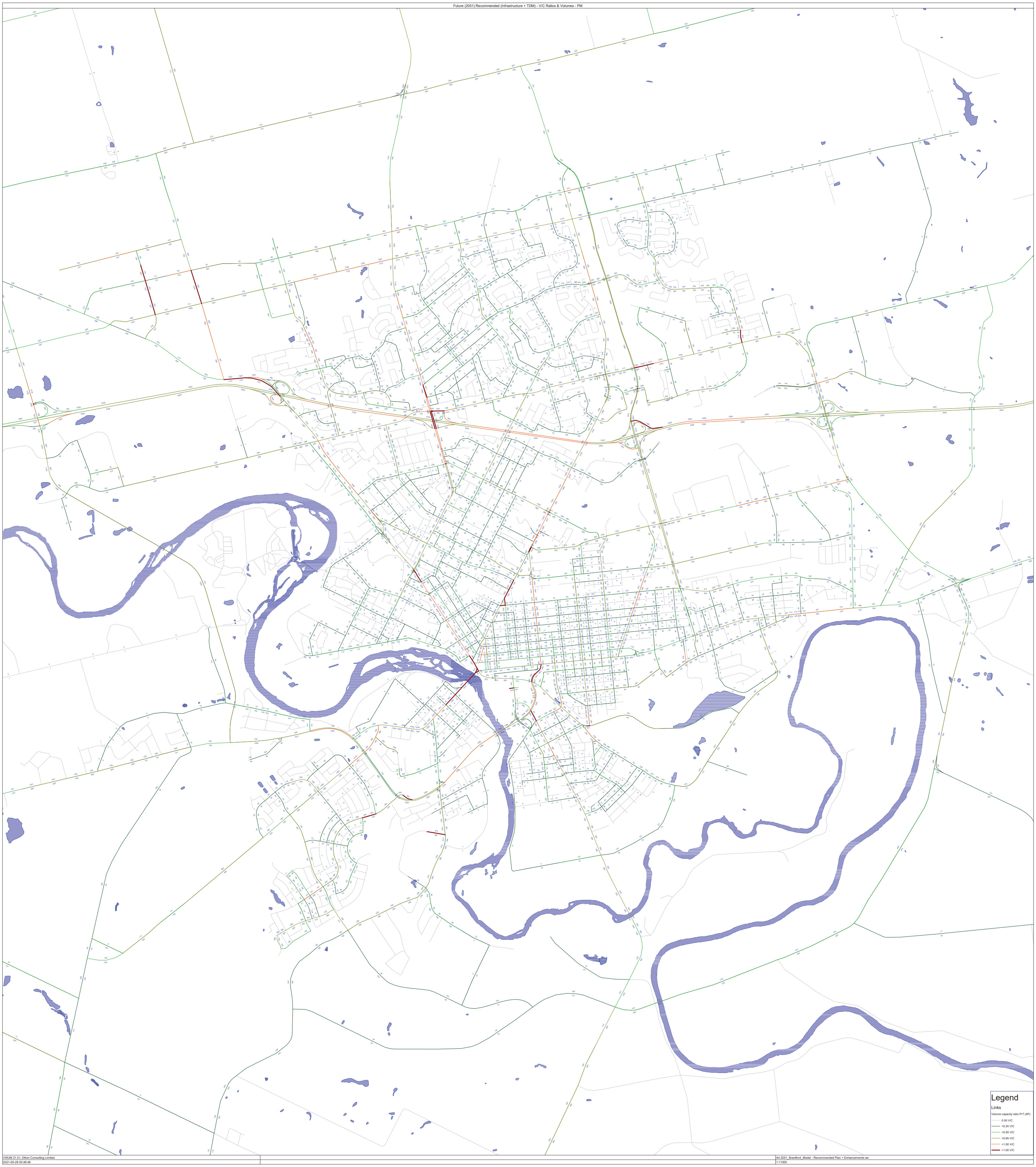
Future (2051) Recommended (Infrastructure + TDM) - V/C Ratios & Volumes - PM



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Appendix E

Future Traffic Operations (One-Way)

Lanes, Volumes, Timings
1: Icomm Dr/Brant Ave & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱				↰	↑↑	↱		↰↑	↱
Traffic Volume (vph)	818	396	71	0	0	0	140	869	67	176	418	1192
Future Volume (vph)	818	396	71	0	0	0	140	869	67	176	418	1192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	110.0		210.0	40.0		0.0
Storage Lanes	1		1	0		0	1		2	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00
Ped Bike Factor	0.98	0.99	0.96				0.99		0.99		1.00	0.98
Frt			0.850						0.850			0.850
Flt Protected	0.950	0.976					0.950				0.984	
Satd. Flow (prot)	1597	3297	1484	0	0	0	1659	3579	1633	0	3420	1570
Flt Permitted	0.950	0.976					0.399				0.552	
Satd. Flow (perm)	1571	3271	1426	0	0	0	693	3579	1612	0	1919	1532
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109						88			865
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		446.3			127.5			177.1			125.8	
Travel Time (s)		33.5			9.6			12.8			9.1	
Confl. Peds. (#/hr)	19		33				9		1	1		9
Peak Hour Factor	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Adj. Flow (vph)	940	483	108	0	0	0	182	988	88	220	445	1310
Shared Lane Traffic (%)	50%											
Lane Group Flow (vph)	470	953	108	0	0	0	182	988	88	0	665	1310
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)		3.7			3.7			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm				pm+pt	NA	Perm	pm+pt	NA	Free
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4				2		2	6		Free
Minimum Split (s)	31.0	31.0	31.0				8.0	31.0	31.0	8.0	31.0	
Total Split (s)	31.0	31.0	31.0				8.0	31.0	31.0	8.0	31.0	
Total Split (%)	44.3%	44.3%	44.3%				11.4%	44.3%	44.3%	11.4%	44.3%	
Maximum Green (s)	27.0	27.0	27.0				4.0	25.0	25.0	4.0	25.0	
Yellow Time (s)	2.0	2.0	2.0				3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0				1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0	4.0				4.0	6.0	6.0		6.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Walk Time (s)	15.0	15.0	15.0					15.0	15.0		15.0	
Flash Dont Walk (s)	10.0	10.0	10.0					10.0	10.0		10.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

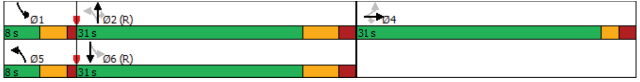
Lanes, Volumes, Timings
1: Icomm Dr/Brant Ave & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	27.0	27.0	27.0				31.0	25.0	25.0		27.0	70.0
Actuated g/C Ratio	0.39	0.39	0.39				0.44	0.36	0.36		0.39	1.00
v/c Ratio	0.78	0.76	0.18				0.50	0.77	0.14		1.40dl	0.86
Control Delay	29.9	23.3	4.1				16.6	25.0	4.6		30.8	7.3
Queue Delay	0.0	0.0	0.0				0.0	0.0	0.0		0.0	0.0
Total Delay	29.9	23.3	4.1				16.6	25.0	4.6		30.8	7.3
LOS	C	C	A				B	C	A		C	A
Approach Delay		24.0						22.3			15.2	
Approach LOS		C						C			B	
Queue Length 50th (m)	57.5	57.7	0.0				12.5	59.1	0.0		28.4	0.0
Queue Length 95th (m)	#100.8	69.2	3.5				19.1	77.7	5.4		#48.2	#8.7
Internal Link Dist (m)		422.3			103.5			153.1			101.8	
Turn Bay Length (m)							110.0		210.0			
Base Capacity (vph)	605	1261	616				362	1278	632		783	1532
Starvation Cap Reductn	0	0	0				0	0	0		0	0
Spillback Cap Reductn	0	0	0				0	0	0		0	0
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.78	0.76	0.18				0.50	0.77	0.14		0.85	0.86

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Pretimed
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 19.9   Intersection LOS: B
Intersection Capacity Utilization 81.3%   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.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 1: Icomm Dr/Brant Ave & Colborne St



HCM Signalized Intersection Capacity Analysis
1: Icomm Dr/Brant Ave & Colborne St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱				↰	↑↑	↱		↰↑	↱
Traffic Volume (vph)	818	396	71	0	0	0	140	869	67	176	418	1192
Future Volume (vph)	818	396	71	0	0	0	140	869	67	176	418	1192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0				4.0	6.0	6.0		6.0	4.0
Lane Util. Factor	0.91	0.91	1.00				1.00	0.95	1.00		0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.96				1.00	1.00	0.99		1.00	0.98
Flpb, ped/bikes	0.98	0.99	1.00				1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	0.98	1.00				0.95	1.00	1.00		0.98	1.00
Satd. Flow (prot)	1571	3271	1426				1656	3579	1612		3419	1532
Flt Permitted	0.95	0.98	1.00				0.40	1.00	1.00		0.55	1.00
Satd. Flow (perm)	1571	3271	1426				695	3579	1612		1919	1532
Peak-hour factor, PHF	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Adj. Flow (vph)	940	483	108	0	0	0	182	988	88	220	445	1310
RTOR Reduction (vph)	0	0	66	0	0	0	0	0	57	0	0	0
Lane Group Flow (vph)	470	953	42	0	0	0	182	988	31	0	665	1310
Confl. Peds. (#/hr)	19		33				9		1	1		9
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Turn Type	Perm	NA	Perm				pm+pt	NA	Perm	pm+pt	NA	Free
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4				2		2	6		Free
Actuated Green, G (s)	27.0	27.0	27.0				29.0	25.0	25.0		29.0	70.0
Effective Green, g (s)	27.0	27.0	27.0				29.0	25.0	25.0		29.0	70.0
Actuated g/C Ratio	0.39	0.39	0.39				0.41	0.36	0.36		0.41	1.00
Clearance Time (s)	4.0	4.0	4.0				4.0	6.0	6.0		6.0	
Lane Grp Cap (vph)	605	1261	550				342	1278	575		880	1532
v/s Ratio Prot							0.03	0.28			0.04	
v/s Ratio Perm	0.30	0.29	0.03				0.19		0.02		0.27	c0.86
v/c Ratio	0.78	0.76	0.08				0.53	0.77	0.05		1.40dl	0.86
Uniform Delay, d1	18.9	18.6	13.6				13.6	20.0	14.8		17.5	0.0
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.5	4.3	0.3				5.8	4.6	0.2		6.0	6.3
Delay (s)	28.3	22.9	13.9				19.4	24.6	14.9		23.5	6.3
Level of Service	C	C	B				B	C	B		C	A
Approach Delay (s)		23.9			0.0			23.2			12.1	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Lanes, Volumes, Timings
2: Colborne St & King St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	100	539	0	0	90	0
Future Volume (vph)	100	539	0	0	90	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.992			0.950	
Satd. Flow (prot)	0	3550	0	0	1789	0
Flt Permitted		0.992			0.950	
Satd. Flow (perm)	0	3550	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		127.5	121.5		114.7	
Travel Time (s)		9.6	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	586	0	0	98	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	695	0	0	98	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 29.5%   ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Colborne St & King St

2051 AM Peak (1-Way).syn
09-21-2022

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	100	539	0	0	90	0
Future Volume (Veh/h)	100	539	0	0	90	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	109	586	0	0	98	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)		127				
pX, platoon unblocked						
vC, conflicting volume	0				511	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				511	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				79	100
cM capacity (veh/h)	1622				459	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	304	391	98
Volume Left	109	0	98
Volume Right	0	0	0
cSH	1622	1700	459
Volume to Capacity	0.07	0.23	0.21
Queue Length 95th (m)	1.6	0.0	6.1
Control Delay (s)	3.0	0.0	15.0
Lane LOS	A		B
Approach Delay (s)	1.3		15.0
Approach LOS			B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Colborne St & Queen St

2051 AM Peak (1-Way).syn
09-21-2022

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	27	602	0	0	78	0
Future Volume (vph)	27	602	0	0	78	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	654	0	0	85	0

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total (vph)	247	436	85
Volume Left (vph)	29	0	85
Volume Right (vph)	0	0	0
Hadj (s)	0.07	0.02	0.22
Departure Headway (s)	4.8	4.8	5.5
Degree Utilization, x	0.33	0.58	0.13
Capacity (veh/h)	738	746	618
Control Delay (s)	9.0	12.9	9.3
Approach Delay (s)	11.5		9.3
Approach LOS	B		A

Intersection Summary			
Delay	11.2		
Level of Service	B		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
3: Colborne St & Queen St

2051 AM Peak (1-Way).syn
09-21-2022

	↗	→	←	↖	↘	↙
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	27	602	0	0	78	0
Future Volume (vph)	27	602	0	0	78	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	3608	0	0	1807	0
Flt Permitted		0.998			0.950	
Satd. Flow (perm)	0	3608	0	0	1807	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	29	654	0	0	85	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	683	0	0	85	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 28.4% ICU Level of Service A
Analysis Period (min) 15

Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

2051 AM Peak (1-Way).syn
09-21-2022

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	680	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	680	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Flt Permitted												
Satd. Flow (perm)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		183.0			240.0			61.0			43.5	
Travel Time (s)		13.7			18.0			4.6			3.3	
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
Adj. Flow (vph)	0	739	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	739	0	0	0	0	0	0	0	0	0	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2						2			2	
Detector Template		Thru						Thru			Thru	
Leading Detector (m)		10.0						10.0			10.0	
Trailing Detector (m)		0.0						0.0			0.0	
Detector 1 Position(m)		0.0						0.0			0.0	
Detector 1 Size(m)		0.6						0.6			0.6	
Detector 1 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0						0.0			0.0	
Detector 1 Queue (s)		0.0						0.0			0.0	
Detector 1 Delay (s)		0.0						0.0			0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Detector Phase		2						4			4	
Switch Phase												
Minimum Initial (s)		4.0						4.0			4.0	

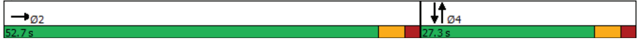
Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		27.3						27.3			27.3	
Total Split (s)		52.7						27.3			27.3	
Total Split (%)		65.9%						34.1%			34.1%	
Maximum Green (s)		47.4						22.0			22.0	
Yellow Time (s)		3.3						3.3			3.3	
All-Red Time (s)		2.0						2.0			2.0	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.3						5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0						3.0			3.0	
Recall Mode		Max						None			None	
Walk Time (s)		7.0						7.0			7.0	
Flash Dont Walk (s)		15.0						15.0			15.0	
Pedestrian Calls (#/hr)		0						120			120	
Act Effct Green (s)		64.9										
Actuated g/C Ratio		0.73										
v/c Ratio		0.28										
Control Delay		6.5										
Queue Delay		0.0										
Total Delay		6.5										
LOS		A										
Approach Delay		6.5										
Approach LOS		A										
Queue Length 50th (m)		27.5										
Queue Length 95th (m)		36.2										
Internal Link Dist (m)		159.0			216.0			37.0			19.5	
Turn Bay Length (m)												
Base Capacity (vph)		2596										
Starvation Cap Reductn		0										
Spillback Cap Reductn		0										
Storage Cap Reductn		0										
Reduced v/c Ratio		0.28										

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 89.5
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.28
Intersection Signal Delay: 6.5 Intersection LOS: A
Intersection Capacity Utilization 23.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Market Street IPS/Market St IPS & Colborne St



HCM Signalized Intersection Capacity Analysis
4: Market Street IPS/Market St IPS & Colborne St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	680	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	680	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3										
Lane Util. Factor		0.95										
Frt		1.00										
Flt Protected		1.00										
Satd. Flow (prot)		3579										
Flt Permitted		1.00										
Satd. Flow (perm)		3579										
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)	0	739	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	739	0	0	0	0	0	0	0	0	0	0
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Actuated Green, G (s)		63.6										
Effective Green, g (s)		63.6										
Actuated g/C Ratio		0.70										
Clearance Time (s)		5.3										
Vehicle Extension (s)		3.0										
Lane Grp Cap (vph)		2506										
v/s Ratio Prot		c0.21										
v/s Ratio Perm												
v/c Ratio		0.29										
Uniform Delay, d1		5.1										
Progression Factor		1.00										
Incremental Delay, d2		0.3										
Delay (s)		5.4										
Level of Service		A										
Approach Delay (s)		5.4			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	10.6
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Colborne St & Charlotte Street

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	137	543	0	0	104	0
Future Volume (vph)	137	543	0	0	104	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.990			0.950	
Satd. Flow (prot)	0	3543	0	0	1789	0
Flt Permitted		0.990			0.950	
Satd. Flow (perm)	0	3543	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		240.0	140.5		77.6	
Travel Time (s)		18.0	10.5		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	149	590	0	0	113	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	739	0	0	113	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 31.4% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
5: Colborne St & Charlotte Street

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	137	543	0	0	104	0
Future Volume (Veh/h)	137	543	0	0	104	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	149	590	0	0	113	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)		240	141			
pX, platoon unblocked					0.94	
vC, conflicting volume	0				593	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				451	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				75	100
cM capacity (veh/h)	1622				460	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	346	393	113
Volume Left	149	0	113
Volume Right	0	0	0
cSH	1622	1700	460
Volume to Capacity	0.09	0.23	0.25
Queue Length 95th (m)	2.3	0.0	7.3
Control Delay (s)	3.6	0.0	15.3
Lane LOS	A		C
Approach Delay (s)	1.7		15.3
Approach LOS			C

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
6: Clarence Street & Colborne

2051 AM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱					↑↑	↱		↰↑	
Traffic Volume (vph)	94	458	95	0	0	0	0	1429	984	165	1139	0
Future Volume (vph)	94	458	95	0	0	0	0	1429	984	165	1139	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		23.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00
Ped Bike Factor	0.98		0.96						0.97			
Frt			0.850						0.850			
Flt Protected	0.950										0.994	
Satd. Flow (prot)	1807	3579	1633	0	0	0	0	3614	1601	0	3597	0
Flt Permitted	0.950										0.513	
Satd. Flow (perm)	1774	3579	1563	0	0	0	0	3614	1560	0	1856	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			59						28			
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		140.5			1204.0			126.9			109.9	
Travel Time (s)		10.5			90.3			9.5			8.2	
Confl. Peds. (#/hr)	12		21						8	8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Adj. Flow (vph)	102	498	103	0	0	0	0	1553	1070	179	1238	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	498	103	0	0	0	0	1553	1070	0	1417	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA	Perm	Perm	NA	
Protected Phases		2						8			4	
Permitted Phases	2		2						8	4		
Minimum Split (s)	28.0	28.0	28.0					25.0	25.0	25.0	25.0	
Total Split (s)	28.0	28.0	28.0					92.0	92.0	92.0	92.0	
Total Split (%)	23.3%	23.3%	23.3%					76.7%	76.7%	76.7%	76.7%	
Maximum Green (s)	24.0	24.0	24.0					88.0	88.0	88.0	88.0	
Yellow Time (s)	3.5	3.5	3.5					3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5					0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0					7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	17.0	17.0	17.0					14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0					0	0	0	0	

Lanes, Volumes, Timings
6: Clarence Street & Colborne

2051 AM Peak (1-Way).syn
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	24.0	24.0	24.0					88.0	88.0		88.0	
Actuated g/C Ratio	0.20	0.20	0.20					0.73	0.73		0.73	
v/c Ratio	0.29	0.70	0.29					0.59	0.93		1.04	
Control Delay	43.4	50.5	21.5					8.6	28.7		53.4	
Queue Delay	0.0	0.0	0.0					0.0	0.0		23.7	
Total Delay	43.4	50.5	21.5					8.6	28.7		77.0	
LOS	D	D	C					A	C		E	
Approach Delay		45.2						16.8			77.0	
Approach LOS		D						B			E	
Queue Length 50th (m)	20.6	57.8	8.6					78.7	181.4		~189.9	
Queue Length 95th (m)	36.7	76.2	24.0					94.5	#318.9		#231.9	
Internal Link Dist (m)		116.5			1180.0			102.9			85.9	
Turn Bay Length (m)	25.0		23.0									
Base Capacity (vph)	354	715	359					2650	1151		1361	
Starvation Cap Reductn	0	0	0					0	0		132	
Spillback Cap Reductn	0	0	0					0	0		0	
Storage Cap Reductn	0	0	0					0	0		0	
Reduced v/c Ratio	0.29	0.70	0.29					0.59	0.93		1.15	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 120
Control Type: Pretimed
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 39.0 Intersection LOS: D
Intersection Capacity Utilization 128.0% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Clarence Street & Colborne

HCM Signalized Intersection Capacity Analysis
6: Clarence Street & Colborne

2051 AM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱					↑↑	↱		↰↑	
Traffic Volume (vph)	94	458	95	0	0	0	0	1429	984	165	1139	0
Future Volume (vph)	94	458	95	0	0	0	0	1429	984	165	1139	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00					0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.96					1.00	0.97		1.00	
Flpb, ped/bikes	0.98	1.00	1.00					1.00	1.00		1.00	
Frt	1.00	1.00	0.85					1.00	0.85		1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00		0.99	
Satd. Flow (prot)	1774	3579	1563					3614	1560		3596	
Flt Permitted	0.95	1.00	1.00					1.00	1.00		0.51	
Satd. Flow (perm)	1774	3579	1563					3614	1560		1857	
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)	102	498	103	0	0	0	0	1553	1070	179	1238	0
RTOR Reduction (vph)	0	0	47	0	0	0	0	0	7	0	0	0
Lane Group Flow (vph)	102	498	56	0	0	0	0	1553	1063	0	1417	0
Confl. Peds. (#/hr)	12		21						8	8		
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Turn Type	Perm	NA	Perm					NA	Perm	Perm	NA	
Protected Phases		2						8			4	
Permitted Phases	2		2						8	4		
Actuated Green, G (s)	24.0	24.0	24.0					88.0	88.0		88.0	
Effective Green, g (s)	24.0	24.0	24.0					88.0	88.0		88.0	
Actuated g/C Ratio	0.20	0.20	0.20					0.73	0.73		0.73	
Clearance Time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lane Grp Cap (vph)	354	715	312					2650	1144		1361	
v/s Ratio Prot		c0.14						0.43				
v/s Ratio Perm	0.06		0.04						0.68		c0.76	
v/c Ratio	0.29	0.70	0.18					0.59	0.93		1.04	
Uniform Delay, d1	40.7	44.6	39.8					7.5	13.4		16.0	
Progression Factor	1.00	1.00	1.00					1.00	1.00		1.00	
Incremental Delay, d2	2.0	5.6	1.3					1.0	14.2		35.8	
Delay (s)	42.8	50.2	41.1					8.4	27.6		51.8	
Level of Service	D	D	D					A	C		D	
Approach Delay (s)		47.8			0.0			16.3			51.8	
Approach LOS		D			A			B			D	

Intersection Summary

HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	128.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Canadian Tire Entrance & Colborne St & Dalhousie Street

2051 AM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑↑	↱	↰		↱↱	↰↱			
Traffic Volume (vph)	65	1441	0	0	0	922	0	0	0	0
Future Volume (vph)	65	1441	0	0	0	922	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		22.0	48.0		0.0	0.0	0.0	0.0	0.0
Storage Lanes	1		1	1		2	1	0	0	0
Taper Length (m)	7.5			7.5			7.5		7.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00	1.00
Frt						0.850				
Flt Protected	0.950									
Satd. Flow (prot)	1789	3579	1883	1883	0	2818	1883	0	0	0
Flt Permitted	0.950									
Satd. Flow (perm)	1789	3579	1883	1883	0	2818	1883	0	0	0
Right Turn on Red	Yes		Yes			Yes		Yes		
Satd. Flow (RTOR)	71					1730				
Link Speed (k/h)		48			48		48		48	
Link Distance (m)		1204.0			112.9		111.0		175.7	
Travel Time (s)		90.3			8.5		8.3		13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	1566	0	0	0	1002	0	0	0	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	71	1566	0	0	0	1002	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Right	Left	Right
Median Width(m)		3.7			3.7		3.7		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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24	14	24	14
Number of Detectors	1	2	1	1		1	1			
Detector Template	Left	Thru	Right	Left		Right	Left			
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0	2.0			
Trailing Detector (m)	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			
Detector 1 Size(m)	2.0	0.6	2.0	2.0		2.0	2.0			
Detector 1 Type	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			
Detector 1 Queue (s)	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			
Detector 2 Position(m)		9.4								
Detector 2 Size(m)		0.6								
Detector 2 Type		Cl+Ex								
Detector 2 Channel										
Detector 2 Extend (s)		0.0								
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				

Lanes, Volumes, Timings — 2051 AM Peak (1-Way).syn
7: Canadian Tire Entrance & Colborne St & Dalhousie Street — 09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Detector Phase	2	2	2	2			8			
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0			3.0			
Minimum Split (s)	21.6	21.6	21.6	21.6			8.3			
Total Split (s)	71.7	71.7	71.7	71.7			8.3			
Total Split (%)	89.6%	89.6%	89.6%	89.6%			10.4%			
Maximum Green (s)	66.1	66.1	66.1	66.1			3.0			
Yellow Time (s)	3.3	3.3	3.3	3.3			3.3			
All-Red Time (s)	2.3	2.3	2.3	2.3			2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			0.0			
Total Lost Time (s)	5.6	5.6	5.6	5.6			5.3			
Lead/Lag										
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			
Recall Mode	C-Max	C-Max	C-Max	C-Max			None			
Walk Time (s)	5.0	5.0	5.0	5.0			5.0			
Flash Dont Walk (s)	11.0	11.0	11.0	11.0			11.0			
Pedestrian Calls (#/hr)	0	0	0	0			0			
Act Effct Green (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
v/c Ratio	0.04	0.44				0.36				
Control Delay	0.0	0.4				0.4				
Queue Delay	0.0	0.0				0.0				
Total Delay	0.0	0.4				0.4				
LOS	A	A				A				
Approach Delay		0.4			0.4					
Approach LOS		A			A					
Queue Length 50th (m)	0.0	0.0				0.0				
Queue Length 95th (m)	0.0	0.0				0.0				
Internal Link Dist (m)		1180.0			88.9		87.0		151.7	
Turn Bay Length (m)										
Base Capacity (vph)	1789	3579				2818				
Starvation Cap Reductn	0	0				0				
Spillback Cap Reductn	0	0				0				
Storage Cap Reductn	0	0				0				
Reduced v/c Ratio	0.04	0.44				0.36				

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 0.4 Intersection LOS: A
Intersection Capacity Utilization 44.5% ICU Level of Service A
Analysis Period (min) 15

Lanes, Volumes, Timings — 2051 AM Peak (1-Way).syn
7: Canadian Tire Entrance & Colborne St & Dalhousie Street — 09-21-2022

Splits and Phases: 7: Canadian Tire Entrance & Colborne St & Dalhousie Street

HCM Signalized Intersection Capacity Analysis — 2051 AM Peak (1-Way).syn
7: Canadian Tire Entrance & Colborne St & Dalhousie Street — 09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑↑	↱	↰		↱↱	Y			
Traffic Volume (vph)	65	1441	0	0	0	922	0	0	0	0
Future Volume (vph)	65	1441	0	0	0	922	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6				4.0				
Lane Util. Factor	1.00	0.95				0.88				
Frt	1.00	1.00				0.85				
Flt Protected	0.95	1.00				1.00				
Satd. Flow (prot)	1789	3579				2818				
Flt Permitted	0.95	1.00				1.00				
Satd. Flow (perm)	1789	3579				2818				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	1566	0	0	0	1002	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	71	1566	0	0	0	1002	0	0	0	0
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				
Actuated Green, G (s)	80.0	80.0				80.0				
Effective Green, g (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
Clearance Time (s)	5.6	5.6								
Vehicle Extension (s)	3.0	3.0								
Lane Grp Cap (vph)	1789	3579				2818				
v/s Ratio Prot		c0.44								
v/s Ratio Perm	0.04					0.36				
v/c Ratio	0.04	0.44				0.36				
Uniform Delay, d1	0.0	0.0				0.0				
Progression Factor	1.00	1.00				1.00				
Incremental Delay, d2	0.0	0.4				0.4				
Delay (s)	0.0	0.4				0.4				
Level of Service	A	A				A				
Approach Delay (s)		0.4			0.4		0.0		0.0	
Approach LOS		A			A		A		A	

Intersection Summary			
HCM 2000 Control Delay	0.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings — 2051 AM Peak (1-Way).syn
8: Clarence Street & Dalhousie St — 09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	378	403	162	81	1442	0	0	926	78
Future Volume (vph)	0	0	0	378	403	162	81	1442	0	0	926	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		50.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.97		0.97		1.00			1.00	
Frt						0.850					0.988	
Flt Protected				0.950				0.997				
Satd. Flow (prot)	0	0	0	1825	3614	1585	0	3572	0	0	3568	0
Flt Permitted				0.950				0.752				
Satd. Flow (perm)	0	0	0	1774	3614	1534	0	2694	0	0	3568	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						36					18	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		139.0			1069.0			109.9			102.5	
Travel Time (s)		10.4			80.2			8.2			7.7	
Confl. Peds. (#/hr)				23		17	8					8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	411	438	176	88	1567	0	0	1007	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	411	438	176	0	1655	0	0	1092	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				pm+pt	NA	Perm	Perm	NA			NA	
Protected Phases				5	2			4			8	
Permitted Phases				2		2	4					
Minimum Split (s)				8.0	28.1	28.1	31.1	31.1			31.1	
Total Split (s)				29.0	29.0	29.0	61.0	61.0			61.0	
Total Split (%)				32.2%	32.2%	32.2%	67.8%	67.8%			67.8%	
Maximum Green (s)				25.0	23.0	23.0	55.0	55.0			55.0	
Yellow Time (s)				3.5	4.0	4.0	4.0	4.0			4.0	
All-Red Time (s)				0.5	2.0	2.0	2.0	2.0			2.0	
Lost Time Adjust (s)				0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)				4.0	6.0	6.0		6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)					7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)					15.0	15.0	18.0	18.0			18.0	
Pedestrian Calls (#/hr)					0	0	0	0			0	

Lanes, Volumes, Timings
8: Clarence Street & Dalhousie St

2051 AM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)				25.0	23.0	23.0		55.0			55.0	
Actuated g/C Ratio				0.28	0.26	0.26		0.61			0.61	
v/c Ratio				0.81	0.47	0.42		1.01			0.50	
Control Delay				44.8	30.4	25.7		42.4			10.6	
Queue Delay				0.0	0.0	0.0		35.5			0.0	
Total Delay				44.8	30.4	25.7		77.9			10.6	
LOS				D	C	C		E			B	
Approach Delay					35.4			77.9			10.6	
Approach LOS					D			E			B	
Queue Length 50th (m)				66.1	33.7	19.9		~140.4			49.7	
Queue Length 95th (m)				#111.4	47.7	38.5		#200.2			64.1	
Internal Link Dist (m)		115.0			1045.0			85.9			78.5	
Turn Bay Length (m)						50.0						
Base Capacity (vph)				506	923	418		1646			2187	
Starvation Cap Reductn				0	0	0		264			0	
Spillback Cap Reductn				0	0	0		0			0	
Storage Cap Reductn				0	0	0		0			0	
Reduced v/c Ratio				0.81	0.47	0.42		1.20			0.50	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 46.9 Intersection LOS: D
Intersection Capacity Utilization 104.6% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Clarence Street & Dalhousie St

HCM Signalized Intersection Capacity Analysis
8: Clarence Street & Dalhousie St

2051 AM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	378	403	162	81	1442	0	0	926	78
Future Volume (vph)	0	0	0	378	403	162	81	1442	0	0	926	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	6.0	6.0		6.0			6.0	
Lane Util. Factor				1.00	0.95	1.00		0.95			0.95	
Frpb, ped/bikes				1.00	1.00	0.97		1.00			1.00	
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			0.99	
Flt Protected				0.95	1.00	1.00		1.00			1.00	
Satd. Flow (prot)				1825	3614	1534		3572			3569	
Flt Permitted				0.95	1.00	1.00		0.75			1.00	
Satd. Flow (perm)				1825	3614	1534		2692			3569	
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)	0	0	0	411	438	176	88	1567	0	0	1007	85
RTOR Reduction (vph)	0	0	0	0	0	27	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	411	438	149	0	1655	0	0	1085	0
Confl. Peds. (#/hr)				23		17	8					8
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Turn Type				pm+pt	NA	Perm	Perm	NA			NA	
Protected Phases				5	2			4			8	
Permitted Phases				2		2	4					
Actuated Green, G (s)				25.0	23.0	23.0		55.0			55.0	
Effective Green, g (s)				25.0	23.0	23.0		55.0			55.0	
Actuated g/C Ratio				0.28	0.26	0.26		0.61			0.61	
Clearance Time (s)				4.0	6.0	6.0		6.0			6.0	
Lane Grp Cap (vph)				506	923	392		1645			2181	
v/s Ratio Prot				c0.23	0.12						0.30	
v/s Ratio Perm						0.10		c0.61				
v/c Ratio				0.81	0.47	0.38		1.01			0.50	
Uniform Delay, d1				30.3	28.4	27.6		17.5			9.8	
Progression Factor				1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2				13.3	1.7	2.8		23.7			0.8	
Delay (s)				43.6	30.1	30.4		41.2			10.6	
Level of Service				D	C	C		D			B	
Approach Delay (s)		0.0			35.6			41.2			10.6	
Approach LOS		A			D			D			B	

Intersection Summary

HCM 2000 Control Delay	30.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
9: Charlotte Street & Dalhousie St

2051 AM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (vph)	0	0	0	96	438	28	128	71	0	0	41	10
Future Volume (vph)	0	0	0	96	438	28	128	71	0	0	41	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	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.993						0.973	
Flt Protected					0.992			0.969				
Satd. Flow (prot)	0	0	0	0	3525	0	0	1825	0	0	1833	0
Flt Permitted					0.992			0.969				
Satd. Flow (perm)	0	0	0	0	3525	0	0	1825	0	0	1833	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		241.1			139.0			32.3			102.3	
Travel Time (s)		18.1			10.4			2.4			7.7	
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
Adj. Flow (vph)	0	0	0	104	476	30	139	77	0	0	45	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	610	0	0	216	0	0	56	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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 39.9% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
9: Charlotte Street & Dalhousie St

2051 AM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (veh/h)	0	0	0	96	438	28	128	71	0	0	41	10
Future Volume (Veh/h)	0	0	0	96	438	28	128	71	0	0	41	10
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	0	0	104	476	30	139	77	0	0	45	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		241			139							
pX, platoon unblocked	0.90						0.90	0.90		0.90	0.90	0.90
vC, conflicting volume	506			0			480	714	0	738	699	253
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	238			0			209	469	0	495	452	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			94			76	81	100	100	89	99
cM capacity (veh/h)	1197			1622			570	415	1084	338	424	979

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	342	268	216	56
Volume Left	104	0	139	0
Volume Right	0	30	0	11
cSH	1622	1700	503	477
Volume to Capacity	0.06	0.16	0.43	0.12
Queue Length 95th (m)	1.6	0.0	16.2	3.0
Control Delay (s)	2.6	0.0	17.4	13.5
Lane LOS	A		C	B
Approach Delay (s)	1.5		17.4	13.5
Approach LOS			C	B

Intersection Summary

Average Delay	6.1		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↱		↱
Traffic Volume (vph)	0	0	480	96	0	104
Future Volume (vph)	0	0	480	96	0	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0			10.0	0.0	0.0
Storage Lanes	0			1	0	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00
Ped Bike Factor				0.81		0.74
Frt				0.850		0.865
Flt Protected						
Satd. Flow (prot)	0	0	3614	1617	0	1645
Flt Permitted						
Satd. Flow (perm)	0	0	3614	1305	0	1217
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				70		167
Link Speed (k/h)		48	48		48	
Link Distance (m)		182.0	241.1		101.1	
Travel Time (s)		13.7	18.1		7.6	
Confl. Peds. (#/hr)				94		216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Adj. Flow (vph)	0	0	522	104	0	113
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	522	104	0	113
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Turn Type			NA	Perm		Perm
Protected Phases			2			
Permitted Phases				2		4
Minimum Split (s)			29.3	29.3		28.3
Total Split (s)			50.0	50.0		40.0
Total Split (%)			55.6%	55.6%		44.4%
Maximum Green (s)			44.7	44.7		34.7
Yellow Time (s)			3.3	3.3		3.3
All-Red Time (s)			2.0	2.0		2.0
Lost Time Adjust (s)			0.0	0.0		0.0
Total Lost Time (s)			5.3	5.3		5.3
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)			7.0	7.0		7.0
Flash Dont Walk (s)			17.0	17.0		16.0
Pedestrian Calls (#/hr)			0	0		0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↱		↱
Traffic Volume (vph)	0	0	480	96	0	104
Future Volume (vph)	0	0	480	96	0	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			5.3	5.3		5.3
Lane Util. Factor			0.95	1.00		1.00
Frpb, ped/bikes			1.00	0.81		0.74
Flpb, ped/bikes			1.00	1.00		1.00
Frt			1.00	0.85		0.86
Flt Protected			1.00	1.00		1.00
Satd. Flow (prot)			3614	1305		1217
Flt Permitted			1.00	1.00		1.00
Satd. Flow (perm)			3614	1305		1217
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	522	104	0	113
RTOR Reduction (vph)	0	0	0	35	0	69
Lane Group Flow (vph)	0	0	522	69	0	44
Confl. Peds. (#/hr)				94		216
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Turn Type			NA	Perm		Perm
Protected Phases			2			
Permitted Phases				2		4
Actuated Green, G (s)			44.7	44.7		34.7
Effective Green, g (s)			44.7	44.7		34.7
Actuated g/C Ratio			0.50	0.50		0.39
Clearance Time (s)			5.3	5.3		5.3
Lane Grp Cap (vph)			1794	648		469
v/s Ratio Prot			c0.14			
v/s Ratio Perm				0.05		c0.04
v/c Ratio			0.29	0.11		0.09
Uniform Delay, d1			13.3	12.0		17.6
Progression Factor			0.80	0.57		1.00
Incremental Delay, d2			0.4	0.3		0.4
Delay (s)			11.1	7.1		18.0
Level of Service			B	A		B
Approach Delay (s)		0.0	10.4		18.0	
Approach LOS		A	B		B	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)			44.7	44.7		34.7
Actuated g/C Ratio			0.50	0.50		0.39
v/c Ratio			0.29	0.15		0.20
Control Delay			11.2	3.4		1.8
Queue Delay			0.0	0.0		0.0
Total Delay			11.2	3.4		1.8
LOS			B	A		A
Approach Delay			9.9		1.8	
Approach LOS			A		A	
Queue Length 50th (m)			36.7	3.4		0.0
Queue Length 95th (m)			m48.6	m6.4		3.8
Internal Link Dist (m)		158.0	217.1		77.1	
Turn Bay Length (m)				10.0		
Base Capacity (vph)			1794	683		571
Starvation Cap Reductn			0	0		0
Spillback Cap Reductn			0	0		0
Storage Cap Reductn			0	0		0
Reduced v/c Ratio			0.29	0.15		0.20

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 37 (41%), Referenced to phase 2:WBT and 6:, Start of Green

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.29

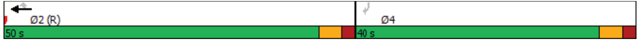
Intersection Signal Delay: 8.7　　Intersection LOS: A

Intersection Capacity Utilization 48.0%　　ICU Level of Service A

Analysis Period (min) 15

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

Splits and Phases: 10: Dalhousie St & Market St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↱			↰			↑	↱
Traffic Volume (vph)	0	0	0	56	504	27	7	17	0	0	30	32
Future Volume (vph)	0	0	0	56	504	27	7	17	0	0	30	32
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	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.95	1.00			0.99				0.97
Frt					0.992							0.850
Flt Protected				0.950				0.985				
Satd. Flow (prot)	0	0	0	1825	3607	0	0	1892	0	0	1921	1601
Flt Permitted				0.950				0.948				
Satd. Flow (perm)	0	0	0	1738	3607	0	0	1811	0	0	1921	1551
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					10							35
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	0	0	0	61	548	29	8	18	0	0	33	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	61	577	0	0	26	0	0	33	35
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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Minimum Split (s)				26.3	26.3		26.3	26.3			26.3	26.3
Total Split (s)				48.0	48.0		32.0	32.0			32.0	32.0
Total Split (%)				60.0%	60.0%		40.0%	40.0%			40.0%	40.0%
Maximum Green (s)				42.7	42.7		26.7	26.7			26.7	26.7
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	3.3
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	2.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				5.3	5.3			5.3			5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)				14.0	14.0		14.0	14.0			14.0	14.0
Pedestrian Calls (#/hr)				0	0		0	0			0	0
Act Effct Green (s)				42.7	42.7			26.7			26.7	26.7
Actuated g/C Ratio				0.53	0.53			0.33			0.33	0.33
v/c Ratio				0.07	0.30			0.04			0.05	0.06

11: Queen St/Queen Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay				9.3	10.7			18.4			18.5	7.1
Queue Delay				0.0	0.0			0.0			0.0	0.0
Total Delay				9.3	10.7			18.4			18.5	7.1
LOS				A	B			B			B	A
Approach Delay					10.5			18.4			12.6	
Approach LOS					B			B			B	
Queue Length 50th (m)				4.2	23.4			2.6			3.4	0.0
Queue Length 95th (m)				9.4	32.7			7.7			9.0	5.7
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)				927	1929			604			641	540
Starvation Cap Reductn				0	0			0			0	0
Spillback Cap Reductn				0	0			0			0	0
Storage Cap Reductn				0	0			0			0	0
Reduced v/c Ratio				0.07	0.30			0.04			0.05	0.06

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 37 (46%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.30
Intersection Signal Delay: 11.0 Intersection LOS: B
Intersection Capacity Utilization 65.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St

11: Queen St/Queen Street & Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑↱			↰↑			↑	↱
Traffic Volume (vph)	0	0	0	56	504	27	7	17	0	0	30	32
Future Volume (vph)	0	0	0	56	504	27	7	17	0	0	30	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.3	5.3			5.3			5.3	5.3
Lane Util. Factor				1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00			1.00			1.00	0.97
Flpb, ped/bikes				0.95	1.00			0.99			1.00	1.00
Frt				1.00	0.99			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.98			1.00	1.00
Satd. Flow (prot)				1738	3609			1881			1921	1551
Flt Permitted				0.95	1.00			0.95			1.00	1.00
Satd. Flow (perm)				1738	3609			1811			1921	1551
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)	0	0	0	61	548	29	8	18	0	0	33	35
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	0	23
Lane Group Flow (vph)	0	0	0	61	572	0	0	26	0	0	33	12
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Actuated Green, G (s)				42.7	42.7			26.7			26.7	26.7
Effective Green, g (s)				42.7	42.7			26.7			26.7	26.7
Actuated g/C Ratio				0.53	0.53			0.33			0.33	0.33
Clearance Time (s)				5.3	5.3			5.3			5.3	5.3
Lane Grp Cap (vph)				927	1926			604			641	517
v/s Ratio Prot					c0.16						c0.02	
v/s Ratio Perm				0.04				0.01				0.01
v/c Ratio				0.07	0.30			0.04			0.05	0.02
Uniform Delay, d1				9.0	10.3			18.0			18.1	17.9
Progression Factor				1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2				0.1	0.4			0.1			0.2	0.1
Delay (s)				9.1	10.7			18.1			18.2	18.0
Level of Service				A	B			B			B	B
Approach Delay (s)		0.0			10.6			18.1			18.1	
Approach LOS		A			B			B			B	

Intersection Summary

HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

12: King St/King Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↑↱			↰↑			↑↱	
Traffic Volume (vph)	0	0	0	9	482	52	60	58	0	0	43	48
Future Volume (vph)	0	0	0	9	482	52	60	58	0	0	43	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00			1.00			0.99	
Frt					0.986						0.929	
Flt Protected					0.999			0.975				
Satd. Flow (prot)	0	0	0	0	3548	0	0	1873	0	0	1624	0
Flt Permitted					0.999			0.825				
Satd. Flow (perm)	0	0	0	0	3547	0	0	1582	0	0	1624	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					19						52	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		172.6			119.6			114.7			99.2	
Travel Time (s)		12.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	0	0	0	10	524	57	65	63	0	0	47	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	591	0	0	128	0	0	99	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Minimum Split (s)				27.3	27.3		27.3	27.3			27.3	
Total Split (s)				43.0	43.0		37.0	37.0			37.0	
Total Split (%)				53.8%	53.8%		46.3%	46.3%			46.3%	
Maximum Green (s)				37.7	37.7		31.7	31.7			31.7	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				15.0	15.0		15.0	15.0			15.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					37.7			31.7			31.7	
Actuated g/C Ratio					0.47			0.40			0.40	
v/c Ratio					0.35			0.20			0.15	

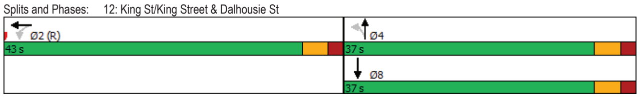
12: King St/King Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					5.0			17.0			9.1	
Queue Delay					0.0			0.0			0.0	
Total Delay					5.0			17.0			9.1	
LOS					A			B			A	
Approach Delay					5.0			17.0			9.1	
Approach LOS					A			B			A	
Queue Length 50th (m)					6.3			12.5			4.3	
Queue Length 95th (m)					9.6			23.8			13.3	
Internal Link Dist (m)		148.6			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)					1681			626			674	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.35			0.20			0.15	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 43 (54%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 7.4 Intersection LOS: A
Intersection Capacity Utilization 45.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 12: King St/King Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis
12: King St/King Street & Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↑↱			↰↑			↑↱	
Traffic Volume (vph)	0	0	0	9	482	52	60	58	0	0	43	48
Future Volume (vph)	0	0	0	9	482	52	60	58	0	0	43	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	
Lane Util. Factor					0.95			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.99	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.99			1.00			0.93	
Flt Protected					1.00			0.98			1.00	
Satd. Flow (prot)					3546			1870			1624	
Flt Permitted					1.00			0.82			1.00	
Satd. Flow (perm)					3546			1581			1624	
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)	0	0	0	10	524	57	65	63	0	0	47	52
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	31	0
Lane Group Flow (vph)	0	0	0	0	581	0	0	128	0	0	68	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Actuated Green, G (s)					37.7			31.7			31.7	
Effective Green, g (s)					37.7			31.7			31.7	
Actuated g/C Ratio					0.47			0.40			0.40	
Clearance Time (s)					5.3			5.3			5.3	
Lane Grp Cap (vph)					1671			626			643	
v/s Ratio Prot											0.04	
v/s Ratio Perm					0.16			c0.08				
v/c Ratio					0.35			0.20			0.11	
Uniform Delay, d1					13.4			15.9			15.2	
Progression Factor					0.34			1.00			1.00	
Incremental Delay, d2					0.6			0.7			0.3	
Delay (s)					5.1			16.6			15.5	
Level of Service					A			B			B	
Approach Delay (s)		0.0			5.1			16.6			15.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Brant Ave & Armoury/Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio				0.49	0.01	0.32		0.91			0.69	
Control Delay				17.0	11.3	9.7		22.9			13.1	
Queue Delay				0.0	0.0	0.0		45.7			0.0	
Total Delay				17.0	11.3	9.7		68.7			13.1	
LOS				B	B	A		E			B	
Approach Delay					14.9			68.7			13.1	
Approach LOS					B			E			B	
Queue Length 50th (m)				27.4	0.3	0.0		116.6			73.9	
Queue Length 95th (m)				41.0	m0.9	6.7		#180.0			96.3	
Internal Link Dist (m)		30.4			148.6			101.8			311.3	
Turn Bay Length (m)												
Base Capacity (vph)				836	578	493		2001			2163	
Starvation Cap Reductn				0	0	0		347			0	
Spillback Cap Reductn				0	0	0		0			0	
Storage Cap Reductn				0	0	0		0			0	
Reduced v/c Ratio				0.49	0.01	0.32		1.10			0.69	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 12 (15%), Referenced to phase 2:NBSB, Start of Green
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 39.5 Intersection LOS: D
Intersection Capacity Utilization 74.2% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: Brant Ave & Armoury/Dalhousie St

Lanes, Volumes, Timings
13: Brant Ave & Armoury/Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱		↰↰	↑	↱		↰↑↑			↑↑↱	
Traffic Volume (vph)	0	0	0	382	3	147	5	1682	0	0	1404	0
Future Volume (vph)	0	0	0	382	3	147	5	1682	0	0	1404	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.99		0.95		1.00				
Frt						0.850						
Flt Protected				0.950								
Satd. Flow (prot)	0	1921	0	3506	1921	1617	0	3579	0	0	3614	0
Flt Permitted				0.757				0.934				
Satd. Flow (perm)	0	1921	0	2777	1921	1542	0	3343	0	0	3614	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						42						
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		54.4			172.6			125.8			335.3	
Travel Time (s)		4.1			12.9			9.1			24.1	
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Peak Hour Factor	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	406	5	156	15	1809	0	0	1494	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	406	5	156	0	1824	0	0	1494	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)		7.4			7.4			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA	Perm	Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2					
Minimum Split (s)	28.0	28.0		28.0	28.0	28.0	29.1	29.1			29.1	
Total Split (s)	28.0	28.0		28.0	28.0	28.0	52.0	52.0			52.0	
Total Split (%)	35.0%	35.0%		35.0%	35.0%	35.0%	65.0%	65.0%			65.0%	
Maximum Green (s)	22.1	22.1		22.1	22.1	22.1	45.9	45.9			45.9	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3			3.3	
All-Red Time (s)	2.6	2.6		2.6	2.6	2.6	2.8	2.8			2.8	
Lost Time Adjust (s)		0.0		-2.0	-2.0	-2.0		-2.0			-2.0	
Total Lost Time (s)		5.9		3.9	3.9	3.9		4.1			4.1	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0	14.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0			0	
Act Effct Green (s)				24.1	24.1	24.1		47.9			47.9	
Actuated g/C Ratio				0.30	0.30	0.30		0.60			0.60	

HCM Signalized Intersection Capacity Analysis
13: Brant Ave & Armoury/Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱		↰↰	↑	↱		↰↑↑			↑↑↱	
Traffic Volume (vph)	0	0	0	382	3	147	5	1682	0	0	1404	0
Future Volume (vph)	0	0	0	382	3	147	5	1682	0	0	1404	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.9	3.9	3.9		4.1			4.1	
Lane Util. Factor				0.97	1.00	1.00		0.95			0.95	
Frpb, ped/bikes				1.00	1.00	0.95		1.00			1.00	
Flpb, ped/bikes				0.99	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	1.00	1.00		1.00			1.00	
Satd. Flow (prot)				3486	1921	1542		3578			3614	
Flt Permitted				0.76	1.00	1.00		0.93			1.00	
Satd. Flow (perm)				2778	1921	1542		3341			3614	
Peak-hour factor, PHF	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Adj. Flow (vph)	0	0	0	406	5	156	15	1809	0	0	1494	0
RTOR Reduction (vph)	0	0	0	0	0	29	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	406	5	127	0	1824	0	0	1494	0
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2					
Actuated Green, G (s)				22.1	22.1	22.1		45.9			45.9	
Effective Green, g (s)				24.1	24.1	24.1		47.9			47.9	
Actuated g/C Ratio				0.30	0.30	0.30		0.60			0.60	
Clearance Time (s)				5.9	5.9	5.9		6.1			6.1	
Lane Grp Cap (vph)				836	578	464		2000			2163	
v/s Ratio Prot					0.00						0.41	
v/s Ratio Perm				c0.15		0.08		c0.55				
v/c Ratio				0.49	0.01	0.27		0.91			0.69	
Uniform Delay, d1				22.9	19.6	21.3		14.2			11.0	
Progression Factor				0.65	0.57	0.51		1.00			1.00	
Incremental Delay, d2				1.9	0.0	1.4		7.8			1.8	
Delay (s)				16.7	11.3	12.2		22.0			12.8	
Level of Service				B	B	B		C			B	
Approach Delay (s)		0.0			15.4			22.0			12.8	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
1: Icomm Dr/Brant Ave & Colborne St

2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱				↰	↑↑	↱		↰↑	↱
Traffic Volume (vph)	985	479	152	0	0	0	175	547	81	196	557	1222
Future Volume (vph)	985	479	152	0	0	0	175	547	81	196	557	1222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	110.0		210.0	40.0		0.0
Storage Lanes	1		1	0		0	1		2	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.91	0.91	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00
Ped Bike Factor	0.98	0.99	0.95				1.00		0.99		1.00	0.98
Frt			0.850						0.850			0.850
Flt Protected	0.950	0.976					0.950				0.986	
Satd. Flow (prot)	1597	3297	1484	0	0	0	1659	3579	1633	0	3424	1570
Flt Permitted	0.950	0.976					0.217				0.655	
Satd. Flow (perm)	1564	3264	1415	0	0	0	378	3579	1612	0	2274	1532
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			230						96			847
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		446.3			127.5			177.1			125.8	
Travel Time (s)		33.5			9.6			12.8			9.1	
Confl. Peds. (#/hr)	19		33				9		1	1		9
Peak Hour Factor	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Adj. Flow (vph)	1132	584	230	0	0	0	227	622	107	245	593	1343
Shared Lane Traffic (%)	50%											
Lane Group Flow (vph)	566	1150	230	0	0	0	227	622	107	0	838	1343
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)		3.7			3.7			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	pm+pt	NA	Perm				pm+pt	NA	Perm	Perm	NA	Free
Protected Phases	7	4					5	2			6	
Permitted Phases	4		4				2		2	6		Free
Minimum Split (s)	8.0	31.0	31.0				8.0	31.0	31.0	31.0	31.0	
Total Split (s)	38.0	38.0	38.0				8.0	52.0	52.0	44.0	44.0	
Total Split (%)	42.2%	42.2%	42.2%				8.9%	57.8%	57.8%	48.9%	48.9%	
Maximum Green (s)	34.0	32.0	32.0				4.0	46.0	46.0	38.0	38.0	
Yellow Time (s)	3.5	4.0	4.0				3.5	4.0	4.0	4.0	4.0	
All-Red Time (s)	0.5	2.0	2.0				0.5	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0	0.0		0.0	
Total Lost Time (s)	4.0	6.0	6.0				4.0	6.0	6.0		6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Walk Time (s)		15.0	15.0					15.0	15.0	15.0	15.0	
Flash Dont Walk (s)		10.0	10.0					10.0	10.0	10.0	10.0	
Pedestrian Calls (#/hr)		0	0					0	0	0	0	

HCM Signalized Intersection Capacity Analysis
1: Icomm Dr/Brant Ave & Colborne St

2051 PM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↑	↱				↰	↑↑	↱		↰↑	↱
Traffic Volume (vph)	985	479	152	0	0	0	175	547	81	196	557	1222
Future Volume (vph)	985	479	152	0	0	0	175	547	81	196	557	1222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0				4.0	6.0	6.0		6.0	4.0
Lane Util. Factor	0.91	0.91	1.00				1.00	0.95	1.00		0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.95				1.00	1.00	0.99		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	0.98	1.00				0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)	1597	3297	1415				1658	3579	1612		3422	1532
Flt Permitted	0.95	0.98	1.00				0.22	1.00	1.00		0.65	1.00
Satd. Flow (perm)	1597	3297	1415				379	3579	1612		2274	1532
Peak-hour factor, PHF	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Adj. Flow (vph)	1132	584	230	0	0	0	227	622	107	245	593	1343
RTOR Reduction (vph)	0	0	148	0	0	0	0	0	47	0	0	0
Lane Group Flow (vph)	566	1150	82	0	0	0	227	622	60	0	838	1343
Confl. Peds. (#/hr)	19		33				9		1	1		9
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Turn Type	pm+pt	NA	Perm				pm+pt	NA	Perm	Perm	NA	Free
Protected Phases	7	4					5	2			6	
Permitted Phases	4		4				2		2	6		Free
Actuated Green, G (s)	34.0	34.0	32.0				46.0	46.0	46.0		38.0	90.0
Effective Green, g (s)	34.0	34.0	32.0				46.0	46.0	46.0		38.0	90.0
Actuated g/C Ratio	0.38	0.38	0.36				0.51	0.51	0.51		0.42	1.00
Clearance Time (s)	4.0	6.0	6.0				4.0	6.0	6.0		6.0	
Lane Grp Cap (vph)	603	1245	503				250	1829	823		960	1532
v/s Ratio Prot	0.35	0.35					0.04	0.17				
v/s Ratio Perm			0.06				0.42		0.04		0.37	c0.88
v/c Ratio	0.94	0.92	0.16				0.91	0.34	0.07		0.87	0.88
Uniform Delay, d1	27.0	26.8	19.8				20.5	13.0	11.2		23.8	0.0
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	24.3	12.8	0.7				37.4	0.5	0.2		10.8	7.4
Delay (s)	51.3	39.5	20.5				57.8	13.5	11.3		34.6	7.4
Level of Service	D	D	C				E	B	B		C	A
Approach Delay (s)		40.7			0.0			23.8			17.8	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
1: Icomm Dr/Brant Ave & Colborne St

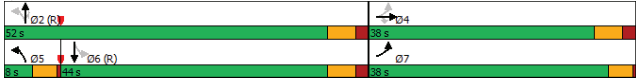
2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	34.0	32.0	32.0				48.0	46.0	46.0		38.0	90.0
Actuated g/C Ratio	0.38	0.36	0.36				0.53	0.51	0.51		0.42	1.00
v/c Ratio	0.94	0.98	0.35				0.88	0.34	0.12		0.87	0.88
Control Delay	53.1	52.1	4.6				50.6	13.7	3.5		35.7	8.3
Queue Delay	0.0	0.0	0.0				0.0	0.0	0.0		0.0	0.0
Total Delay	53.1	52.1	4.6				50.6	13.7	3.5		35.7	8.3
LOS	D	D	A				D	B	A		D	A
Approach Delay		46.8						21.3			18.9	
Approach LOS		D						C			B	
Queue Length 50th (m)	101.7	106.5	0.0				20.0	31.8	0.9		67.9	0.0
Queue Length 95th (m)	#162.1	#128.9	2.9				#34.8	41.7	5.6		#104.2	#7.3
Internal Link Dist (m)		422.3			103.5			153.1			101.8	
Turn Bay Length (m)							110.0		210.0			
Base Capacity (vph)	603	1172	651				258	1829	870		960	1532
Starvation Cap Reductn	0	0	0				0	0	0		0	0
Spillback Cap Reductn	0	0	0				0	0	0		0	0
Storage Cap Reductn	0	0	0				0	0	0		0	0
Reduced v/c Ratio	0.94	0.98	0.35				0.88	0.34	0.12		0.87	0.88

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 30.0 Intersection LOS: C
Intersection Capacity Utilization 84.8% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Icomm Dr/Brant Ave & Colborne St



Lanes, Volumes, Timings
2: Colborne St & King St

2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	79	677	0	0	74	0
Future Volume (vph)	79	677	0	0	74	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	3561	0	0	1789	0
Flt Permitted		0.995			0.950	
Satd. Flow (perm)	0	3561	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		127.5	121.5		114.7	
Travel Time (s)		9.6	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	736	0	0	80	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	822	0	0	80	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 31.8% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Colborne St & King St

2051 PM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	79	677	0	0	74	0
Future Volume (Veh/h)	79	677	0	0	74	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	736	0	0	80	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)		127				
pX, platoon unblocked						
vC, conflicting volume	0				540	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				540	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				82	100
cM capacity (veh/h)	1622				447	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	331	491	80
Volume Left	86	0	80
Volume Right	0	0	0
cSH	1622	1700	447
Volume to Capacity	0.05	0.29	0.18
Queue Length 95th (m)	1.3	0.0	4.9
Control Delay (s)	2.2	0.0	14.8
Lane LOS	A		B
Approach Delay (s)	0.9		14.8
Approach LOS			B

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
3: Colborne St & Queen St

2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	46	705	0	0	105	0
Future Volume (vph)	46	705	0	0	105	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected		0.997			0.950	
Satd. Flow (prot)	0	3605	0	0	1807	0
Flt Permitted		0.997			0.950	
Satd. Flow (perm)	0	3605	0	0	1807	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	50	766	0	0	114	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	816	0	0	114	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 33.3%	ICU Level of Service A
Analysis Period (min) 15	

HCM Unsignalized Intersection Capacity Analysis
3: Colborne St & Queen St

2051 PM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	46	705	0	0	105	0
Future Volume (vph)	46	705	0	0	105	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	766	0	0	114	0

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total (vph)	305	511	114
Volume Left (vph)	50	0	114
Volume Right (vph)	0	0	0
Hadj (s)	0.10	0.02	0.22
Departure Headway (s)	4.9	4.9	5.7
Degree Utilization, x	0.42	0.69	0.18
Capacity (veh/h)	721	733	602
Control Delay (s)	10.3	16.8	9.9
Approach Delay (s)	14.3		9.9
Approach LOS	B		A

Intersection Summary			
Delay	13.8		
Level of Service	B		
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	810	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	810	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Flt Permitted												
Satd. Flow (perm)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		183.0			240.0			61.0			43.5	
Travel Time (s)		13.7			18.0			4.6			3.3	
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
Adj. Flow (vph)	0	880	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	880	0	0	0	0	0	0	0	0	0	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2						2			2	
Detector Template		Thru						Thru			Thru	
Leading Detector (m)		10.0						10.0			10.0	
Trailing Detector (m)		0.0						0.0			0.0	
Detector 1 Position(m)		0.0						0.0			0.0	
Detector 1 Size(m)		0.6						0.6			0.6	
Detector 1 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0						0.0			0.0	
Detector 1 Queue (s)		0.0						0.0			0.0	
Detector 1 Delay (s)		0.0						0.0			0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Detector Phase		2						4			4	
Switch Phase												
Minimum Initial (s)		4.0						4.0			4.0	

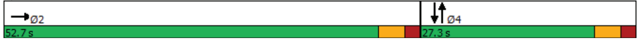
Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		27.3						27.3			27.3	
Total Split (s)		52.7						27.3			27.3	
Total Split (%)		65.9%						34.1%			34.1%	
Maximum Green (s)		47.4						22.0			22.0	
Yellow Time (s)		3.3						3.3			3.3	
All-Red Time (s)		2.0						2.0			2.0	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.3						5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0						3.0			3.0	
Recall Mode		Max						None			None	
Walk Time (s)		7.0						7.0			7.0	
Flash Dont Walk (s)		15.0						15.0			15.0	
Pedestrian Calls (#/hr)		0						120			120	
Act Effct Green (s)		64.9										
Actuated g/C Ratio		0.73										
v/c Ratio		0.34										
Control Delay		6.9										
Queue Delay		0.0										
Total Delay		6.9										
LOS		A										
Approach Delay		6.9										
Approach LOS		A										
Queue Length 50th (m)		34.5										
Queue Length 95th (m)		44.6										
Internal Link Dist (m)		159.0			216.0			37.0			19.5	
Turn Bay Length (m)												
Base Capacity (vph)		2596										
Starvation Cap Reductn		0										
Spillback Cap Reductn		0										
Storage Cap Reductn		0										
Reduced v/c Ratio		0.34										

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 89.5
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.34
Intersection Signal Delay: 6.9 Intersection LOS: A
Intersection Capacity Utilization 26.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Market Street IPS/Market St IPS & Colborne St



HCM Signalized Intersection Capacity Analysis
4: Market Street IPS/Market St IPS & Colborne St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	810	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	810	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3										
Lane Util. Factor		0.95										
Frt		1.00										
Flt Protected		1.00										
Satd. Flow (prot)		3579										
Flt Permitted		1.00										
Satd. Flow (perm)		3579										
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)	0	880	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	880	0	0	0	0	0	0	0	0	0	0
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Actuated Green, G (s)		63.6										
Effective Green, g (s)		63.6										
Actuated g/C Ratio		0.70										
Clearance Time (s)		5.3										
Vehicle Extension (s)		3.0										
Lane Grp Cap (vph)		2506										
v/s Ratio Prot		c0.25										
v/s Ratio Perm												
v/c Ratio		0.35										
Uniform Delay, d1		5.4										
Progression Factor		1.00										
Incremental Delay, d2		0.4										
Delay (s)		5.8										
Level of Service		A										
Approach Delay (s)		5.8			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	10.6
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Colborne St & Charlotte Street

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	87	723	0	0	91	0
Future Volume (vph)	87	723	0	0	91	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	3561	0	0	1789	0
Flt Permitted		0.995			0.950	
Satd. Flow (perm)	0	3561	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		240.0	140.5		77.6	
Travel Time (s)		18.0	10.5		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	786	0	0	99	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	881	0	0	99	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 34.2% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
5: Colborne St & Charlotte Street

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	87	723	0	0	91	0
Future Volume (Veh/h)	87	723	0	0	91	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	95	786	0	0	99	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)		240	141			
pX, platoon unblocked					0.91	
vC, conflicting volume	0				583	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				356	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				81	100
cM capacity (veh/h)	1622				530	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	357	524	99
Volume Left	95	0	99
Volume Right	0	0	0
cSH	1622	1700	530
Volume to Capacity	0.06	0.31	0.19
Queue Length 95th (m)	1.4	0.0	5.2
Control Delay (s)	2.3	0.0	13.3
Lane LOS	A		B
Approach Delay (s)	0.9		13.3
Approach LOS			B

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	34.2%	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)	98	570	146	0	0	0	0	1663	914	195	2021	0
Future Volume (vph)	98	570	146	0	0	0	0	1663	914	195	2021	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		23.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00
Ped Bike Factor	0.98		0.96						0.97			
Frt			0.850						0.850			
Flt Protected	0.950										0.996	
Satd. Flow (prot)	1807	3579	1633	0	0	0	0	3614	1601	0	3603	0
Flt Permitted	0.950										0.483	
Satd. Flow (perm)	1774	3579	1563	0	0	0	0	3614	1560	0	1747	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			55						100			
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		140.5			1204.0			126.9			109.9	
Travel Time (s)		10.5			90.3			9.5			8.2	
Confl. Peds. (#/hr)	12		21						8	8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Adj. Flow (vph)	107	620	159	0	0	0	0	1808	993	212	2197	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	620	159	0	0	0	0	1808	993	0	2409	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Minimum Split (s)	28.0	28.0	28.0					25.0	25.0	9.0	25.0	
Total Split (s)	29.0	29.0	29.0					81.0	81.0	10.0	91.0	
Total Split (%)	24.2%	24.2%	24.2%					67.5%	67.5%	8.3%	75.8%	
Maximum Green (s)	25.0	25.0	25.0					77.0	77.0	5.0	87.0	
Yellow Time (s)	3.5	3.5	3.5					3.5	3.5	3.0	3.5	
All-Red Time (s)	0.5	0.5	0.5					0.5	0.5	2.0	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	17.0	17.0	17.0					14.0	14.0		14.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	25.0	25.0	25.0					77.0	77.0		87.0	
Actuated g/C Ratio	0.21	0.21	0.21					0.64	0.64		0.72	
v/c Ratio	0.29	0.83	0.43					0.78	0.96		1.77	
Control Delay	42.6	56.4	30.8					18.5	38.7		366.0	
Queue Delay	0.0	0.0	0.0					0.3	0.0		0.0	
Total Delay	42.6	56.4	30.8					18.8	38.7		366.0	
LOS	D	E	C					B	D		F	
Approach Delay		50.1						25.8			366.0	
Approach LOS		D						C			F	
Queue Length 50th (m)	21.4	74.2	21.0					148.7	188.7		~449.4	
Queue Length 95th (m)	37.7	#99.8	41.8					178.6	#300.9		m#446.8	
Internal Link Dist (m)		116.5			1180.0			102.9			85.9	
Turn Bay Length (m)	25.0		23.0									
Base Capacity (vph)	369	745	369					2318	1036		1359	
Starvation Cap Reductn	0	0	0					0	0		6	
Spillback Cap Reductn	0	0	0					123	0		0	
Storage Cap Reductn	0	0	0					0	0		0	
Reduced v/c Ratio	0.29	0.83	0.43					0.82	0.96		1.78	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 150
Control Type: Pretimed
Maximum v/c Ratio: 1.77
Intersection Signal Delay: 163.8 Intersection LOS: F
Intersection Capacity Utilization 149.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Clarence Street & Colborne

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱					↑↑	↱		↰↑	
Traffic Volume (vph)	98	570	146	0	0	0	0	1663	914	195	2021	0
Future Volume (vph)	98	570	146	0	0	0	0	1663	914	195	2021	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00					0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.96					1.00	0.97		1.00	
Flpb, ped/bikes	0.98	1.00	1.00					1.00	1.00		1.00	
Frt	1.00	1.00	0.85					1.00	0.85		1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00		1.00	
Satd. Flow (prot)	1774	3579	1563					3614	1560		3601	
Flt Permitted	0.95	1.00	1.00					1.00	1.00		0.48	
Satd. Flow (perm)	1774	3579	1563					3614	1560		1747	
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)	107	620	159	0	0	0	0	1808	993	212	2197	0
RTOR Reduction (vph)	0	0	44	0	0	0	0	0	36	0	0	0
Lane Group Flow (vph)	107	620	115	0	0	0	0	1808	957	0	2409	0
Confl. Peds. (#/hr)	12		21						8	8		
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Actuated Green, G (s)	25.0	25.0	25.0					77.0	77.0		87.0	
Effective Green, g (s)	25.0	25.0	25.0					77.0	77.0		87.0	
Actuated g/C Ratio	0.21	0.21	0.21					0.64	0.64		0.72	
Clearance Time (s)	4.0	4.0	4.0					4.0	4.0		4.0	
Lane Grp Cap (vph)	369	745	325					2318	1001		1343	
v/s Ratio Prot		c0.17						0.50			c0.07	
v/s Ratio Perm	0.06		0.07						0.61		c1.23	
v/c Ratio	0.29	0.83	0.36					0.78	0.96		1.79	
Uniform Delay, d1	40.0	45.5	40.6					15.4	19.9		16.5	
Progression Factor	1.00	1.00	1.00					1.00	1.00		0.53	
Incremental Delay, d2	2.0	10.5	3.0					2.7	19.7		357.5	
Delay (s)	42.0	56.0	43.6					18.1	39.6		366.2	
Level of Service	D	E	D					B	D		F	
Approach Delay (s)		52.1			0.0			25.7			366.2	
Approach LOS		D			A			C			F	

Intersection Summary

HCM 2000 Control Delay	164.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	149.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑↑	↱	↰		↱↱	↰↱			
Traffic Volume (vph)	32	1131	0	0	0	1301	0	0	0	0
Future Volume (vph)	32	1131	0	0	0	1301	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		22.0	48.0		0.0	0.0	0.0	0.0	0.0
Storage Lanes	1		1	1		2	1	0	0	0
Taper Length (m)	7.5			7.5			7.5		7.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00	1.00
Frt						0.850				
Flt Protected	0.950									
Satd. Flow (prot)	1789	3579	1883	1883	0	2818	1883	0	0	0
Flt Permitted	0.950									
Satd. Flow (perm)	1789	3579	1883	1883	0	2818	1883	0	0	0
Right Turn on Red	Yes		Yes			Yes		Yes		
Satd. Flow (RTOR)	35					1824				
Link Speed (k/h)		48			48		48		48	
Link Distance (m)		1204.0			112.9		111.0		175.7	
Travel Time (s)		90.3			8.5		8.3		13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1229	0	0	0	1414	0	0	0	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	35	1229	0	0	0	1414	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Right	Left	Right
Median Width(m)		3.7			3.7		3.7		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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24	14	24	14
Number of Detectors	1	2	1	1		1	1			
Detector Template	Left	Thru	Right	Left		Right	Left			
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0	2.0			
Trailing Detector (m)	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			
Detector 1 Size(m)	2.0	0.6	2.0	2.0		2.0	2.0			
Detector 1 Type	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			
Detector 1 Queue (s)	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			
Detector 2 Position(m)		9.4								
Detector 2 Size(m)		0.6								
Detector 2 Type		Cl+Ex								
Detector 2 Channel										
Detector 2 Extend (s)		0.0								
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				

Lanes, Volumes, Timings
7: Canadian Tire Entrance & Colborne St & Dalhousie Street

2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Detector Phase	2	2	2	2			8			
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0			3.0			
Minimum Split (s)	21.6	21.6	21.6	21.6			8.3			
Total Split (s)	64.0	64.0	64.0	64.0			16.0			
Total Split (%)	80.0%	80.0%	80.0%	80.0%			20.0%			
Maximum Green (s)	58.4	58.4	58.4	58.4			10.7			
Yellow Time (s)	3.3	3.3	3.3	3.3			3.3			
All-Red Time (s)	2.3	2.3	2.3	2.3			2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			0.0			
Total Lost Time (s)	5.6	5.6	5.6	5.6			5.3			
Lead/Lag										
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			
Recall Mode	C-Max	C-Max	C-Max	C-Max			None			
Walk Time (s)	5.0	5.0	5.0	5.0			5.0			
Flash Dont Walk (s)	11.0	11.0	11.0	11.0			11.0			
Pedestrian Calls (#/hr)	0	0	0	0			0			
Act Effct Green (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
v/c Ratio	0.02	0.34				0.50				
Control Delay	0.0	0.3				0.6				
Queue Delay	0.0	0.0				0.0				
Total Delay	0.0	0.3				0.6				
LOS	A	A				A				
Approach Delay		0.3			0.6					
Approach LOS		A			A					
Queue Length 50th (m)	0.0	0.0				0.0				
Queue Length 95th (m)	0.0	0.0				0.0				
Internal Link Dist (m)		1180.0			88.9		87.0		151.7	
Turn Bay Length (m)										
Base Capacity (vph)	1789	3579				2818				
Starvation Cap Reductn	0	0				0				
Spillback Cap Reductn	0	0				0				
Storage Cap Reductn	0	0				0				
Reduced v/c Ratio	0.02	0.34				0.50				

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 0.5 Intersection LOS: A
Intersection Capacity Utilization 35.9% ICU Level of Service A
Analysis Period (min) 15

Lanes, Volumes, Timings
7: Canadian Tire Entrance & Colborne St & Dalhousie Street

2051 PM Peak (1-Way).syn
09-21-2022

Splits and Phases: 7: Canadian Tire Entrance & Colborne St & Dalhousie Street

HCM Signalized Intersection Capacity Analysis
7: Canadian Tire Entrance & Colborne St & Dalhousie Street

2051 PM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑↑	↱	↰		↱↱	↰↱			
Traffic Volume (vph)	32	1131	0	0	0	1301	0	0	0	0
Future Volume (vph)	32	1131	0	0	0	1301	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6				4.0				
Lane Util. Factor	1.00	0.95				0.88				
Frt	1.00	1.00				0.85				
Flt Protected	0.95	1.00				1.00				
Satd. Flow (prot)	1789	3579				2818				
Flt Permitted	0.95	1.00				1.00				
Satd. Flow (perm)	1789	3579				2818				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1229	0	0	0	1414	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	35	1229	0	0	0	1414	0	0	0	0
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				
Actuated Green, G (s)	80.0	80.0				80.0				
Effective Green, g (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
Clearance Time (s)	5.6	5.6								
Vehicle Extension (s)	3.0	3.0								
Lane Grp Cap (vph)	1789	3579				2818				
v/s Ratio Prot		0.34								
v/s Ratio Perm	0.02					c0.50				
v/c Ratio	0.02	0.34				0.50				
Uniform Delay, d1	0.0	0.0				0.0				
Progression Factor	1.00	1.00				1.00				
Incremental Delay, d2	0.0	0.3				0.6				
Delay (s)	0.0	0.3				0.6				
Level of Service	A	A				A				
Approach Delay (s)		0.3			0.6		0.0		0.0	
Approach LOS		A			A		A		A	

Intersection Summary			
HCM 2000 Control Delay	0.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
8: Clarence Street & Dalhousie St

2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	520	621	166	79	1682	0	0	1696	51
Future Volume (vph)	0	0	0	520	621	166	79	1682	0	0	1696	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		50.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.96		0.96					1.00	
Frt						0.850					0.996	
Flt Protected				0.950				0.998				
Satd. Flow (prot)	0	0	0	1825	3614	1585	0	3575	0	0	3598	0
Flt Permitted				0.950				0.508				
Satd. Flow (perm)	0	0	0	1756	3614	1523	0	1820	0	0	3598	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						64					4	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		139.0			1069.0			109.9			102.5	
Travel Time (s)		10.4			80.2			8.2			7.7	
Confl. Peds. (#/hr)				23		17	8					8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	565	675	180	86	1828	0	0	1843	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	565	675	180	0	1914	0	0	1898	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA	Perm	pm+pt	NA			NA	
Protected Phases					2		7	4			8	
Permitted Phases				2		2	4					
Minimum Split (s)				28.1	28.1	28.1	8.0	31.1			31.1	
Total Split (s)				37.0	37.0	37.0	10.0	83.0			73.0	
Total Split (%)				30.8%	30.8%	30.8%	8.3%	69.2%			60.8%	
Maximum Green (s)				31.0	31.0	31.0	6.0	77.0			67.0	
Yellow Time (s)				4.0	4.0	4.0	3.5	4.0			4.0	
All-Red Time (s)				2.0	2.0	2.0	0.5	2.0			2.0	
Lost Time Adjust (s)				0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)				6.0	6.0	6.0		6.0			6.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)				15.0	15.0	15.0		18.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	

Lanes, Volumes, Timings
8: Clarence Street & Dalhousie St

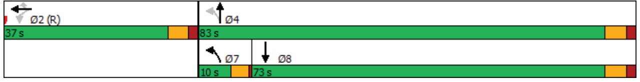
2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)				31.0	31.0	31.0		77.0			67.0	
Actuated g/C Ratio				0.26	0.26	0.26		0.64			0.56	
v/c Ratio				1.25	0.72	0.41		1.56			0.94	
Control Delay				166.8	45.8	26.6		271.9			35.9	
Queue Delay				0.9	0.0	0.0		0.0			44.4	
Total Delay				167.7	45.8	26.6		271.9			80.3	
LOS				F	D	C		F			F	
Approach Delay					91.9			271.9			80.3	
Approach LOS					F			F			F	
Queue Length 50th (m)				~165.7	76.5	22.1		~339.2			209.3	
Queue Length 95th (m)				#232.4	97.5	43.2		#382.0			#272.5	
Internal Link Dist (m)		115.0			1045.0			85.9			78.5	
Turn Bay Length (m)						50.0						
Base Capacity (vph)				453	933	440		1226			2010	
Starvation Cap Reductn				0	0	0		0			0	
Spillback Cap Reductn				43	0	0		0			372	
Storage Cap Reductn				0	0	0		0			0	
Reduced v/c Ratio				1.38	0.72	0.41		1.56			1.16	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 140
Control Type: Pretimed
Maximum v/c Ratio: 1.56
Intersection Signal Delay: 153.6 Intersection LOS: F
Intersection Capacity Utilization 141.1% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Clarence Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis
8: Clarence Street & Dalhousie St

2051 PM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	520	621	166	79	1682	0	0	1696	51
Future Volume (vph)	0	0	0	520	621	166	79	1682	0	0	1696	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0		6.0			6.0	
Lane Util. Factor				1.00	0.95	1.00		0.95			0.95	
Frpb, ped/bikes				1.00	1.00	0.96		1.00			1.00	
Flpb, ped/bikes				0.96	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	1.00	1.00		1.00			1.00	
Satd. Flow (prot)				1756	3614	1523		3574			3597	
Flt Permitted				0.95	1.00	1.00		0.51			1.00	
Satd. Flow (perm)				1756	3614	1523		1820			3597	
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)	0	0	0	565	675	180	86	1828	0	0	1843	55
RTOR Reduction (vph)	0	0	0	0	0	47	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	565	675	133	0	1914	0	0	1896	0
Confl. Peds. (#/hr)				23		17	8					8
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA			NA	
Protected Phases					2		7	4			8	
Permitted Phases				2		2	4					
Actuated Green, G (s)				31.0	31.0	31.0		77.0			67.0	
Effective Green, g (s)				31.0	31.0	31.0		77.0			67.0	
Actuated g/C Ratio				0.26	0.26	0.26		0.64			0.56	
Clearance Time (s)				6.0	6.0	6.0		6.0			6.0	
Lane Grp Cap (vph)				453	933	393		1255			2008	
v/s Ratio Prot					0.19			c0.08			0.53	
v/s Ratio Perm				c0.32		0.09		c0.90				
v/c Ratio				1.25	0.72	0.34		1.53			0.94	
Uniform Delay, d1				44.5	40.6	36.2		21.5			24.8	
Progression Factor				1.00	1.00	1.00		0.37			1.00	
Incremental Delay, d2				128.6	4.9	2.3		238.9			10.7	
Delay (s)				173.1	45.4	38.5		246.9			35.4	
Level of Service				F	D	D		F			D	
Approach Delay (s)		0.0			95.4			246.9			35.4	
Approach LOS		A			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	129.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	141.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
9: Charlotte Street & Dalhousie St

2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↱	
Traffic Volume (vph)	0	0	0	56	678	17	28	29	0	0	132	51
Future Volume (vph)	0	0	0	56	678	17	28	29	0	0	132	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.997						0.962	
Flt Protected					0.996			0.976				
Satd. Flow (prot)	0	0	0	0	3554	0	0	1838	0	0	1812	0
Flt Permitted					0.996			0.976				
Satd. Flow (perm)	0	0	0	0	3554	0	0	1838	0	0	1812	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		241.1			139.0			32.3			102.3	
Travel Time (s)		18.1			10.4			2.4			7.7	
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
Adj. Flow (vph)	0	0	0	61	737	18	30	32	0	0	143	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	816	0	0	62	0	0	198	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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 44.3% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
9: Charlotte Street & Dalhousie St

2051 PM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↱	
Traffic Volume (veh/h)	0	0	0	56	678	17	28	29	0	0	132	51
Future Volume (Veh/h)	0	0	0	56	678	17	28	29	0	0	132	51
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	0	0	61	737	18	30	32	0	0	143	55
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		241			139							
pX, platoon unblocked	0.83						0.83	0.83		0.83	0.83	0.83
vC, conflicting volume	755			0			617	877	0	884	868	378
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	295			0			129	442	0	450	431	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			96			93	92	100	100	65	94
cM capacity (veh/h)	1048			1622			460	406	1084	373	412	900

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	430	386	62	198
Volume Left	61	0	30	0
Volume Right	0	18	0	55
cSH	1622	1700	431	485
Volume to Capacity	0.04	0.23	0.14	0.41
Queue Length 95th (m)	0.9	0.0	3.8	14.9
Control Delay (s)	1.3	0.0	14.8	17.5
Lane LOS	A		B	C
Approach Delay (s)	0.7		14.8	17.5
Approach LOS			B	C

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
10: Dalhousie St & Market St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↱		↱
Traffic Volume (vph)	0	0	659	98	0	120
Future Volume (vph)	0	0	659	98	0	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0			10.0	0.0	0.0
Storage Lanes	0			1	0	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00
Ped Bike Factor				0.81		0.74
Frt				0.850		0.865
Flt Protected						
Satd. Flow (prot)	0	0	3614	1617	0	1645
Flt Permitted						
Satd. Flow (perm)	0	0	3614	1305	0	1217
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				53		103
Link Speed (k/h)		48	48		48	
Link Distance (m)		182.0	241.1		101.1	
Travel Time (s)		13.7	18.1		7.6	
Confl. Peds. (#/hr)				94		216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Adj. Flow (vph)	0	0	716	107	0	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	716	107	0	130
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Turn Type			NA	Perm		Perm
Protected Phases			2			
Permitted Phases				2		4
Minimum Split (s)			29.3	29.3		28.3
Total Split (s)			51.0	51.0		39.0
Total Split (%)			56.7%	56.7%		43.3%
Maximum Green (s)			45.7	45.7		33.7
Yellow Time (s)			3.3	3.3		3.3
All-Red Time (s)			2.0	2.0		2.0
Lost Time Adjust (s)			0.0	0.0		0.0
Total Lost Time (s)			5.3	5.3		5.3
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)			7.0	7.0		7.0
Flash Dont Walk (s)			17.0	17.0		16.0
Pedestrian Calls (#/hr)			0	0		0

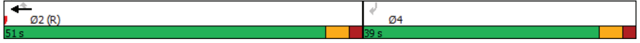
Lanes, Volumes, Timings
10: Dalhousie St & Market St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)			45.7	45.7		33.7
Actuated g/C Ratio			0.51	0.51		0.37
v/c Ratio			0.39	0.16		0.25
Control Delay			14.4	7.1		7.4
Queue Delay			0.0	0.0		0.0
Total Delay			14.4	7.1		7.4
LOS			B	A		A
Approach Delay			13.4		7.4	
Approach LOS			B		A	
Queue Length 50th (m)			38.0	4.6		3.0
Queue Length 95th (m)			50.6	12.8		14.3
Internal Link Dist (m)		158.0	217.1		77.1	
Turn Bay Length (m)				10.0		
Base Capacity (vph)			1835	688		520
Starvation Cap Reductn			0	0		0
Spillback Cap Reductn			0	0		0
Storage Cap Reductn			0	0		0
Reduced v/c Ratio			0.39	0.16		0.25

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 37 (41%), Referenced to phase 2:WBT and 6:, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.39
Intersection Signal Delay: 12.6 Intersection LOS: B
Intersection Capacity Utilization 48.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 10: Dalhousie St & Market St



HCM Signalized Intersection Capacity Analysis
10: Dalhousie St & Market St

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑	↱		↱
Traffic Volume (vph)	0	0	659	98	0	120
Future Volume (vph)	0	0	659	98	0	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			5.3	5.3		5.3
Lane Util. Factor			0.95	1.00		1.00
Frpb, ped/bikes			1.00	0.81		0.74
Flpb, ped/bikes			1.00	1.00		1.00
Frt			1.00	0.85		0.86
Flt Protected			1.00	1.00		1.00
Satd. Flow (prot)			3614	1305		1217
Flt Permitted			1.00	1.00		1.00
Satd. Flow (perm)			3614	1305		1217
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	716	107	0	130
RTOR Reduction (vph)	0	0	0	26	0	64
Lane Group Flow (vph)	0	0	716	81	0	66
Confl. Peds. (#/hr)				94		216
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Turn Type			NA	Perm		Perm
Protected Phases			2			
Permitted Phases				2		4
Actuated Green, G (s)			45.7	45.7		33.7
Effective Green, g (s)			45.7	45.7		33.7
Actuated g/C Ratio			0.51	0.51		0.37
Clearance Time (s)			5.3	5.3		5.3
Lane Grp Cap (vph)			1835	662		455
v/s Ratio Prot			c0.20			
v/s Ratio Perm				0.06		c0.05
v/c Ratio			0.39	0.12		0.14
Uniform Delay, d1			13.6	11.6		18.6
Progression Factor			1.00	1.00		1.00
Incremental Delay, d2			0.6	0.4		0.7
Delay (s)			14.2	12.0		19.3
Level of Service			B	B		B
Approach Delay (s)		0.0	13.9		19.3	
Approach LOS		A	B		B	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↱			↰			↑	↱
Traffic Volume (vph)	0	0	0	58	687	34	9	28	0	0	41	76
Future Volume (vph)	0	0	0	58	687	34	9	28	0	0	41	76
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	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.95	1.00			0.99				0.97
Frt					0.993							0.850
Flt Protected				0.950				0.988				
Satd. Flow (prot)	0	0	0	1825	3610	0	0	1898	0	0	1921	1601
Flt Permitted				0.950				0.951				
Satd. Flow (perm)	0	0	0	1727	3610	0	0	1818	0	0	1921	1547
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9							83
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	0	0	0	63	747	37	10	30	0	0	45	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	63	784	0	0	40	0	0	45	83
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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Minimum Split (s)				26.3	26.3		26.3	26.3			26.3	26.3
Total Split (s)				56.0	56.0		34.0	34.0			34.0	34.0
Total Split (%)				62.2%	62.2%		37.8%	37.8%			37.8%	37.8%
Maximum Green (s)				50.7	50.7		28.7	28.7			28.7	28.7
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	3.3
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	2.0
Lost Time Adjust (s)				0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)				5.3	5.3			5.3			5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)				14.0	14.0		14.0	14.0			14.0	14.0
Pedestrian Calls (#/hr)				0	0		0	0			0	0
Act Effct Green (s)				50.7	50.7			28.7			28.7	28.7
Actuated g/C Ratio				0.56	0.56			0.32			0.32	0.32
v/c Ratio				0.06	0.38			0.07			0.07	0.15

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay				2.3	4.8			21.9			21.9	6.0
Queue Delay				0.0	0.0			0.0			0.0	0.0
Total Delay				2.3	4.8			21.9			21.9	6.0
LOS				A	A			C			C	A
Approach Delay					4.6			21.9			11.6	
Approach LOS					A			C			B	
Queue Length 50th (m)				0.7	4.2			4.8			5.4	0.0
Queue Length 95th (m)				2.0	7.3			11.7			12.9	9.5
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)				972	2037			579			612	549
Starvation Cap Reductn				0	0			0			0	0
Spillback Cap Reductn				0	0			0			0	0
Storage Cap Reductn				0	0			0			0	0
Reduced v/c Ratio				0.06	0.38			0.07			0.07	0.15

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 54 (60%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.38
Intersection Signal Delay: 6.1 Intersection LOS: A
Intersection Capacity Utilization 68.4% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St

HCM Signalized Intersection Capacity Analysis
11: Queen St/Queen Street & Dalhousie St

2051 PM Peak (1-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↱			↰			↑	↱
Traffic Volume (vph)	0	0	0	58	687	34	9	28	0	0	41	76
Future Volume (vph)	0	0	0	58	687	34	9	28	0	0	41	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.3	5.3			5.3			5.3	5.3
Lane Util. Factor				1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00			1.00			1.00	0.97
Flpb, ped/bikes				0.95	1.00			0.99			1.00	1.00
Frt				1.00	0.99			1.00			1.00	0.85
Flt Protected				0.95	1.00			0.99			1.00	1.00
Satd. Flow (prot)				1727	3610			1888			1921	1547
Flt Permitted				0.95	1.00			0.95			1.00	1.00
Satd. Flow (perm)				1727	3610			1818			1921	1547
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)	0	0	0	63	747	37	10	30	0	0	45	83
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	57
Lane Group Flow (vph)	0	0	0	63	780	0	0	40	0	0	45	26
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Actuated Green, G (s)				50.7	50.7			28.7			28.7	28.7
Effective Green, g (s)				50.7	50.7			28.7			28.7	28.7
Actuated g/C Ratio				0.56	0.56			0.32			0.32	0.32
Clearance Time (s)				5.3	5.3			5.3			5.3	5.3
Lane Grp Cap (vph)				972	2033			579			612	493
v/s Ratio Prot					c0.22						c0.02	
v/s Ratio Perm				0.04				0.02				0.02
v/c Ratio				0.06	0.38			0.07			0.07	0.05
Uniform Delay, d1				8.9	10.9			21.3			21.4	21.2
Progression Factor				0.24	0.39			1.00			1.00	1.00
Incremental Delay, d2				0.1	0.5			0.2			0.2	0.2
Delay (s)				2.3	4.8			21.6			21.6	21.4
Level of Service				A	A			C			C	C
Approach Delay (s)		0.0			4.6			21.6			21.5	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (vph)	0	0	0	24	748	40	25	25	0	0	14	62
Future Volume (vph)	0	0	0	24	748	40	25	25	0	0	14	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00			1.00			0.99	
Frt					0.993						0.890	
Flt Protected					0.999			0.976				
Satd. Flow (prot)	0	0	0	0	3579	0	0	1875	0	0	1556	0
Flt Permitted					0.999			0.864				
Satd. Flow (perm)	0	0	0	0	3578	0	0	1656	0	0	1556	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					10						67	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		172.6			119.6			114.7			99.2	
Travel Time (s)		12.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	0	0	0	26	813	43	27	27	0	0	15	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	882	0	0	54	0	0	82	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Minimum Split (s)				27.3	27.3		27.3	27.3			27.3	
Total Split (s)				57.0	57.0		33.0	33.0			33.0	
Total Split (%)				63.3%	63.3%		36.7%	36.7%			36.7%	
Maximum Green (s)				51.7	51.7		27.7	27.7			27.7	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				15.0	15.0		15.0	15.0			15.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					51.7			27.7			27.7	
Actuated g/C Ratio					0.57			0.31			0.31	
v/c Ratio					0.43			0.11			0.16	

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

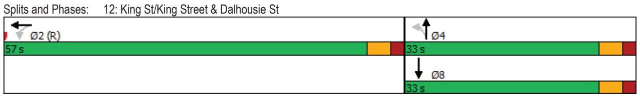
2051 PM Peak (1-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					3.2			30.0			8.8	
Queue Delay					0.1			0.0			0.0	
Total Delay					3.3			30.0			8.8	
LOS					A			C			A	
Approach Delay					3.3			30.0			8.8	
Approach LOS					A			C			A	
Queue Length 50th (m)					5.6			7.8			1.8	
Queue Length 95th (m)					9.9			m9.0			11.5	
Internal Link Dist (m)		148.6			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)					2059			509			525	
Starvation Cap Reductn					279			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.50			0.11			0.16	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 62 (69%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.43
Intersection Signal Delay: 5.2 Intersection LOS: A
Intersection Capacity Utilization 49.9% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: King St/King Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis
12: King St/King Street & Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (vph)	0	0	0	24	748	40	25	25	0	0	14	62
Future Volume (vph)	0	0	0	24	748	40	25	25	0	0	14	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	
Lane Util. Factor					0.95			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.99	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.99			1.00			0.89	
Flt Protected					1.00			0.98			1.00	
Satd. Flow (prot)					3575			1870			1556	
Flt Permitted					1.00			0.86			1.00	
Satd. Flow (perm)					3575			1656			1556	
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)	0	0	0	26	813	43	27	27	0	0	15	67
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	46	0
Lane Group Flow (vph)	0	0	0	0	878	0	0	54	0	0	36	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Actuated Green, G (s)					51.7			27.7			27.7	
Effective Green, g (s)					51.7			27.7			27.7	
Actuated g/C Ratio					0.57			0.31			0.31	
Clearance Time (s)					5.3			5.3			5.3	
Lane Grp Cap (vph)					2053			509			478	
v/s Ratio Prot											0.02	
v/s Ratio Perm					0.25			c0.03				
v/c Ratio					0.43			0.11			0.07	
Uniform Delay, d1					10.8			22.3			22.1	
Progression Factor					0.24			1.31			1.00	
Incremental Delay, d2					0.6			0.2			0.3	
Delay (s)					3.2			29.4			22.4	
Level of Service					A			C			C	
Approach Delay (s)		0.0			3.2			29.4			22.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	6.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Brant Ave & Armoury/Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰↰	↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	673	6	221	4	1528	0	0	1302	0
Future Volume (vph)	0	0	0	673	6	221	4	1528	0	0	1302	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.99		0.96		1.00				
Frt						0.850						
Flt Protected				0.950								
Satd. Flow (prot)	0	1921	0	3506	1921	1617	0	3579	0	0	3614	0
Flt Permitted				0.757				0.940				
Satd. Flow (perm)	0	1921	0	2779	1921	1549	0	3364	0	0	3614	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						48						
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		54.4			172.6			125.8			335.3	
Travel Time (s)		4.1			12.9			9.1			24.1	
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Peak Hour Factor	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	716	10	235	12	1643	0	0	1385	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	716	10	235	0	1655	0	0	1385	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)		7.4			7.4			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA	Perm	Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2					
Minimum Split (s)	28.0	28.0		28.0	28.0	28.0	29.1	29.1			29.1	
Total Split (s)	28.0	28.0		28.0	28.0	28.0	42.0	42.0			42.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%	40.0%	60.0%	60.0%			60.0%	
Maximum Green (s)	22.1	22.1		22.1	22.1	22.1	35.9	35.9			35.9	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3			3.3	
All-Red Time (s)	2.6	2.6		2.6	2.6	2.6	2.8	2.8			2.8	
Lost Time Adjust (s)		0.0		-2.0	-2.0	-2.0		-2.0			-2.0	
Total Lost Time (s)		5.9		3.9	3.9	3.9		4.1			4.1	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0	14.0	16.0	16.0			16.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0			0	
Act Effct Green (s)				24.1	24.1	24.1		37.9			37.9	
Actuated g/C Ratio				0.34	0.34	0.34		0.54			0.54	

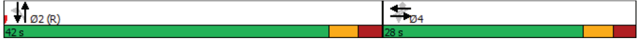
Lanes, Volumes, Timings
13: Brant Ave & Armoury/Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio				0.75	0.02	0.42		0.91			0.71	
Control Delay				26.2	15.3	16.5		23.9			14.5	
Queue Delay				0.0	0.0	0.0		21.6			0.0	
Total Delay				26.2	15.3	16.5		45.4			14.5	
LOS				C	B	B		D			B	
Approach Delay					23.7			45.4			14.5	
Approach LOS					C			D			B	
Queue Length 50th (m)				41.9	0.9	17.9		94.4			65.1	
Queue Length 95th (m)				60.6	2.3	35.4		#148.4			87.4	
Internal Link Dist (m)		30.4			148.6			101.8			311.3	
Turn Bay Length (m)												
Base Capacity (vph)				956	661	564		1821			1956	
Starvation Cap Reductn				0	0	0		229			0	
Spillback Cap Reductn				0	0	0		0			0	
Storage Cap Reductn				0	0	0		0			0	
Reduced v/c Ratio				0.75	0.02	0.42		1.04			0.71	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Green
Natural Cycle: 70
Control Type: Pretimed
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 29.5 Intersection LOS: C
Intersection Capacity Utilization 71.0% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Brant Ave & Armoury/Dalhousie St



HCM Signalized Intersection Capacity Analysis
13: Brant Ave & Armoury/Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰↰	↑	↱		↰↑			↑↱	
Traffic Volume (vph)	0	0	0	673	6	221	4	1528	0	0	1302	0
Future Volume (vph)	0	0	0	673	6	221	4	1528	0	0	1302	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.9	3.9	3.9		4.1			4.1	
Lane Util. Factor				0.97	1.00	1.00		0.95			0.95	
Frpb, ped/bikes				1.00	1.00	0.96		1.00			1.00	
Flpb, ped/bikes				0.99	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	1.00	1.00		1.00			1.00	
Satd. Flow (prot)				3488	1921	1549		3578			3614	
Flt Permitted				0.76	1.00	1.00		0.94			1.00	
Satd. Flow (perm)				2780	1921	1549		3363			3614	
Peak-hour factor, PHF	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Adj. Flow (vph)	0	0	0	716	10	235	12	1643	0	0	1385	0
RTOR Reduction (vph)	0	0	0	0	0	31	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	716	10	204	0	1655	0	0	1385	0
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2					
Actuated Green, G (s)				22.1	22.1	22.1		35.9			35.9	
Effective Green, g (s)				24.1	24.1	24.1		37.9			37.9	
Actuated g/C Ratio				0.34	0.34	0.34		0.54			0.54	
Clearance Time (s)				5.9	5.9	5.9		6.1			6.1	
Lane Grp Cap (vph)				957	661	533		1820			1956	
v/s Ratio Prot					0.01						0.38	
v/s Ratio Perm				c0.26		0.13		c0.49				
v/c Ratio				0.75	0.02	0.38		0.91			0.71	
Uniform Delay, d1				20.3	15.1	17.3		14.5			11.9	
Progression Factor				1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2				5.3	0.0	2.1		8.3			2.2	
Delay (s)				25.6	15.2	19.4		22.7			14.1	
Level of Service				C	B	B		C			B	
Approach Delay (s)		0.0			24.0			22.7			14.1	
Approach LOS		A			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Appendix F

Future Traffic Operations (Two-Way)

Lanes, Volumes, Timings
2: Colborne St & King St

2051 AM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (vph)	60	323	289	31	73	29
Future Volume (vph)	60	323	289	31	73	29
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			0.987		0.961	
Flt Protected		0.992			0.966	
Satd. Flow (prot)	0	1868	1859	0	1748	0
Flt Permitted		0.992			0.966	
Satd. Flow (perm)	0	1868	1859	0	1748	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		160.9	121.5		114.7	
Travel Time (s)		12.1	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	351	314	34	79	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	416	348	0	111	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 53.2%		ICU Level of Service A
Analysis Period (min) 15		

HCM Unsignalized Intersection Capacity Analysis
2: Colborne St & King St

2051 AM Peak (2-Way).syn
09-21-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	60	323	289	31	73	29
Future Volume (Veh/h)	60	323	289	31	73	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	351	314	34	79	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		161				
pX, platoon unblocked					0.96	
vC, conflicting volume	348				812	331
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	348				786	331
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				76	95
cM capacity (veh/h)	1211				329	711

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	416	348	111
Volume Left	65	0	79
Volume Right	0	34	32
cSH	1211	1700	389
Volume to Capacity	0.05	0.20	0.29
Queue Length 95th (m)	1.3	0.0	8.8
Control Delay (s)	1.7	0.0	17.9
Lane LOS	A		C
Approach Delay (s)	1.7	0.0	17.9
Approach LOS			C

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
3: Colborne St & Queen St

2051 AM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (vph)	16	361	302	16	67	19
Future Volume (vph)	16	361	302	16	67	19
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			0.993		0.970	
Flt Protected		0.998			0.963	
Satd. Flow (prot)	0	1899	1908	0	1781	0
Flt Permitted		0.998			0.963	
Satd. Flow (perm)	0	1899	1908	0	1781	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	17	392	328	17	73	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	409	345	0	94	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 43.5%		ICU Level of Service A
Analysis Period (min) 15		

HCM Unsignalized Intersection Capacity Analysis
3: Colborne St & Queen St

2051 AM Peak (2-Way).syn
09-21-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	16	361	302	16	67	19
Future Volume (vph)	16	361	302	16	67	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	392	328	17	73	21

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	409	345	94
Volume Left (vph)	17	0	73
Volume Right (vph)	0	17	21
Hadj (s)	0.02	-0.03	0.03
Departure Headway (s)	4.6	4.6	5.6
Degree Utilization, x	0.52	0.44	0.15
Capacity (veh/h)	755	754	560
Control Delay (s)	12.5	11.2	9.6
Approach Delay (s)	12.5	11.2	9.6
Approach LOS	B	B	A

Intersection Summary			
Delay	11.7		
Level of Service	B		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

2051 AM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Traffic Volume (vph)	0	408	0	0	288	0	0	0	0	0	0	0
Future Volume (vph)	0	408	0	0	288	0	0	0	0	0	0	0
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
Frt												
Flt Protected												
Satd. Flow (prot)	0	1883	0	0	1883	0	0	1883	0	0	1883	0
Flt Permitted												
Satd. Flow (perm)	0	1883	0	0	1883	0	0	1883	0	0	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		183.0			240.0			61.0			43.5	
Travel Time (s)		13.7			18.0			4.6			3.3	
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
Adj. Flow (vph)	0	443	0	0	313	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	443	0	0	313	0	0	0	0	0	0	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2			2			2			2	
Detector Template		Thru			Thru			Thru			Thru	
Leading Detector (m)		10.0			10.0			10.0			10.0	
Trailing Detector (m)		0.0			0.0			0.0			0.0	
Detector 1 Position(m)		0.0			0.0			0.0			0.0	
Detector 1 Size(m)		0.6			0.6			0.6			0.6	
Detector 1 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0			0.0			0.0	
Detector 1 Queue (s)		0.0			0.0			0.0			0.0	
Detector 1 Delay (s)		0.0			0.0			0.0			0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type		NA			NA							
Protected Phases		2			6			4			4	
Permitted Phases												
Detector Phase		2			6			4			4	
Switch Phase												
Minimum Initial (s)		4.0			4.0			4.0			4.0	

Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

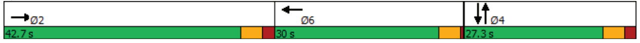
2051 AM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		27.3			20.0			27.3			27.3	
Total Split (s)		42.7			30.0			27.3			27.3	
Total Split (%)		42.7%			30.0%			27.3%			27.3%	
Maximum Green (s)		37.4			26.0			22.0			22.0	
Yellow Time (s)		3.3			3.5			3.3			3.3	
All-Red Time (s)		2.0			0.5			2.0			2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.3			4.0			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Recall Mode		Max			None			None			None	
Walk Time (s)		7.0			5.0			7.0			7.0	
Flash Dont Walk (s)		15.0			11.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			120			120	
Act Effct Green (s)		39.2			20.2							
Actuated g/C Ratio		0.44			0.23							
v/c Ratio		0.54			0.74							
Control Delay		25.2			44.5							
Queue Delay		0.0			0.0							
Total Delay		25.2			44.5							
LOS		C			D							
Approach Delay		25.2			44.5							
Approach LOS		C			D							
Queue Length 50th (m)		62.8			53.9							
Queue Length 95th (m)		101.6			82.2							
Internal Link Dist (m)		159.0			216.0			37.0			19.5	
Turn Bay Length (m)												
Base Capacity (vph)		826			565							
Starvation Cap Reductn		0			0							
Spillback Cap Reductn		0			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.54			0.55							

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 89.3
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 33.2 Intersection LOS: C
Intersection Capacity Utilization 25.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Market Street IPS/Market St IPS & Colborne St



HCM Signalized Intersection Capacity Analysis
4: Market Street IPS/Market St IPS & Colborne St

2051 AM Peak (2-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Traffic Volume (vph)	0	408	0	0	288	0	0	0	0	0	0	0
Future Volume (vph)	0	408	0	0	288	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			4.0							
Lane Util. Factor		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		1883			1883							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		1883			1883							
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)	0	443	0	0	313	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	443	0	0	313	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6			4			4	
Permitted Phases												
Actuated Green, G (s)		39.2			20.2							
Effective Green, g (s)		39.2			20.2							
Actuated g/C Ratio		0.43			0.22							
Clearance Time (s)		5.3			4.0							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		816			420							
v/s Ratio Prot		c0.24			c0.17							
v/s Ratio Perm												
v/c Ratio		0.54			0.75							
Uniform Delay, d1		19.0			32.7							
Progression Factor		1.00			1.00							
Incremental Delay, d2		2.6			7.0							
Delay (s)		21.6			39.7							
Level of Service		C			D							
Approach Delay (s)		21.6			39.7			0.0			0.0	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	14.6
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Colborne St & Charlotte Street

2051 AM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (vph)	82	326	263	18	88	6
Future Volume (vph)	82	326	263	18	88	6
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			0.991		0.991	
Flt Protected		0.990			0.955	
Satd. Flow (prot)	0	1865	1866	0	1782	0
Flt Permitted		0.990			0.955	
Satd. Flow (perm)	0	1865	1866	0	1782	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		240.0	140.5		77.6	
Travel Time (s)		18.0	10.5		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	354	286	20	96	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	443	306	0	103	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 51.9% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
5: Colborne St & Charlotte Street

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	82	326	263	18	88	6
Future Volume (Veh/h)	82	326	263	18	88	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	354	286	20	96	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		240	141			
pX, platoon unblocked	0.93				0.85	0.93
vC, conflicting volume	306				828	296
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	215				527	204
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				76	99
cM capacity (veh/h)	1259				406	777

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	443	306	103
Volume Left	89	0	96
Volume Right	0	20	7
cSH	1259	1700	420
Volume to Capacity	0.07	0.18	0.25
Queue Length 95th (m)	1.7	0.0	7.2
Control Delay (s)	2.2	0.0	16.3
Lane LOS	A		C
Approach Delay (s)	2.2	0.0	16.3
Approach LOS			C

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
6: Clarence Street & Colborne

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰↑	↱		↰↱	
Traffic Volume (vph)	56	275	57	227	242	97	49	1774	590	99	950	47
Future Volume (vph)	56	275	57	227	242	97	49	1774	590	99	950	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		23.0	25.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95
Ped Bike Factor	0.99	0.99							0.96			
Frt		0.974			0.957				0.850		0.994	
Flt Protected	0.950			0.950				0.999			0.995	
Satd. Flow (prot)	1807	1830	0	1825	1839	0	0	3611	1601	0	3579	0
Flt Permitted	0.477			0.223				0.705			0.505	
Satd. Flow (perm)	897	1830	0	428	1839	0	0	2549	1542	0	1817	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			25				371		7	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		140.5			1204.0			126.9			109.9	
Travel Time (s)		10.5			90.3			9.5			8.2	
Confl. Peds. (#/hr)	12		21						8	8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Adj. Flow (vph)	61	299	62	247	263	105	53	1928	641	108	1033	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	361	0	247	368	0	0	1981	641	0	1192	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2			6			8		8	4		
Minimum Split (s)	28.0	28.0		8.0	20.0		8.0	25.0	25.0	9.0	25.0	
Total Split (s)	28.0	28.0		8.0	36.0		8.0	45.0	45.0	9.0	46.0	
Total Split (%)	31.1%	31.1%		8.9%	40.0%		8.9%	50.0%	50.0%	10.0%	51.1%	
Maximum Green (s)	24.0	24.0		4.0	32.0		4.0	41.0	41.0	4.0	42.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.0	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	2.0	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes				Yes	
Walk Time (s)	7.0	7.0			5.0			7.0	7.0		7.0	
Flash Dont Walk (s)	17.0	17.0			11.0			14.0	14.0		14.0	
Pedestrian Calls (#/hr)	0	0			0			0	0		0	

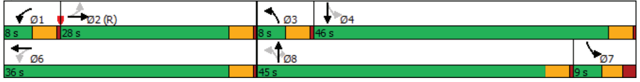
Lanes, Volumes, Timings
6: Clarence Street & Colborne

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	24.0	24.0		32.0	32.0			41.0	41.0		42.0	
Actuated g/C Ratio	0.27	0.27		0.36	0.36			0.46	0.46		0.47	
v/c Ratio	0.26	0.73		1.15	0.55			1.64	0.71		1.26	
Control Delay	29.5	39.0		137.1	25.3			314.8	12.8		140.1	
Queue Delay	0.0	0.0		0.0	0.0			1.0	0.0		0.0	
Total Delay	29.5	39.0		137.1	25.3			315.8	12.8		140.1	
LOS	C	D		F	C			F	B		F	
Approach Delay		37.6			70.2			241.8			140.1	
Approach LOS		D			E			F			F	
Queue Length 50th (m)	8.3	55.1		~37.8	46.7			~263.2	34.0		~89.2	
Queue Length 95th (m)	18.9	#87.7		#84.2	73.5			#305.1	75.5		m#76.0	
Internal Link Dist (m)		116.5			1180.0			102.9			85.9	
Turn Bay Length (m)	25.0			25.0								
Base Capacity (vph)	239	496		214	669			1208	904		949	
Starvation Cap Reductn	0	0		0	0			0	0		0	
Spillback Cap Reductn	0	0		0	1			243	0		0	
Storage Cap Reductn	0	0		0	0			0	0		0	
Reduced v/c Ratio	0.26	0.73		1.15	0.55			2.05	0.71		1.26	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green			
Natural Cycle: 140			
Control Type: Pretimed			
Maximum v/c Ratio: 1.64			
Intersection Signal Delay: 177.3		Intersection LOS: F	
Intersection Capacity Utilization 127.0%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Clarence Street & Colborne



HCM Signalized Intersection Capacity Analysis
6: Clarence Street & Colborne

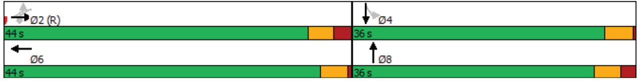
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰↑	↱		↰↱	
Traffic Volume (vph)	56	275	57	227	242	97	49	1774	590	99	950	47
Future Volume (vph)	56	275	57	227	242	97	49	1774	590	99	950	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	0.96		1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.97		1.00	0.96			1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		1.00	
Satd. Flow (prot)	1787	1830		1825	1839			3610	1542		3579	
Flt Permitted	0.48	1.00		0.22	1.00			0.70	1.00		0.50	
Satd. Flow (perm)	896	1830		428	1839			2548	1542		1815	
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)	61	299	62	247	263	105	53	1928	641	108	1033	51
RTOR Reduction (vph)	0	8	0	0	16	0	0	0	202	0	4	0
Lane Group Flow (vph)	61	353	0	247	352	0	0	1981	439	0	1188	0
Confl. Peds. (#/hr)	12		21						8	8		
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	24.0	24.0		32.0	32.0			41.0	41.0		42.0	
Effective Green, g (s)	24.0	24.0		32.0	32.0			41.0	41.0		42.0	
Actuated g/C Ratio	0.27	0.27		0.36	0.36			0.46	0.46		0.47	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	238	488		214	653			1207	702		925	
v/s Ratio Prot		0.19		c0.05	0.19			c0.07			c0.06	
v/s Ratio Perm	0.07			c0.36				c0.67	0.28		0.54	
v/c Ratio	0.26	0.72		1.15	0.54			1.64	0.63		1.28	
Uniform Delay, d1	26.0	30.0		30.1	23.1			24.5	18.7		24.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		0.79	
Incremental Delay, d2	2.6	9.0		109.3	3.2			292.3	4.2		130.1	
Delay (s)	28.6	39.0		139.4	26.3			316.8	22.8		149.1	
Level of Service	C	D		F	C			F	C		F	
Approach Delay (s)		37.5			71.7			245.0			149.1	
Approach LOS		D			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	181.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	127.0%	ICU Level of Service	H
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)	39	864	0	0	553	369	0	0	0	576	0	0
Future Volume (vph)	39	864	0	0	553	369	0	0	0	576	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		22.0	48.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850						
Flt Protected	0.950										0.950	
Satd. Flow (prot)	1789	1883	1883	1883	1883	1601	0	1883	0	0	1789	0
Flt Permitted	0.255										0.757	
Satd. Flow (perm)	480	1883	1883	1883	1883	1601	0	1883	0	0	1426	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						330						
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		1204.0			112.9			111.0			175.7	
Travel Time (s)		90.3			8.5			8.3			13.2	
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
Adj. Flow (vph)	42	939	0	0	601	401	0	0	0	626	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	939	0	0	601	401	0	0	0	0	626	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1		2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0		10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	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)	2.0	0.6	2.0	2.0	0.6	2.0		0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	D.Pm	NA	Free				Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	2		Free				4		

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

Splits and Phases: 7: Canadian Tire Entrance & Colborne St & Dalhousie Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	2	2	2	2	6			8		4	4	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0			3.0		4.0	4.0	
Minimum Split (s)	21.6	21.6	21.6	21.6	20.0			8.3		20.0	20.0	
Total Split (s)	44.0	44.0	44.0	44.0	44.0			36.0		36.0	36.0	
Total Split (%)	55.0%	55.0%	55.0%	55.0%	55.0%			45.0%		45.0%	45.0%	
Maximum Green (s)	38.4	38.4	38.4	38.4	40.0			30.7		32.0	32.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.5			3.3		3.5	3.5	
All-Red Time (s)	2.3	2.3	2.3	2.3	0.5			2.0		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6	5.6	5.6	4.0			5.3			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None			None		None	None	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)	38.4	38.4			40.0	80.0					32.0	
Actuated g/C Ratio	0.48	0.48			0.50	1.00					0.40	
v/c Ratio	0.18	1.04			0.64	0.25					1.10	
Control Delay	14.5	63.8			18.6	0.4					93.6	
Queue Delay	0.0	0.0			0.0	0.0					0.0	
Total Delay	14.5	63.8			18.6	0.4					93.6	
LOS	B	E			B	A					F	
Approach Delay		61.7			11.3						93.6	
Approach LOS		E			B						F	
Queue Length 50th (m)	3.5	~156.4			63.4	0.0					~109.4	
Queue Length 95th (m)	9.9	#223.8			96.7	0.0					#169.2	
Internal Link Dist (m)		1180.0			88.9			87.0			151.7	
Turn Bay Length (m)	50.0											
Base Capacity (vph)	230	903			941	1601					570	
Starvation Cap Reductn	0	0			0	0					0	
Spillback Cap Reductn	0	0			0	0					0	
Storage Cap Reductn	0	0			0	0					0	
Reduced v/c Ratio	0.18	1.04			0.64	0.25					1.10	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 50.0 Intersection LOS: D
Intersection Capacity Utilization 85.4% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱		↱			✥	
Traffic Volume (vph)	39	864	0	0	553	369	0	0	0	576	0	0
Future Volume (vph)	39	864	0	0	553	369	0	0	0	576	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6			4.0	4.0					4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00					1.00	
Frt	1.00	1.00			1.00	0.85					1.00	
Flt Protected	0.95	1.00			1.00	1.00					0.95	
Satd. Flow (prot)	1789	1883			1883	1601					1789	
Flt Permitted	0.25	1.00			1.00	1.00					0.76	
Satd. Flow (perm)	479	1883			1883	1601					1426	
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)	42	939	0	0	601	401	0	0	0	626	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	42	939	0	0	601	401	0	0	0	0	626	0
Turn Type	Perm	NA	Perm	D.Pm	NA	Free				Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	2		Free				4		
Actuated Green, G (s)	38.4	38.4			40.0	80.0					32.0	
Effective Green, g (s)	38.4	38.4			40.0	80.0					32.0	
Actuated g/C Ratio	0.48	0.48			0.50	1.00					0.40	
Clearance Time (s)	5.6	5.6			4.0						4.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	229	903			941	1601					570	
v/s Ratio Prot		c0.50			0.32							
v/s Ratio Perm	0.09					0.25					c0.44	
v/c Ratio	0.18	1.04			0.64	0.25					1.10	
Uniform Delay, d1	11.9	20.8			14.7	0.0					24.0	
Progression Factor	1.00	1.00			1.00	1.00					1.00	
Incremental Delay, d2	1.8	40.8			1.4	0.4					67.4	
Delay (s)	13.6	61.6			16.1	0.4					91.4	
Level of Service	B	E			B	A					F	
Approach Delay (s)		59.5			9.8			0.0			91.4	
Approach LOS		E			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	48.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
8: Clarence Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰↱			↰↱	
Traffic Volume (vph)	37	183	38	151	161	65	33	1501	394	66	907	31
Future Volume (vph)	37	183	38	151	161	65	33	1501	394	66	907	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor				0.98	0.99			1.00			1.00	
Frt		0.974			0.957			0.969			0.995	
Flt Protected	0.950			0.950				0.999			0.997	
Satd. Flow (prot)	1825	1871	0	1825	1793	0	0	3479	0	0	3585	0
Flt Permitted	0.510			0.519				0.912			0.538	
Satd. Flow (perm)	980	1871	0	981	1793	0	0	3176	0	0	1934	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			15			53			5	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		139.0			1069.0			109.9			102.5	
Travel Time (s)		10.4			80.2			8.2			7.7	
Confl. Peds. (#/hr)				23		17	8					8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	40	199	41	164	175	71	36	1632	428	72	986	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	240	0	164	246	0	0	2096	0	0	1092	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		
Minimum Split (s)	31.1	31.1		28.1	28.1		9.0	31.1		8.0	31.1	
Total Split (s)	32.0	32.0		32.0	32.0		9.0	50.0		8.0	49.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		10.0%	55.6%		8.9%	54.4%	
Maximum Green (s)	26.0	26.0		26.0	26.0		4.0	44.0		4.0	43.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.5	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		0.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0		15.0	15.0			18.0			18.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	

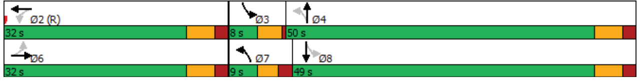
Lanes, Volumes, Timings
8: Clarence Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	26.0	26.0		26.0	26.0			47.0			45.0	
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.52			0.50	
v/c Ratio	0.14	0.44		0.58	0.47			1.24			1.09	
Control Delay	31.4	34.8		37.0	28.1			121.4			77.5	
Queue Delay	0.0	0.0		0.0	0.0			0.7			6.0	
Total Delay	31.4	34.8		37.0	28.1			122.2			83.5	
LOS	C	C		D	C			F			F	
Approach Delay		34.3			31.6			122.2			83.5	
Approach LOS		C			C			F			F	
Queue Length 50th (m)	7.2	42.4		24.1	32.6			~248.0			~67.8	
Queue Length 95th (m)	m14.6	65.2		45.0	54.2			m8.4			#116.3	
Internal Link Dist (m)		115.0			1045.0			85.9			78.5	
Turn Bay Length (m)	25.0			50.0								
Base Capacity (vph)	283	549		283	528			1694			1006	
Starvation Cap Reductn	0	0		0	0			336			0	
Spillback Cap Reductn	0	0		0	0			0			19	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.14	0.44		0.58	0.47			1.54			1.11	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 120
Control Type: Pretimed
Maximum v/c Ratio: 1.24
Intersection Signal Delay: 95.4 Intersection LOS: F
Intersection Capacity Utilization 114.9% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Clarence Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis
8: Clarence Street & Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰↱			↰↱	
Traffic Volume (vph)	37	183	38	151	161	65	33	1501	394	66	907	31
Future Volume (vph)	37	183	38	151	161	65	33	1501	394	66	907	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		0.98	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.96			0.97			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1825	1872		1795	1792			3481			3585	
Flt Permitted	0.51	1.00		0.52	1.00			0.91			0.54	
Satd. Flow (perm)	980	1872		981	1792			3176			1935	
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)	40	199	41	164	175	71	36	1632	428	72	986	34
RTOR Reduction (vph)	0	9	0	0	11	0	0	25	0	0	2	0
Lane Group Flow (vph)	40	231	0	164	235	0	0	2071	0	0	1090	0
Confl. Peds. (#/hr)				23		17	8					8
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	26.0	26.0		26.0	26.0			48.0			47.0	
Effective Green, g (s)	26.0	26.0		26.0	26.0			48.0			47.0	
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.53			0.52	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lane Grp Cap (vph)	283	540		283	517			1707			1083	
v/s Ratio Prot		0.12			0.13			c0.05			0.04	
v/s Ratio Perm	0.04			c0.17				c0.59			0.48	
v/c Ratio	0.14	0.43		0.58	0.46			1.21			1.01	
Uniform Delay, d1	23.7	26.0		27.3	26.2			21.0			21.5	
Progression Factor	1.25	1.29		1.00	1.00			0.36			1.00	
Incremental Delay, d2	1.0	2.3		8.4	2.9			96.6			28.8	
Delay (s)	30.6	35.8		35.7	29.1			104.2			50.3	
Level of Service	C	D		D	C			F			D	
Approach Delay (s)		35.0			31.7			104.2			50.3	
Approach LOS		D			C			F			D	

Intersection Summary			
HCM 2000 Control Delay	76.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	114.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
9: Charlotte Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	55	217	0	96	175	11	128	17	0	17	31	4
Future Volume (vph)	55	217	0	96	175	11	128	17	0	17	31	4
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
Frt					0.995						0.990	
Flt Protected		0.990			0.983			0.958			0.984	
Satd. Flow (prot)	0	1865	0	0	1842	0	0	1804	0	0	1835	0
Flt Permitted		0.990			0.983			0.958			0.984	
Satd. Flow (perm)	0	1865	0	0	1842	0	0	1804	0	0	1835	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		241.1			139.0			32.3			102.3	
Travel Time (s)		18.1			10.4			2.4			7.7	
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
Adj. Flow (vph)	60	236	0	104	190	12	139	18	0	18	34	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	296	0	0	306	0	0	157	0	0	56	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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 46.8% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
9: Charlotte Street & Dalhousie St

2051 AM Peak (2-Way).syn
09-21-2022

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (veh/h)	55	217	0	96	175	11	128	17	0	17	31	4
Future Volume (Veh/h)	55	217	0	96	175	11	128	17	0	17	31	4
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)	60	236	0	104	190	12	139	18	0	18	34	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		241			139							
pX, platoon unblocked	0.94			0.88			0.91	0.91	0.88	0.91	0.91	0.94
vC, conflicting volume	202			236			781	766	236	769	760	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115			57			551	535	57	538	528	108
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 %	96			92			59	95	100	95	91	100
cM capacity (veh/h)	1381			1355			340	362	884	361	365	886

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	296	306	157	56
Volume Left	60	104	139	18
Volume Right	0	12	0	4
cSH	1381	1355	343	380
Volume to Capacity	0.04	0.08	0.46	0.15
Queue Length 95th (m)	1.0	1.9	17.5	3.9
Control Delay (s)	1.9	3.1	24.1	16.1
Lane LOS	A	A	C	C
Approach Delay (s)	1.9	3.1	24.1	16.1
Approach LOS			C	C

Intersection Summary			
Average Delay	7.6		
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
10: Dalhousie St & Market St

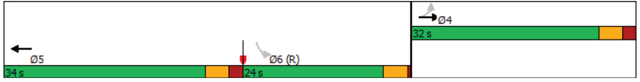
2051 AM Peak (2-Way).syn
09-21-2022

	↗	→	←	↖	↘	↙
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)		26.7	28.7		20.0	
Actuated g/C Ratio		0.30	0.32		0.22	
v/c Ratio		0.52	0.56		0.21	
Control Delay		30.3	28.7		0.9	
Queue Delay		0.0	0.0		0.0	
Total Delay		30.3	28.7		0.9	
LOS		C	C		A	
Approach Delay		30.3	28.7		0.9	
Approach LOS		C	C		A	
Queue Length 50th (m)		42.3	44.8		0.0	
Queue Length 95th (m)		66.6	m65.1		0.0	
Internal Link Dist (m)		158.0	217.1		77.1	
Turn Bay Length (m)						
Base Capacity (vph)		569	561		547	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.52	0.56		0.21	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 25.0 Intersection LOS: C
Intersection Capacity Utilization 42.1% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Dalhousie St & Market St



Lanes, Volumes, Timings
10: Dalhousie St & Market St

2051 AM Peak (2-Way).syn
09-21-2022

	↗	→	←	↖	↘	↙
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⋎	
Traffic Volume (vph)	0	272	192	96	0	104
Future Volume (vph)	0	272	192	96	0	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0			10.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.94		0.47	
Frt			0.955		0.865	
Flt Protected						
Satd. Flow (prot)	0	1921	1700	0	772	0
Flt Permitted						
Satd. Flow (perm)	0	1921	1700	0	772	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			29		483	
Link Speed (k/h)		48	48		48	
Link Distance (m)		182.0	241.1		101.1	
Travel Time (s)		13.7	18.1		7.6	
Confl. Peds. (#/hr)				94		216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Adj. Flow (vph)	0	296	209	104	0	113
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	296	313	0	113	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Turn Type		NA	NA		Perm	
Protected Phases		4	5			
Permitted Phases	4				6	
Minimum Split (s)	28.3	28.3	29.3		20.0	
Total Split (s)	32.0	32.0	34.0		24.0	
Total Split (%)	35.6%	35.6%	37.8%		26.7%	
Maximum Green (s)	26.7	26.7	28.7		20.0	
Yellow Time (s)	3.3	3.3	3.3		3.5	
All-Red Time (s)	2.0	2.0	2.0		0.5	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.3	5.3		4.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Walk Time (s)	7.0	7.0	7.0		5.0	
Flash Dont Walk (s)	16.0	16.0	17.0		11.0	
Pedestrian Calls (#/hr)	0	0	0		0	

HCM Signalized Intersection Capacity Analysis
10: Dalhousie St & Market St

2051 AM Peak (2-Way).syn
09-21-2022

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⋎	
Traffic Volume (vph)	0	272	192	96	0	104
Future Volume (vph)	0	272	192	96	0	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3	5.3		4.0	
Lane Util. Factor		1.00	1.00		1.00	
Frpb, ped/bikes		1.00	0.94		0.47	
Flpb, ped/bikes		1.00	1.00		1.00	
Frt		1.00	0.96		0.86	
Flt Protected		1.00	1.00		1.00	
Satd. Flow (prot)		1921	1700		772	
Flt Permitted		1.00	1.00		1.00	
Satd. Flow (perm)		1921	1700		772	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	296	209	104	0	113
RTOR Reduction (vph)	0	0	20	0	88	0
Lane Group Flow (vph)	0	296	293	0	25	0
Confl. Peds. (#/hr)				94		216
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Turn Type		NA	NA		Perm	
Protected Phases		4	5			
Permitted Phases	4				6	
Actuated Green, G (s)		26.7	28.7		20.0	
Effective Green, g (s)		26.7	28.7		20.0	
Actuated g/C Ratio		0.30	0.32		0.22	
Clearance Time (s)		5.3	5.3		4.0	
Lane Grp Cap (vph)		569	542		171	
v/s Ratio Prot		c0.15	c0.17			
v/s Ratio Perm					c0.03	
v/c Ratio		0.52	0.54		0.15	
Uniform Delay, d1		26.3	25.2		28.1	
Progression Factor		1.00	1.06		1.00	
Incremental Delay, d2		3.4	3.7		1.8	
Delay (s)		29.7	30.5		29.9	
Level of Service		C	C		C	
Approach Delay (s)		29.7	30.5		29.9	
Approach LOS		C	C		C	

Intersection Summary			
HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.6
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

2051 AM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	11	241	0	56	202	11	7	25	0	12	37	13
Future Volume (vph)	11	241	0	56	202	11	7	25	0	12	37	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					0.99			0.99			0.98	
Frt					0.994						0.972	
Flt Protected		0.998			0.990			0.989			0.990	
Satd. Flow (prot)	0	1917	0	0	1885	0	0	1900	0	0	1821	0
Flt Permitted		0.984			0.887			0.954			0.959	
Satd. Flow (perm)	0	1890	0	0	1678	0	0	1820	0	0	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					4						14	
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	12	262	0	61	220	12	8	27	0	13	40	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	274	0	0	293	0	0	35	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Minimum Split (s)	26.3	26.3		26.3	26.3		26.3	26.3		26.3	26.3	
Total Split (s)	50.0	50.0		50.0	50.0		30.0	30.0		30.0	30.0	
Total Split (%)	62.5%	62.5%		62.5%	62.5%		37.5%	37.5%		37.5%	37.5%	
Maximum Green (s)	44.7	44.7		44.7	44.7		24.7	24.7		24.7	24.7	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.3			5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		44.7			44.7			24.7			24.7	
Actuated g/C Ratio		0.56			0.56			0.31			0.31	
v/c Ratio		0.26			0.31			0.06			0.12	

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

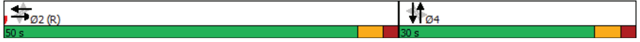
2051 AM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		9.9			10.4			20.0			17.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		9.9			10.4			20.0			17.3	
LOS		A			B			B			B	
Approach Delay		9.9			10.4			20.0			17.3	
Approach LOS		A			B			B			B	
Queue Length 50th (m)		19.8			21.6			3.7			5.7	
Queue Length 95th (m)		32.6			35.9			9.9			14.3	
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)		1056			939			561			549	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.26			0.31			0.06			0.12	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 37 (46%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.31
Intersection Signal Delay: 11.4 Intersection LOS: B
Intersection Capacity Utilization 61.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis
11: Queen St/Queen Street & Dalhousie St

2051 AM Peak (2-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	11	241	0	56	202	11	7	25	0	12	37	13
Future Volume (vph)	11	241	0	56	202	11	7	25	0	12	37	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3			5.3			5.3	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			0.99			0.99			0.99	
Frt		1.00			0.99			1.00			0.97	
Flt Protected		1.00			0.99			0.99			0.99	
Satd. Flow (prot)		1917			1873			1887			1807	
Flt Permitted		0.98			0.89			0.95			0.96	
Satd. Flow (perm)		1891			1679			1821			1749	
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)	12	262	0	61	220	12	8	27	0	13	40	14
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	274	0	0	291	0	0	35	0	0	57	0
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)		44.7			44.7			24.7			24.7	
Effective Green, g (s)		44.7			44.7			24.7			24.7	
Actuated g/C Ratio		0.56			0.56			0.31			0.31	
Clearance Time (s)		5.3			5.3			5.3			5.3	
Lane Grp Cap (vph)		1056			938			562			540	
v/s Ratio Prot												
v/s Ratio Perm		0.14			c0.17			0.02			c0.03	
v/c Ratio		0.26			0.31			0.06			0.11	
Uniform Delay, d1		9.1			9.4			19.5			19.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.6			0.9			0.2			0.4	
Delay (s)		9.7			10.3			19.7			20.2	
Level of Service		A			B			B			C	
Approach Delay (s)		9.7			10.3			19.7			20.2	
Approach LOS		A			B			B			C	

Intersection Summary

HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

2051 AM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	40	215	0	9	193	21	60	29	0	17	54	19
Future Volume (vph)	40	215	0	9	193	21	60	29	0	17	54	19
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					0.99			1.00			0.99	
Frt					0.987						0.971	
Flt Protected		0.992			0.998			0.968			0.991	
Satd. Flow (prot)	0	1906	0	0	1867	0	0	1860	0	0	1706	0
Flt Permitted		0.924			0.986			0.777			0.950	
Satd. Flow (perm)	0	1775	0	0	1844	0	0	1486	0	0	1630	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9						17	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		186.2			119.6			114.7			99.2	
Travel Time (s)		13.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	43	234	0	10	210	23	65	32	0	18	59	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	277	0	0	243	0	0	97	0	0	98	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Minimum Split (s)	27.3	27.3		27.3	27.3		27.3	27.3		27.3	27.3	
Total Split (s)	53.0	53.0		53.0	53.0		37.0	37.0		37.0	37.0	
Total Split (%)	58.9%	58.9%		58.9%	58.9%		41.1%	41.1%		41.1%	41.1%	
Maximum Green (s)	47.7	47.7		47.7	47.7		31.7	31.7		31.7	31.7	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.3			5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		47.7			47.7			31.7			31.7	
Actuated g/C Ratio		0.53			0.53			0.35			0.35	
v/c Ratio		0.29			0.25			0.19			0.17	

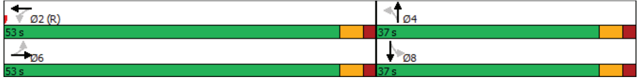
Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		11.7			11.8			21.4			17.5	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		11.7			11.8			21.4			17.5	
LOS		B			B			C			B	
Approach Delay		11.7			11.8			21.4			17.5	
Approach LOS		B			B			C			B	
Queue Length 50th (m)		17.4			20.5			11.5			9.4	
Queue Length 95th (m)		m21.4			33.8			22.5			20.1	
Internal Link Dist (m)		162.2			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)		940			981			523			585	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.29			0.25			0.19			0.17	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.29
Intersection Signal Delay: 13.8 Intersection LOS: B
Intersection Capacity Utilization 55.2% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: King St/King Street & Dalhousie St



Lanes, Volumes, Timings
13: Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰	↱			↰↱			↰↱	
Traffic Volume (vph)	0	0	0	154	3	59	5	1770	185	70	1334	0
Future Volume (vph)	0	0	0	154	3	59	5	1770	185	70	1334	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		50.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt					0.857			0.986				
Flt Protected				0.950							0.998	
Satd. Flow (prot)	0	1883	0	1789	1614	0	0	3528	0	0	3571	0
Flt Permitted				0.757				0.952			0.613	
Satd. Flow (perm)	0	1883	0	1426	1614	0	0	3359	0	0	2194	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					25			28				
Link Speed (k/h)		50			48			48			48	
Link Distance (m)		85.9			186.2			120.0			158.3	
Travel Time (s)		6.2			14.0			9.0			11.9	
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
Adj. Flow (vph)	0	0	0	167	3	64	5	1924	201	76	1450	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	167	67	0	0	2130	0	0	1526	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0		8.0	62.0		8.0	62.0	
Total Split (%)	22.2%	22.2%		22.2%	22.2%		8.9%	68.9%		8.9%	68.9%	
Maximum Green (s)	16.0	16.0		16.0	16.0		4.0	58.0		4.0	58.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		4.0		4.0	4.0			4.0			4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)				16.0	16.0			62.0			62.0	
Actuated g/C Ratio				0.18	0.18			0.69			0.69	
v/c Ratio				0.66	0.22			0.91			0.97	

HCM Signalized Intersection Capacity Analysis
12: King St/King Street & Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	40	215	0	9	193	21	60	29	0	17	54	19
Future Volume (vph)	40	215	0	9	193	21	60	29	0	17	54	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3			5.3			5.3	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			1.00			0.97	
Flt Protected		0.99			1.00			0.97			0.99	
Satd. Flow (prot)		1906			1867			1850			1701	
Flt Permitted		0.92			0.99			0.78			0.95	
Satd. Flow (perm)		1776			1845			1485			1630	
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)	43	234	0	10	210	23	65	32	0	18	59	21
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	277	0	0	239	0	0	97	0	0	87	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)		47.7			47.7			31.7			31.7	
Effective Green, g (s)		47.7			47.7			31.7			31.7	
Actuated g/C Ratio		0.53			0.53			0.35			0.35	
Clearance Time (s)		5.3			5.3			5.3			5.3	
Lane Grp Cap (vph)		941			977			523			574	
v/s Ratio Prot												
v/s Ratio Perm		c0.16			0.13			c0.07			0.05	
v/c Ratio		0.29			0.24			0.19			0.15	
Uniform Delay, d1		11.8			11.4			20.2			19.9	
Progression Factor		0.95			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.6			0.8			0.6	
Delay (s)		11.4			12.0			21.0			20.5	
Level of Service		B			B			C			C	
Approach Delay (s)		11.4			12.0			21.0			20.5	
Approach LOS		B			B			C			C	

Intersection Summary

HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay				45.9	22.8			19.1			29.9	
Queue Delay				0.0	0.0			45.6			0.0	
Total Delay				45.9	22.8			64.7			29.9	
LOS				D	C			E			C	
Approach Delay					39.3			64.7			29.9	
Approach LOS					D			E			C	
Queue Length 50th (m)				24.7	6.3			105.6			53.4	
Queue Length 95th (m)				#53.7	16.1			#144.3			#92.2	
Internal Link Dist (m)		61.9			162.2			96.0			134.3	
Turn Bay Length (m)												
Base Capacity (vph)				253	307			2330			1572	
Starvation Cap Reductn				0	0			396			0	
Spillback Cap Reductn				0	0			0			0	
Storage Cap Reductn				0	0			0			0	
Reduced v/c Ratio				0.66	0.22			1.10			0.97	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 49.5 Intersection LOS: D
Intersection Capacity Utilization 104.0% ICU Level of Service G
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Dalhousie St

HCM Signalized Intersection Capacity Analysis — 2051 AM Peak (2-Way).syn
13: Dalhousie St — 09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰	↱			↰↱			↰↱	
Traffic Volume (vph)	0	0	0	154	3	59	5	1770	185	70	1334	0
Future Volume (vph)	0	0	0	154	3	59	5	1770	185	70	1334	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0			4.0	
Lane Util. Factor				1.00	1.00			0.95			0.95	
Frt				1.00	0.86			0.99			1.00	
Flt Protected				0.95	1.00			1.00			1.00	
Satd. Flow (prot)				1789	1614			3527			3570	
Flt Permitted				0.76	1.00			0.95			0.61	
Satd. Flow (perm)				1426	1614			3360			2194	
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)	0	0	0	167	3	64	5	1924	201	76	1450	0
RTOR Reduction (vph)	0	0	0	0	21	0	0	9	0	0	0	0
Lane Group Flow (vph)	0	0	0	167	46	0	0	2121	0	0	1526	0
Turn Type				Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)				16.0	16.0			62.0			62.0	
Effective Green, g (s)				16.0	16.0			62.0			62.0	
Actuated g/C Ratio				0.18	0.18			0.69			0.69	
Clearance Time (s)				4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)				253	286			2322			1572	
v/s Ratio Prot					0.03			0.04			c0.04	
v/s Ratio Perm				c0.12				0.59			c0.63	
v/c Ratio				0.66	0.16			0.91			0.97	
Uniform Delay, d1				34.5	31.3			11.8			13.1	
Progression Factor				0.93	0.95			1.00			1.00	
Incremental Delay, d2				12.6	1.2			7.0			16.7	
Delay (s)				44.6	30.9			18.7			29.9	
Level of Service				D	C			B			C	
Approach Delay (s)		0.0			40.7			18.7			29.9	
Approach LOS		A			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings — 2051 AM Peak (2-Way).syn
15: Colborne St — 09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✥		↰	↑↱			↰↑	↱
Traffic Volume (vph)	785	207	62	0	205	81	97	618	28	93	366	838
Future Volume (vph)	785	207	62	0	205	81	97	618	28	93	366	838
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		25.0	110.0		0.0	40.0		0.0
Storage Lanes	2		0	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	1.00
Frt		0.966			0.962			0.994				0.850
Flt Protected	0.950						0.950				0.990	
Satd. Flow (prot)	3471	1819	0	0	1812	0	1789	3557	0	0	3543	1601
Flt Permitted	0.520						0.469				0.589	
Satd. Flow (perm)	1900	1819	0	0	1812	0	883	3557	0	0	2108	1601
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		30			39			6				668
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		90.1			160.9			71.7			120.0	
Travel Time (s)		6.8			12.1			5.4			9.0	
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
Adj. Flow (vph)	853	225	67	0	223	88	105	672	30	101	398	911
Shared Lane Traffic (%)												
Lane Group Flow (vph)	853	292	0	0	311	0	105	702	0	0	499	911
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)		7.4			7.4			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA			NA		Perm	NA		pm+pt	NA	Free
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		Free
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		8.0	20.0	
Total Split (s)	43.0	43.0		43.0	43.0		24.0	24.0		8.0	32.0	
Total Split (%)	57.3%	57.3%		57.3%	57.3%		32.0%	32.0%		10.7%	42.7%	
Maximum Green (s)	39.0	39.0		39.0	39.0		20.0	20.0		4.0	28.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0			4.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0			5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0			0	
Act Effct Green (s)	39.0	39.0			39.0		20.0	20.0			28.0	75.0
Actuated g/C Ratio	0.52	0.52			0.52		0.27	0.27			0.37	1.00
v/c Ratio	0.86	0.30			0.32		0.45	0.74			0.58	0.57

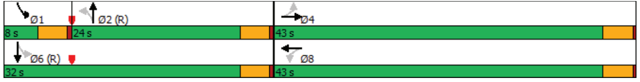
Lanes, Volumes, Timings — 2051 AM Peak (2-Way).syn
15: Colborne St — 09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	27.1	10.2			10.1		30.1	30.3			21.0	1.5
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Delay	27.1	10.2			10.1		30.1	30.3			21.0	1.5
LOS	C	B			B		C	C			C	A
Approach Delay		22.8			10.1			30.3			8.4	
Approach LOS		C			B			C			A	
Queue Length 50th (m)	50.6	19.4			20.3		12.4	47.2			26.4	0.0
Queue Length 95th (m)	#88.6	33.6			35.2		26.7	65.5			38.2	0.0
Internal Link Dist (m)		66.1			136.9			47.7			96.0	
Turn Bay Length (m)							110.0					
Base Capacity (vph)	988	960			960		235	952			863	1601
Starvation Cap Reductn	0	0			0		0	0			0	0
Spillback Cap Reductn	0	0			0		0	0			0	0
Storage Cap Reductn	0	0			0		0	0			0	0
Reduced v/c Ratio	0.86	0.30			0.32		0.45	0.74			0.58	0.57

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 17.8 Intersection LOS: B
Intersection Capacity Utilization 82.2% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Colborne St



HCM Signalized Intersection Capacity Analysis — 2051 AM Peak (2-Way).syn
15: Colborne St — 09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			✥		↰	↑↱			↰↑	↱
Traffic Volume (vph)	785	207	62	0	205	81	97	618	28	93	366	838
Future Volume (vph)	785	207	62	0	205	81	97	618	28	93	366	838
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95			0.95	1.00
Frt	1.00	0.97			0.96		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.99	1.00
Satd. Flow (prot)	3471	1819			1811		1789	3556			3543	1601
Flt Permitted	0.52	1.00			1.00		0.47	1.00			0.59	1.00
Satd. Flow (perm)	1899	1819			1811		884	3556			2108	1601
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)	853	225	67	0	223	88	105	672	30	101	398	911
RTOR Reduction (vph)	0	14	0	0	19	0	0	4	0	0	0	0
Lane Group Flow (vph)	853	278	0	0	292	0	105	698	0	0	499	911
Turn Type	Perm	NA			NA		Perm	NA		pm+pt	NA	Free
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		Free
Actuated Green, G (s)	39.0	39.0			39.0		20.0	20.0			28.0	75.0
Effective Green, g (s)	39.0	39.0			39.0		20.0	20.0			28.0	75.0
Actuated g/C Ratio	0.52	0.52			0.52		0.27	0.27			0.37	1.00
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)	987	945			941		235	948			863	1601
v/s Ratio Prot		0.15			0.16			c0.20			0.03	
v/s Ratio Perm	c0.45						0.12				0.18	c0.57
v/c Ratio	0.86	0.29			0.31		0.45	0.74			0.58	0.57
Uniform Delay, d1	15.7	10.2			10.3		22.9	25.1			18.8	0.0
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	10.0	0.8			0.9		6.0	5.1			2.8	1.5
Delay (s)	25.7	11.0			11.2		28.9	30.2			21.6	1.5
Level of Service	C	B			B		C	C			C	A
Approach Delay (s)		21.9			11.2			30.0			8.6	
Approach LOS		C			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
1: Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			↰↑↱		↰	↑↱			↰↑	↱
Traffic Volume (vph)	1176	287	152	0	404	133	175	579	48	118	557	818
Future Volume (vph)	1176	287	152	0	404	133	175	579	48	118	557	818
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		25.0	110.0		0.0	40.0		0.0
Storage Lanes	2		0	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	1.00
Frt		0.948			0.966			0.989				0.850
Flt Protected	0.950						0.950				0.991	
Satd. Flow (prot)	3471	1786	0	0	1819	0	1789	3539	0	0	3546	1601
Flt Permitted	0.345						0.206				0.520	
Satd. Flow (perm)	1261	1786	0	0	1819	0	388	3539	0	0	1861	1601
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		41			25			6				469
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		90.1			160.9			71.7			120.0	
Travel Time (s)		6.8			12.1			5.4			9.0	
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
Adj. Flow (vph)	1278	312	165	0	439	145	190	629	52	128	605	889
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1278	477	0	0	584	0	190	681	0	0	733	889
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)		7.4			7.4			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA			NA		pm+pt	NA		pm+pt	NA	Free
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		Free
Minimum Split (s)	20.0	20.0		20.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	87.0	87.0		87.0	87.0		8.0	35.0		8.0	35.0	
Total Split (%)	66.9%	66.9%		66.9%	66.9%		6.2%	26.9%		6.2%	26.9%	
Maximum Green (s)	83.0	83.0		83.0	83.0		4.0	31.0		4.0	31.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0			4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)	83.0	83.0			83.0		35.0	31.0			35.0	130.0
Actuated g/C Ratio	0.64	0.64			0.64		0.27	0.24			0.27	1.00
v/c Ratio	1.59	0.41			0.50		1.29	0.80			1.33	0.56

HCM Signalized Intersection Capacity Analysis
1: Colborne St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↱			↰↑↱		↰	↑↱			↰↑	↱
Traffic Volume (vph)	1176	287	152	0	404	133	175	579	48	118	557	818
Future Volume (vph)	1176	287	152	0	404	133	175	579	48	118	557	818
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95			0.95	1.00
Frt	1.00	0.95			0.97		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00			0.99	1.00
Satd. Flow (prot)	3471	1786			1820		1789	3538			3548	1601
Flt Permitted	0.34	1.00			1.00		0.21	1.00			0.52	1.00
Satd. Flow (perm)	1260	1786			1820		387	3538			1860	1601
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)	1278	312	165	0	439	145	190	629	52	128	605	889
RTOR Reduction (vph)	0	15	0	0	9	0	0	5	0	0	0	0
Lane Group Flow (vph)	1278	462	0	0	575	0	190	676	0	0	733	889
Turn Type	Perm	NA			NA		pm+pt	NA		pm+pt	NA	Free
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		Free
Actuated Green, G (s)	83.0	83.0			83.0		35.0	31.0			35.0	130.0
Effective Green, g (s)	83.0	83.0			83.0		35.0	31.0			35.0	130.0
Actuated g/C Ratio	0.64	0.64			0.64		0.27	0.24			0.27	1.00
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0			4.0	
Lane Grp Cap (vph)	804	1140			1162		147	843			552	1601
v/s Ratio Prot		0.26			0.32		0.04	0.19			c0.04	
v/s Ratio Perm	c1.01						0.31				c0.32	0.56
v/c Ratio	1.59	0.41			0.49		1.29	0.80			1.33	0.56
Uniform Delay, d1	23.5	11.5			12.4		47.3	46.6			47.5	0.0
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	271.2	1.1			1.5		172.8	8.0			159.8	1.4
Delay (s)	294.7	12.5			13.9		220.1	54.6			207.3	1.4
Level of Service	F	B			B		F	D			F	A
Approach Delay (s)		218.0			13.9			90.7			94.4	
Approach LOS		F			B			F			F	

Intersection Summary			
HCM 2000 Control Delay	128.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.51		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	112.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
1: Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	293.6	11.7			13.6		208.4	54.5			196.6	1.4
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Delay	293.6	11.7			13.6		208.4	54.5			196.6	1.4
LOS	F	B			B		F	D			F	A
Approach Delay		217.0			13.6			88.1			89.6	
Approach LOS		F			B			F			F	
Queue Length 50th (m)	~240.1	50.8			70.8		~50.3	86.3			~117.9	0.0
Queue Length 95th (m)	#281.3	71.9			97.8		#98.7	108.7			#166.2	0.0
Internal Link Dist (m)		66.1			136.9			47.7			96.0	
Turn Bay Length (m)							110.0					
Base Capacity (vph)	805	1155			1170		147	848			552	1601
Starvation Cap Reductn	0	0			0		0	0			0	0
Spillback Cap Reductn	0	0			0		0	0			0	0
Storage Cap Reductn	0	0			0		0	0			0	0
Reduced v/c Ratio	1.59	0.41			0.50		1.29	0.80			1.33	0.56

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 130
Control Type: Pretimed
Maximum v/c Ratio: 1.59
Intersection Signal Delay: 126.4 Intersection LOS: F
Intersection Capacity Utilization 112.6% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Colborne St

Lanes, Volumes, Timings
2: Colborne St & King St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑	↑↱		↰↱	
Traffic Volume (vph)	47	406	500	24	68	37
Future Volume (vph)	47	406	500	24	68	37
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			0.994		0.953	
Flt Protected		0.995			0.969	
Satd. Flow (prot)	0	1874	1872	0	1739	0
Flt Permitted		0.995			0.969	
Satd. Flow (perm)	0	1874	1872	0	1739	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		160.9	121.5		114.7	
Travel Time (s)		12.1	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	441	543	26	74	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	492	569	0	114	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 67.8% ICU Level of Service C
Analysis Period (min) 15

2: Colborne St & King St

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↲↳	
Traffic Volume (veh/h)	47	406	500	24	68	37
Future Volume (Veh/h)	47	406	500	24	68	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	51	441	543	26	74	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		161				
pX, platoon unblocked					0.92	
vC, conflicting volume	569				1099	556
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	569				1065	556
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				66	92
cM capacity (veh/h)	1003				216	531

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	492	569	114
Volume Left	51	0	74
Volume Right	0	26	40
cSH	1003	1700	272
Volume to Capacity	0.05	0.33	0.42
Queue Length 95th (m)	1.2	0.0	14.9
Control Delay (s)	1.5	0.0	27.4
Lane LOS	A		D
Approach Delay (s)	1.5	0.0	27.4
Approach LOS			D

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

3: Colborne St & Queen St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↲↳	
Traffic Volume (vph)	27	423	463	20	88	46
Future Volume (vph)	27	423	463	20	88	46
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			0.994		0.954	
Flt Protected		0.997			0.968	
Satd. Flow (prot)	0	1897	1910	0	1763	0
Flt Permitted		0.997			0.968	
Satd. Flow (perm)	0	1897	1910	0	1763	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	29	460	503	22	96	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	489	525	0	146	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 58.7%		ICU Level of Service B
Analysis Period (min) 15		

3: Colborne St & Queen St

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↲↳	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	27	423	463	20	88	46
Future Volume (vph)	27	423	463	20	88	46
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	460	503	22	96	50

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	489	525	146
Volume Left (vph)	29	0	96
Volume Right (vph)	0	22	50
Hadj (s)	0.03	-0.03	-0.06
Departure Headway (s)	5.1	5.0	6.2
Degree Utilization, x	0.69	0.73	0.25
Capacity (veh/h)	685	704	520
Control Delay (s)	18.8	20.4	11.4
Approach Delay (s)	18.8	20.4	11.4
Approach LOS	C	C	B

Intersection Summary			
Delay	18.6		
Level of Service	C		
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

4: Market Street IPS/Market St IPS & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Traffic Volume (vph)	0	486	0	0	446	0	0	0	0	0	0	0
Future Volume (vph)	0	486	0	0	446	0	0	0	0	0	0	0
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
Frt												
Flt Protected												
Satd. Flow (prot)	0	1883	0	0	1883	0	0	1883	0	0	1883	0
Flt Permitted												
Satd. Flow (perm)	0	1883	0	0	1883	0	0	1883	0	0	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		183.0			240.0			61.0			43.5	
Travel Time (s)		13.7			18.0			4.6			3.3	
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
Adj. Flow (vph)	0	528	0	0	485	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	528	0	0	485	0	0	0	0	0	0	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2			2			2			2	
Detector Template		Thru			Thru			Thru			Thru	
Leading Detector (m)		10.0			10.0			10.0			10.0	
Trailing Detector (m)		0.0			0.0			0.0			0.0	
Detector 1 Position(m)		0.0			0.0			0.0			0.0	
Detector 1 Size(m)		0.6			0.6			0.6			0.6	
Detector 1 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0			0.0			0.0	
Detector 1 Queue (s)		0.0			0.0			0.0			0.0	
Detector 1 Delay (s)		0.0			0.0			0.0			0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type		NA			NA							
Protected Phases		2			6			4			4	
Permitted Phases												
Detector Phase		2			6			4			4	
Switch Phase												
Minimum Initial (s)		4.0			4.0			4.0			4.0	

Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		27.3			20.0			27.3			27.3	
Total Split (s)		33.7			29.0			27.3			27.3	
Total Split (%)		37.4%			32.2%			30.3%			30.3%	
Maximum Green (s)		28.4			25.0			22.0			22.0	
Yellow Time (s)		3.3			3.5			3.3			3.3	
All-Red Time (s)		2.0			0.5			2.0			2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.3			4.0			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Recall Mode		Max			None			None			None	
Walk Time (s)		7.0			5.0			7.0			7.0	
Flash Dont Walk (s)		15.0			11.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			120			120	
Act Effct Green (s)		29.5			23.6							
Actuated g/C Ratio		0.36			0.28							
v/c Ratio		0.79			0.90							
Control Delay		37.9			53.3							
Queue Delay		0.0			0.0							
Total Delay		37.9			53.3							
LOS		D			D							
Approach Delay		37.9			53.3							
Approach LOS		D			D							
Queue Length 50th (m)		86.2			81.4							
Queue Length 95th (m)		#142.8			#138.6							
Internal Link Dist (m)		159.0			216.0			37.0			19.5	
Turn Bay Length (m)												
Base Capacity (vph)		670			590							
Starvation Cap Reductn		0			0							
Spillback Cap Reductn		0			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.79			0.82							

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 83
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 45.3 Intersection LOS: D
Intersection Capacity Utilization 30.0% ICU Level of Service A
Analysis Period (min) 15

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

Splits and Phases: 4: Market Street IPS/Market St IPS & Colborne St

HCM Signalized Intersection Capacity Analysis
4: Market Street IPS/Market St IPS & Colborne St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Traffic Volume (vph)	0	486	0	0	446	0	0	0	0	0	0	0
Future Volume (vph)	0	486	0	0	446	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			4.0							
Lane Util. Factor		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		1883			1883							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		1883			1883							
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)	0	528	0	0	485	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	528	0	0	485	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6			4			4	
Permitted Phases												
Actuated Green, G (s)		29.5			23.6							
Effective Green, g (s)		29.5			23.6							
Actuated g/C Ratio		0.35			0.28							
Clearance Time (s)		5.3			4.0							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		662			529							
v/s Ratio Prot		c0.28			c0.26							
v/s Ratio Perm												
v/c Ratio		0.80			0.92							
Uniform Delay, d1		24.5			29.2							
Progression Factor		1.00			1.00							
Incremental Delay, d2		9.7			20.7							
Delay (s)		34.2			49.9							
Level of Service		C			D							
Approach Delay (s)		34.2			49.9			0.0			0.0	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	41.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	83.9	Sum of lost time (s)	14.6
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Colborne St & Charlotte Street

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (vph)	52	434	415	10	39	31
Future Volume (vph)	52	434	415	10	39	31
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			0.997		0.940	
Flt Protected		0.995			0.973	
Satd. Flow (prot)	0	1874	1878	0	1723	0
Flt Permitted		0.995			0.973	
Satd. Flow (perm)	0	1874	1878	0	1723	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		240.0	140.5		77.6	
Travel Time (s)		18.0	10.5		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	472	451	11	42	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	529	462	0	76	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 62.2% ICU Level of Service B
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
5: Colborne St & Charlotte Street

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	52	434	415	10	39	31
Future Volume (Veh/h)	52	434	415	10	39	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	472	451	11	42	34
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		240	141			
pX, platoon unblocked	0.79				0.83	0.79
vC, conflicting volume	462				1042	456
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	191				392	185
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				91	95
cM capacity (veh/h)	1096				483	680

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	529	462	76
Volume Left	57	0	42
Volume Right	0	11	34
cSH	1096	1700	555
Volume to Capacity	0.05	0.27	0.14
Queue Length 95th (m)	1.2	0.0	3.6
Control Delay (s)	1.5	0.0	12.5
Lane LOS	A		B
Approach Delay (s)	1.5	0.0	12.5
Approach LOS			B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

Lanes, Volumes, Timings
6: Clarence Street & Colborne

2051 PM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱			↰↑	↱		↰↱	
Traffic Volume (vph)	59	342	88	312	373	100	47	1981	548	117	1767	30
Future Volume (vph)	59	342	88	312	373	100	47	1981	548	117	1767	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		23.0	25.0		0.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95
Ped Bike Factor	0.99	0.99							0.96			
Frt		0.969			0.968				0.850		0.998	
Flt Protected	0.950			0.950				0.999			0.997	
Satd. Flow (prot)	1807	1819	0	1825	1860	0	0	3611	1601	0	3599	0
Flt Permitted	0.296			0.138				0.593			0.495	
Satd. Flow (perm)	559	1819	0	265	1860	0	0	2144	1542	0	1787	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			17				340		2	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		140.5			1204.0			126.9			109.9	
Travel Time (s)		10.5			90.3			9.5			8.2	
Confl. Peds. (#/hr)	12		21						8	8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Adj. Flow (vph)	64	372	96	339	405	109	51	2153	596	127	1921	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	468	0	339	514	0	0	2204	596	0	2081	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2			6			8		8	4		
Minimum Split (s)	28.0	28.0		8.0	20.0		8.0	25.0	25.0	9.0	25.0	
Total Split (s)	29.0	29.0		9.0	38.0		8.0	43.0	43.0	9.0	44.0	
Total Split (%)	32.2%	32.2%		10.0%	42.2%		8.9%	47.8%	47.8%	10.0%	48.9%	
Maximum Green (s)	25.0	25.0		5.0	34.0		4.0	39.0	39.0	4.0	40.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.0	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	2.0	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes				Yes	
Walk Time (s)	7.0	7.0			5.0			7.0	7.0		7.0	
Flash Dont Walk (s)	17.0	17.0			11.0			14.0	14.0		14.0	
Pedestrian Calls (#/hr)	0	0			0			0	0		0	

HCM Signalized Intersection Capacity Analysis
6: Clarence Street & Colborne

2051 PM Peak (2-Way).syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱			↰↑	↱		↰↱	
Traffic Volume (vph)	59	342	88	312	373	100	47	1981	548	117	1767	30
Future Volume (vph)	59	342	88	312	373	100	47	1981	548	117	1767	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	0.96		1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.97		1.00	0.97			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		1.00	
Satd. Flow (prot)	1794	1820		1825	1860			3611	1542		3597	
Flt Permitted	0.30	1.00		0.14	1.00			0.59	1.00		0.49	
Satd. Flow (perm)	559	1820		265	1860			2143	1542		1785	
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)	64	372	96	339	405	109	51	2153	596	127	1921	33
RTOR Reduction (vph)	0	10	0	0	11	0	0	0	193	0	1	0
Lane Group Flow (vph)	64	458	0	339	503	0	0	2204	403	0	2080	0
Confl. Peds. (#/hr)	12		21						8	8		
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	25.0	25.0		34.0	34.0			39.0	39.0		40.0	
Effective Green, g (s)	25.0	25.0		34.0	34.0			39.0	39.0		40.0	
Actuated g/C Ratio	0.28	0.28		0.38	0.38			0.43	0.43		0.44	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	155	505		186	702			993	668		873	
v/s Ratio Prot		0.25		c0.10	0.27			c0.10			c0.11	
v/s Ratio Perm	0.11			c0.58				0.86	0.26		c0.95	
v/c Ratio	0.41	0.91		1.82	0.72			2.22	0.60		2.38	
Uniform Delay, d1	26.5	31.4		26.4	23.9			25.5	19.6		25.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		0.84	
Incremental Delay, d2	7.9	22.5		390.5	6.2			552.1	4.0		622.4	
Delay (s)	34.4	53.9		416.9	30.1			577.6	23.6		643.3	
Level of Service	C	D		F	C			F	C		F	
Approach Delay (s)		51.6			183.8			459.7			643.3	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	448.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.21		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	163.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Clarence Street & Colborne

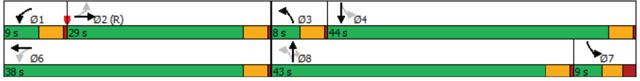
2051 PM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	25.0	25.0		34.0	34.0			39.0	39.0		40.0	
Actuated g/C Ratio	0.28	0.28		0.38	0.38			0.43	0.43		0.44	
v/c Ratio	0.41	0.91		1.82	0.72			2.22	0.69		2.32	
Control Delay	36.3	54.6		411.7	30.0			570.9	13.2		614.4	
Queue Delay	0.0	0.0		0.0	0.0			2.2	0.0		0.0	
Total Delay	36.3	54.6		411.7	30.1			573.1	13.2		614.4	
LOS	D	D		F	C			F	B		F	
Approach Delay		52.4			181.7			453.9			614.4	
Approach LOS		D			F			F			F	
Queue Length 50th (m)	9.0	75.9		~74.3	72.2			~326.4	32.7		~312.1	
Queue Length 95th (m)	21.5	#132.1		#126.0	108.6			#368.2	71.7		m#123.6	
Internal Link Dist (m)		116.5			1180.0			102.9			85.9	
Turn Bay Length (m)	25.0			25.0								
Base Capacity (vph)	155	515		186	713			994	860		896	
Starvation Cap Reductn	0	0		0	0			0	0		0	
Spillback Cap Reductn	0	0		0	2			323	0		0	
Storage Cap Reductn	0	0		0	0			0	0		0	
Reduced v/c Ratio	0.41	0.91		1.82	0.72			3.28	0.69		2.32	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 140
Control Type: Pretimed
Maximum v/c Ratio: 2.32
Intersection Signal Delay: 436.1 Intersection LOS: F
Intersection Capacity Utilization 163.7% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Clarence Street & Colborne



Lanes, Volumes, Timings
7: Canadian Tire Entrance & Colborne St & Dalhousie Street

2051 PM Peak (2-Way).syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱		↑↱			✥	
Traffic Volume (vph)	19	678	0	0	781	520	0	0	0	452	0	0
Future Volume (vph)	19	678	0	0	781	520	0	0	0	452	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		22.0	48.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850						
Flt Protected	0.950										0.950	
Satd. Flow (prot)	1789	1883	1883	1883	1883	1601	0	1883	0	0	1789	0
Flt Permitted	0.099										0.757	
Satd. Flow (perm)	186	1883	1883	1883	1883	1601	0	1883	0	0	1426	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						329						
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		1204.0			112.9			111.0			175.7	
Travel Time (s)		90.3			8.5			8.3			13.2	
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
Adj. Flow (vph)	21	737	0	0	849	565	0	0	0	491	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	737	0	0	849	565	0	0	0	0	491	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1		2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right		Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0		10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	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)	2.0	0.6	2.0	2.0	0.6	2.0		0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	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)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	D.Pm	NA	Free				Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	2		Free				4		

Lanes, Volumes, Timings

7: Canadian Tire Entrance & Colborne St & Dalhousie Street

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	2	2	2	2	6			8		4	4	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0			3.0		4.0	4.0	
Minimum Split (s)	21.6	21.6	21.6	21.6	20.0			8.3		20.0	20.0	
Total Split (s)	44.0	44.0	44.0	44.0	44.0			36.0		36.0	36.0	
Total Split (%)	55.0%	55.0%	55.0%	55.0%	55.0%			45.0%		45.0%	45.0%	
Maximum Green (s)	38.4	38.4	38.4	38.4	40.0			30.7		32.0	32.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.5			3.3		3.5	3.5	
All-Red Time (s)	2.3	2.3	2.3	2.3	0.5			2.0		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.6	5.6	5.6	5.6	4.0			5.3			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None			None		None	None	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)	40.3	40.3			41.9	80.0					30.1	
Actuated g/C Ratio	0.50	0.50			0.52	1.00					0.38	
v/c Ratio	0.23	0.78			0.86	0.35					0.92	
Control Delay	19.8	24.3			28.7	0.6					47.7	
Queue Delay	0.0	0.0			0.0	0.0					0.0	
Total Delay	19.8	24.3			28.7	0.6					47.7	
LOS	B	C			C	A					D	
Approach Delay		24.2			17.5						47.7	
Approach LOS		C			B						D	
Queue Length 50th (m)	1.8	91.1			111.0	0.0					66.5	
Queue Length 95th (m)	7.5	#154.5			#187.3	0.0					#121.0	
Internal Link Dist (m)		1180.0			88.9			87.0			151.7	
Turn Bay Length (m)	50.0											
Base Capacity (vph)	93	948			986	1601					570	
Starvation Cap Reductn	0	0			0	0					0	
Spillback Cap Reductn	0	0			0	0					0	
Storage Cap Reductn	0	0			0	0					0	
Reduced v/c Ratio	0.23	0.78			0.86	0.35					0.86	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 25.0 Intersection LOS: C
Intersection Capacity Utilization 72.8% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.

HCM Signalized Intersection Capacity Analysis

7: Canadian Tire Entrance & Colborne St & Dalhousie Street

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱		↑↱			↰↑↱	
Traffic Volume (vph)	19	678	0	0	781	520	0	0	0	452	0	0
Future Volume (vph)	19	678	0	0	781	520	0	0	0	452	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6			4.0	4.0					4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00					1.00	
Frt	1.00	1.00			1.00	0.85					1.00	
Flt Protected	0.95	1.00			1.00	1.00					0.95	
Satd. Flow (prot)	1789	1883			1883	1601					1789	
Flt Permitted	0.10	1.00			1.00	1.00					0.76	
Satd. Flow (perm)	187	1883			1883	1601					1426	
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)	21	737	0	0	849	565	0	0	0	491	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	21	737	0	0	849	565	0	0	0	0	491	0
Turn Type	Perm	NA	Perm	D.Pm	NA	Free				Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	2		Free				4		
Actuated Green, G (s)	40.3	40.3			41.9	80.0					30.1	
Effective Green, g (s)	40.3	40.3			41.9	80.0					30.1	
Actuated g/C Ratio	0.50	0.50			0.52	1.00					0.38	
Clearance Time (s)	5.6	5.6			4.0						4.0	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	94	948			986	1601					536	
v/s Ratio Prot		0.39			c0.45							
v/s Ratio Perm	0.11					0.35					c0.34	
v/c Ratio	0.22	0.78			0.86	0.35					0.92	
Uniform Delay, d1	11.1	16.2			16.5	0.0					23.7	
Progression Factor	1.00	1.00			1.00	1.00					1.00	
Incremental Delay, d2	5.4	6.2			7.8	0.6					20.4	
Delay (s)	16.5	22.4			24.3	0.6					44.1	
Level of Service	B	C			C	A					D	
Approach Delay (s)		22.3			14.9			0.0			44.1	
Approach LOS		C			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

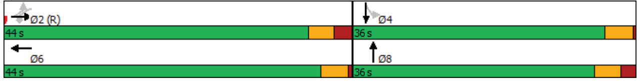
c Critical Lane Group

Lanes, Volumes, Timings

7: Canadian Tire Entrance & Colborne St & Dalhousie Street

Queue shown is maximum after two cycles.

Splits and Phases: 7: Canadian Tire Entrance & Colborne St & Dalhousie Street



Lanes, Volumes, Timings

8: Clarence Street & Dalhousie St

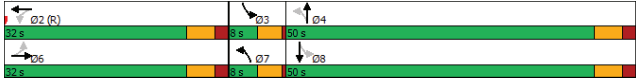
	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱			↰↑↑↱			↰↑↑↱	
Traffic Volume (vph)	39	228	59	207	248	67	32	1743	365	78	1648	20
Future Volume (vph)	39	228	59	207	248	67	32	1743	365	78	1648	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		50.0	25.0		0.0	25.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor				0.99	0.99						1.00	
Frt		0.969			0.968			0.974			0.998	
Flt Protected	0.950			0.950				0.999			0.998	
Satd. Flow (prot)	1825	1862	0	1825	1821	0	0	3495	0	0	3600	0
Flt Permitted	0.361			0.408				0.677			0.517	
Satd. Flow (perm)	694	1862	0	773	1821	0	0	2368	0	0	1865	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			7			39			2	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		139.0			1069.0			109.9			102.5	
Travel Time (s)		10.4			80.2			8.2			7.7	
Confl. Peds. (#/hr)				23		17	8					8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	42	248	64	225	270	73	35	1895	397	85	1791	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	312	0	225	343	0	0	2327	0	0	1898	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		
Minimum Split (s)	31.1	31.1		28.1	28.1		8.0	31.1		8.0	31.1	
Total Split (s)	32.0	32.0		32.0	32.0		8.0	50.0		8.0	50.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		8.9%	55.6%		8.9%	55.6%	
Maximum Green (s)	26.0	26.0		26.0	26.0		4.0	44.0		4.0	44.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.5	4.0		3.5	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		0.5	2.0		0.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0		15.0	15.0			18.0			18.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	26.0	26.0		26.0	26.0			46.0			46.0	
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.51			0.51	
v/c Ratio	0.21	0.57		1.01	0.65			1.86			1.91	
Control Delay	30.7	35.6		97.8	34.0			402.4			435.3	
Queue Delay	0.0	0.9		30.7	0.0			0.8			2.0	
Total Delay	30.7	36.5		128.5	34.0			403.2			437.3	
LOS	C	D		F	C			F			F	
Approach Delay		35.8			71.5			403.2			437.3	
Approach LOS		D			E			F			F	
Queue Length 50th (m)	7.5	55.8		~39.3	50.6			~339.0			~271.8	
Queue Length 95th (m)	m13.6	81.5		#84.1	79.1			m6.3			#314.5	
Internal Link Dist (m)		115.0			1045.0			85.9			78.5	
Turn Bay Length (m)	25.0			50.0								
Base Capacity (vph)	200	544		223	531			1254			992	
Starvation Cap Reductn	0	0		0	0			215			0	
Spillback Cap Reductn	0	75		30	0			0			295	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.21	0.67		1.17	0.65			2.24			2.72	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 140
Control Type: Pretimed
Maximum v/c Ratio: 1.91
Intersection Signal Delay: 353.9 Intersection LOS: F
Intersection Capacity Utilization 145.9% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Clarence Street & Dalhousie St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰↑↱			↰↑↱	
Traffic Volume (vph)	39	228	59	207	248	67	32	1743	365	78	1648	20
Future Volume (vph)	39	228	59	207	248	67	32	1743	365	78	1648	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.97			0.97			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1825	1862		1800	1821			3497			3600	
Flt Permitted	0.36	1.00		0.41	1.00			0.68			0.52	
Satd. Flow (perm)	694	1862		773	1821			2369			1864	
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)	42	248	64	225	270	73	35	1895	397	85	1791	22
RTOR Reduction (vph)	0	6	0	0	5	0	0	18	0	0	1	0
Lane Group Flow (vph)	42	306	0	225	338	0	0	2309	0	0	1897	0
Confl. Peds. (#/hr)				23		17	8					8
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	26.0	26.0		26.0	26.0			48.0			48.0	
Effective Green, g (s)	26.0	26.0		26.0	26.0			48.0			48.0	
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.53			0.53	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0			6.0	
Lane Grp Cap (vph)	200	537		223	526			1313			1071	
v/s Ratio Prot		0.16			0.19			0.08			c0.08	
v/s Ratio Perm	0.06			c0.29				0.86			c0.87	
v/c Ratio	0.21	0.57		1.01	0.64			1.76			1.77	
Uniform Delay, d1	24.2	27.2		32.0	27.9			21.0			21.0	
Progression Factor	1.13	1.17		1.00	1.00			0.36			1.00	
Incremental Delay, d2	2.1	3.9		62.6	5.9			341.6			350.9	
Delay (s)	29.5	35.7		94.6	33.9			349.2			371.9	
Level of Service	C	D		F	C			F			F	
Approach Delay (s)		35.0			57.9			349.2			371.9	
Approach LOS		C			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	303.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	145.9%	ICU Level of Service	H
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)	35	263	4	56	271	7	28	10	10	53	110	20
Future Volume (vph)	35	263	4	56	271	7	28	10	10	53	110	20
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
Frt		0.998			0.997			0.971			0.985	
Flt Protected		0.994			0.992			0.972			0.986	
Satd. Flow (prot)	0	1868	0	0	1863	0	0	1778	0	0	1829	0
Flt Permitted		0.994			0.992			0.972			0.986	
Satd. Flow (perm)	0	1868	0	0	1863	0	0	1778	0	0	1829	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		241.1			139.0			32.3			102.3	
Travel Time (s)		18.1			10.4			2.4			7.7	
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
Adj. Flow (vph)	38	286	4	61	295	8	30	11	11	58	120	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	328	0	0	364	0	0	52	0	0	200	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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 43.8% 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)	35	263	4	56	271	7	28	10	10	53	110	20
Future Volume (Veh/h)	35	263	4	56	271	7	28	10	10	53	110	20
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)	38	286	4	61	295	8	30	11	11	58	120	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		241			139							
pX, platoon unblocked	0.86			0.85			0.92	0.92	0.85	0.92	0.92	0.86
vC, conflicting volume	303			290			867	789	288	802	787	299
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	114			81			480	395	79	408	393	109
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 %	97			95			91	98	99	88	74	97
cM capacity (veh/h)	1274			1293			336	461	837	465	463	815

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	328	364	52	200
Volume Left	38	61	30	58
Volume Right	4	8	11	22
cSH	1274	1293	412	487
Volume to Capacity	0.03	0.05	0.13	0.41
Queue Length 95th (m)	0.7	1.1	3.3	15.1
Control Delay (s)	1.2	1.7	15.0	17.5
Lane LOS	A	A	B	C
Approach Delay (s)	1.2	1.7	15.0	17.5
Approach LOS			B	C

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

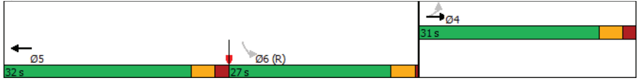
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⅄	
Traffic Volume (vph)	2	301	263	98	1	120
Future Volume (vph)	2	301	263	98	1	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0			10.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.95		0.47	
Frt			0.963		0.866	
Flt Protected						
Satd. Flow (prot)	0	1921	1736	0	779	0
Flt Permitted		0.998				
Satd. Flow (perm)	0	1917	1736	0	779	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			21		130	
Link Speed (k/h)		48	48		48	
Link Distance (m)		182.0	241.1		101.1	
Travel Time (s)		13.7	18.1		7.6	
Confl. Peds. (#/hr)				94		216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Adj. Flow (vph)	2	327	286	107	1	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	329	393	0	131	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Turn Type	Perm	NA	NA		Perm	
Protected Phases		4	5			
Permitted Phases	4				6	
Minimum Split (s)	28.3	28.3	29.3		20.0	
Total Split (s)	31.0	31.0	32.0		27.0	
Total Split (%)	34.4%	34.4%	35.6%		30.0%	
Maximum Green (s)	25.7	25.7	26.7		23.0	
Yellow Time (s)	3.3	3.3	3.3		3.5	
All-Red Time (s)	2.0	2.0	2.0		0.5	
Lost Time Adjust (s)		0.0	0.0		0.0	
Total Lost Time (s)		5.3	5.3		4.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Walk Time (s)	7.0	7.0	7.0		5.0	
Flash Dont Walk (s)	16.0	16.0	17.0		11.0	
Pedestrian Calls (#/hr)	0	0	0		0	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)		25.7	26.7		23.0	
Actuated g/C Ratio		0.29	0.30		0.26	
v/c Ratio		0.60	0.74		0.44	
Control Delay		33.2	36.7		10.6	
Queue Delay		0.0	0.0		0.0	
Total Delay		33.2	36.7		10.6	
LOS		C	D		B	
Approach Delay		33.2	36.7		10.6	
Approach LOS		C	D		B	
Queue Length 50th (m)		48.9	64.9		0.1	
Queue Length 95th (m)		75.8	m86.7		14.9	
Internal Link Dist (m)		158.0	217.1		77.1	
Turn Bay Length (m)						
Base Capacity (vph)		547	529		295	
Starvation Cap Reductn		0	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.60	0.74		0.44	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 31.3 Intersection LOS: C
Intersection Capacity Utilization 44.5% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Dalhousie St & Market St



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⅄	
Traffic Volume (vph)	2	301	263	98	1	120
Future Volume (vph)	2	301	263	98	1	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3	5.3		4.0	
Lane Util. Factor		1.00	1.00		1.00	
Frpb, ped/bikes		1.00	0.95		0.47	
Flpb, ped/bikes		1.00	1.00		1.00	
Frt		1.00	0.96		0.87	
Flt Protected		1.00	1.00		1.00	
Satd. Flow (prot)		1921	1736		779	
Flt Permitted		1.00	1.00		1.00	
Satd. Flow (perm)		1917	1736		779	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	327	286	107	1	130
RTOR Reduction (vph)	0	0	15	0	97	0
Lane Group Flow (vph)	0	329	378	0	34	0
Confl. Peds. (#/hr)				94		216
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Turn Type	Perm	NA	NA		Perm	
Protected Phases		4	5			
Permitted Phases	4				6	
Actuated Green, G (s)		25.7	26.7		23.0	
Effective Green, g (s)		25.7	26.7		23.0	
Actuated g/C Ratio		0.29	0.30		0.26	
Clearance Time (s)		5.3	5.3		4.0	
Lane Grp Cap (vph)		547	515		199	
v/s Ratio Prot			c0.22			
v/s Ratio Perm		c0.17			c0.04	
v/c Ratio		0.60	0.73		0.17	
Uniform Delay, d1		27.7	28.5		26.1	
Progression Factor		1.00	1.04		1.00	
Incremental Delay, d2		4.8	7.5		1.9	
Delay (s)		32.6	37.2		28.0	
Level of Service		C	D		C	
Approach Delay (s)		32.6	37.2		28.0	
Approach LOS		C	D		C	

Intersection Summary			
HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.6
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	18	280	2	58	275	14	9	39	7	16	71	31
Future Volume (vph)	18	280	2	58	275	14	9	39	7	16	71	31
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					0.99			0.99			0.98	
Frt		0.999			0.995			0.982			0.964	
Flt Protected		0.997			0.992			0.992			0.993	
Satd. Flow (prot)	0	1913	0	0	1890	0	0	1856	0	0	1804	0
Flt Permitted		0.969			0.895			0.958			0.967	
Satd. Flow (perm)	0	1860	0	0	1698	0	0	1784	0	0	1747	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			4			8			24	
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	20	304	2	63	299	15	10	42	8	17	77	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	326	0	0	377	0	0	60	0	0	128	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Minimum Split (s)	26.3	26.3		26.3	26.3		26.3	26.3		26.3	26.3	
Total Split (s)	48.0	48.0		48.0	48.0		32.0	32.0		32.0	32.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	42.7	42.7		42.7	42.7		26.7	26.7		26.7	26.7	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.3			5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		42.7			42.7			26.7			26.7	
Actuated g/C Ratio		0.53			0.53			0.33			0.33	
v/c Ratio		0.33			0.42			0.10			0.21	

11: Queen St/Queen Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		11.7			12.8			17.1			16.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		11.7			12.8			17.1			16.6	
LOS		B			B			B			B	
Approach Delay		11.7			12.8			17.1			16.6	
Approach LOS		B			B			B			B	
Queue Length 50th (m)		26.0			31.6			5.4			11.1	
Queue Length 95th (m)		41.8			50.7			13.2			23.1	
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)		993			908			600			599	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.33			0.42			0.10			0.21	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 37 (46%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.42
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 61.5% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St

12: King St/King Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	32	284	3	24	299	16	25	24	10	6	45	25
Future Volume (vph)	32	284	3	24	299	16	25	24	10	6	45	25
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					1.00			0.99			0.99	
Frt		0.999			0.994			0.977			0.956	
Flt Protected		0.995			0.996			0.979			0.996	
Satd. Flow (prot)	0	1910	0	0	1881	0	0	1825	0	0	1670	0
Flt Permitted		0.940			0.962			0.881			0.983	
Satd. Flow (perm)	0	1804	0	0	1816	0	0	1638	0	0	1646	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			5			11			27	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		186.2			119.6			114.7			99.2	
Travel Time (s)		13.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	35	309	3	26	325	17	27	26	11	7	49	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	347	0	0	368	0	0	64	0	0	83	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Minimum Split (s)	27.3	27.3		27.3	27.3		27.3	27.3		27.3	27.3	
Total Split (s)	57.0	57.0		57.0	57.0		33.0	33.0		33.0	33.0	
Total Split (%)	63.3%	63.3%		63.3%	63.3%		36.7%	36.7%		36.7%	36.7%	
Maximum Green (s)	51.7	51.7		51.7	51.7		27.7	27.7		27.7	27.7	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.3			5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		51.7			51.7			27.7			27.7	
Actuated g/C Ratio		0.57			0.57			0.31			0.31	
v/c Ratio		0.33			0.35			0.13			0.16	

11: Queen St/Queen Street & Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	18	280	2	58	275	14	9	39	7	16	71	31
Future Volume (vph)	18	280	2	58	275	14	9	39	7	16	71	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3			5.3			5.3	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			0.99	
Frt		1.00			0.99			0.98			0.96	
Flt Protected		1.00			0.99			0.99			0.99	
Satd. Flow (prot)		1914			1881			1847			1795	
Flt Permitted		0.97			0.90			0.96			0.97	
Satd. Flow (perm)		1859			1697			1784			1747	
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)	20	304	2	63	299	15	10	42	8	17	77	34
RTOR Reduction (vph)	0	0	0	0	2	0	0	5	0	0	16	0
Lane Group Flow (vph)	0	326	0	0	375	0	0	55	0	0	112	0
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)		42.7			42.7			26.7			26.7	
Effective Green, g (s)		42.7			42.7			26.7			26.7	
Actuated g/C Ratio		0.53			0.53			0.33			0.33	
Clearance Time (s)		5.3			5.3			5.3			5.3	
Lane Grp Cap (vph)		992			905			595			583	
v/s Ratio Prot												
v/s Ratio Perm		0.18			c0.22			0.03			c0.06	
v/c Ratio		0.33			0.41			0.09			0.19	
Uniform Delay, d1		10.5			11.2			18.3			19.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.9			1.4			0.3			0.7	
Delay (s)		11.4			12.6			18.6			19.7	
Level of Service		B			B			B			B	
Approach Delay (s)		11.4			12.6			18.6			19.7	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

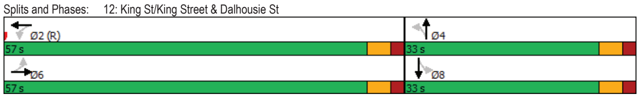
12: King St/King Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		8.6			11.3			20.1			17.1	
Queue Delay		0.0			1.0			0.0			0.0	
Total Delay		8.6			12.3			20.1			17.1	
LOS		A			B			C			B	
Approach Delay		8.6			12.3			20.1			17.1	
Approach LOS		A			B			C			B	
Queue Length 50th (m)		15.9			31.0			6.5			6.9	
Queue Length 95th (m)		m21.7			48.0			15.6			17.2	
Internal Link Dist (m)		162.2			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)		1036			1045			511			525	
Starvation Cap Reductn		0			433			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.33			0.60			0.13			0.16	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 11.8 Intersection LOS: B
Intersection Capacity Utilization 51.5% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: King St/King Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis — 2051 PM Peak (2-Way).syn
12: King St/King Street & Dalhousie St

09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	32	284	3	24	299	16	25	24	10	6	45	25
Future Volume (vph)	32	284	3	24	299	16	25	24	10	6	45	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3			5.3			5.3			5.3	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			0.98			0.96	
Flt Protected		0.99			1.00			0.98			1.00	
Satd. Flow (prot)		1909			1881			1820			1668	
Flt Permitted		0.94			0.96			0.88			0.98	
Satd. Flow (perm)		1803			1816			1637			1647	
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)	35	309	3	26	325	17	27	26	11	7	49	27
RTOR Reduction (vph)	0	0	0	0	2	0	0	8	0	0	19	0
Lane Group Flow (vph)	0	347	0	0	366	0	0	56	0	0	64	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)		51.7			51.7			27.7			27.7	
Effective Green, g (s)		51.7			51.7			27.7			27.7	
Actuated g/C Ratio		0.57			0.57			0.31			0.31	
Clearance Time (s)		5.3			5.3			5.3			5.3	
Lane Grp Cap (vph)		1035			1043			503			506	
v/s Ratio Prot												
v/s Ratio Perm		0.19			c0.20			0.03			c0.04	
v/c Ratio		0.33			0.35			0.11			0.13	
Uniform Delay, d1		10.1			10.2			22.3			22.4	
Progression Factor		0.79			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.9			0.5			0.5	
Delay (s)		8.4			11.1			22.8			23.0	
Level of Service		A			B			C			C	
Approach Delay (s)		8.4			11.1			22.8			23.0	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings — 2051 PM Peak (2-Way).syn
13: Dalhousie St

09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰	↱			↰↱			↰↱	
Traffic Volume (vph)	0	0	0	269	6	89	4	1660	224	78	1224	0
Future Volume (vph)	0	0	0	269	6	89	4	1660	224	78	1224	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		50.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt					0.860			0.982				
Flt Protected				0.950							0.997	
Satd. Flow (prot)	0	1883	0	1789	1620	0	0	3514	0	0	3568	0
Flt Permitted				0.757				0.953			0.591	
Satd. Flow (perm)	0	1883	0	1426	1620	0	0	3349	0	0	2115	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					28			35				
Link Speed (k/h)		50			48			48			48	
Link Distance (m)		85.9			186.2			120.0			158.3	
Travel Time (s)		6.2			14.0			9.0			11.9	
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
Adj. Flow (vph)	0	0	0	292	7	97	4	1804	243	85	1330	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	292	104	0	0	2051	0	0	1415	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)		3.7			3.7			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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	20.0	20.0		20.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	22.0	22.0		22.0	22.0		8.0	60.0		8.0	60.0	
Total Split (%)	24.4%	24.4%		24.4%	24.4%		8.9%	66.7%		8.9%	66.7%	
Maximum Green (s)	18.0	18.0		18.0	18.0		4.0	56.0		4.0	56.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		4.0		4.0	4.0			4.0			4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)				18.0	18.0			60.0			60.0	
Actuated g/C Ratio				0.20	0.20			0.67			0.67	
v/c Ratio				1.02	0.30			0.91			0.96	

Lanes, Volumes, Timings — 2051 PM Peak (2-Way).syn
13: Dalhousie St

09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay				96.5	25.6			20.0			29.5	
Queue Delay				0.0	0.0			45.7			0.0	
Total Delay				96.5	25.6			65.7			29.5	
LOS				F	C			E			C	
Approach Delay					77.9			65.7			29.5	
Approach LOS					E			E			C	
Queue Length 50th (m)				~57.0	12.8			107.1			52.2	
Queue Length 95th (m)				#103.2	26.7			#145.0			#87.6	
Internal Link Dist (m)		61.9			162.2			96.0			134.3	
Turn Bay Length (m)												
Base Capacity (vph)				285	346			2251			1474	
Starvation Cap Reductn				0	0			394			0	
Spillback Cap Reductn				0	0			0			0	
Storage Cap Reductn				0	0			0			0	
Reduced v/c Ratio				1.02	0.30			1.10			0.96	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 53.7 Intersection LOS: D
Intersection Capacity Utilization 114.0% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Dalhousie St

HCM Signalized Intersection Capacity Analysis — 2051 PM Peak (2-Way).syn
13: Dalhousie St

09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰	↱			↰↱			↰↱	
Traffic Volume (vph)	0	0	0	269	6	89	4	1660	224	78	1224	0
Future Volume (vph)	0	0	0	269	6	89	4	1660	224	78	1224	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0			4.0			4.0	
Lane Util. Factor				1.00	1.00			0.95			0.95	
Frt				1.00	0.86			0.98			1.00	
Flt Protected				0.95	1.00			1.00			1.00	
Satd. Flow (prot)				1789	1620			3515			3568	
Flt Permitted				0.76	1.00			0.95			0.59	
Satd. Flow (perm)				1426	1620			3351			2115	
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)	0	0	0	292	7	97	4	1804	243	85	1330	0
RTOR Reduction (vph)	0	0	0	0	22	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	0	0	292	82	0	0	2039	0	0	1415	0
Turn Type				Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)				18.0	18.0			60.0			60.0	
Effective Green, g (s)				18.0	18.0			60.0			60.0	
Actuated g/C Ratio				0.20	0.20			0.67			0.67	
Clearance Time (s)				4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)				285	324			2241			1474	
v/s Ratio Prot					0.05			0.04			c0.04	
v/s Ratio Perm				c0.20				0.57			c0.60	
v/c Ratio				1.02	0.25			0.91			0.96	
Uniform Delay, d1				36.0	30.3			12.7			13.9	
Progression Factor				0.99	1.01			1.00			1.00	
Incremental Delay, d2				58.9	1.8			6.9			15.7	
Delay (s)				94.4	32.6			19.6			29.6	
Level of Service				F	C			B			C	
Approach Delay (s)		0.0			78.2			19.6			29.6	
Approach LOS		A			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	114.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Appendix G

Future Traffic Operations (Preferred)

Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
1: Icomm Dr/Brant Ave & Colborne St
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱				↰	↑↱		↰	↑	↱
Traffic Volume (vph)	818	396	71	0	0	0	140	869	67	176	418	1192
Future Volume (vph)	818	396	71	0	0	0	140	869	67	176	418	1192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	110.0		210.0	40.0		0.0
Storage Lanes	2		1	0		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	0.97		0.93				0.99	1.00		1.00		0.98
Frt			0.850					0.988				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3404	1865	1484	0	0	0	1659	3538	0	1772	1812	1570
Flt Permitted	0.950						0.429			0.138		
Satd. Flow (perm)	3307	1865	1383	0	0	0	744	3538	0	257	1812	1532
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			160					13				856
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		446.3			127.5			177.1			125.8	
Travel Time (s)		33.5			9.6			12.8			9.1	
Confl. Peds. (#/hr)	19		33				9		1	1		9
Peak Hour Factor	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Adj. Flow (vph)	940	483	108	0	0	0	182	988	88	220	445	1310
Shared Lane Traffic (%)												
Lane Group Flow (vph)	940	483	108	0	0	0	182	1076	0	220	445	1310
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)		7.4			7.4			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm				pm+pt	NA		pm+pt	NA	Free
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4				2			6		Free
Minimum Split (s)	31.0	31.0	31.0				8.0	31.0		8.0	31.0	
Total Split (s)	31.0	31.0	31.0				8.0	31.0		13.0	31.0	
Total Split (%)	41.3%	41.3%	41.3%				10.7%	41.3%		17.3%	41.3%	
Maximum Green (s)	27.0	27.0	27.0				4.0	25.0		9.0	25.0	
Yellow Time (s)	2.0	2.0	2.0				3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0				1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0				4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Walk Time (s)	15.0	15.0	15.0					15.0			15.0	
Flash Dont Walk (s)	10.0	10.0	10.0					10.0			10.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	

HCM Signalized Intersection Capacity Analysis — 2051 AM Peak (1-Way) Preffered.syn
1: Icomm Dr/Brant Ave & Colborne St
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱				↰	↑↱		↰	↑	↱
Traffic Volume (vph)	818	396	71	0	0	0	140	869	67	176	418	1192
Future Volume (vph)	818	396	71	0	0	0	140	869	67	176	418	1192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0				4.0	6.0		4.0	6.0	4.0
Lane Util. Factor	0.97	1.00	1.00				1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.93				1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	0.97	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3307	1865	1383				1655	3537		1772	1812	1532
Flt Permitted	0.95	1.00	1.00				0.43	1.00		0.14	1.00	1.00
Satd. Flow (perm)	3307	1865	1383				747	3537		257	1812	1532
Peak-hour factor, PHF	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Adj. Flow (vph)	940	483	108	0	0	0	182	988	88	220	445	1310
RTOR Reduction (vph)	0	0	69	0	0	0	0	9	0	0	0	0
Lane Group Flow (vph)	940	483	39	0	0	0	182	1067	0	220	445	1310
Confl. Peds. (#/hr)	19		33				9		1	1		9
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Turn Type	Perm	NA	Perm				pm+pt	NA		pm+pt	NA	Free
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4				2			6		Free
Actuated Green, G (s)	27.0	27.0	27.0				29.0	25.0		38.0	30.0	75.0
Effective Green, g (s)	27.0	27.0	27.0				29.0	25.0		38.0	30.0	75.0
Actuated g/C Ratio	0.36	0.36	0.36				0.39	0.33		0.51	0.40	1.00
Clearance Time (s)	4.0	4.0	4.0				4.0	6.0		4.0	6.0	
Lane Grp Cap (vph)	1190	671	497				337	1179		312	724	1532
v/s Ratio Prot		0.26					0.03	0.30		0.08	0.25	
v/s Ratio Perm	0.28		0.03				0.18			0.27		c0.86
v/c Ratio	0.79	0.72	0.08				0.54	0.91		0.71	0.61	0.86
Uniform Delay, d1	21.5	20.7	15.8				17.0	23.9		14.3	17.9	0.0
Progression Factor	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.4	6.6	0.3				6.1	11.5		12.6	3.9	6.3
Delay (s)	26.8	27.3	16.1				23.1	35.4		26.9	21.8	6.3
Level of Service	C	C	B				C	D		C	C	A
Approach Delay (s)		26.2			0.0			33.6			12.1	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
1: Icomm Dr/Brant Ave & Colborne St
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	27.0	27.0	27.0				31.0	25.0		40.0	30.0	75.0
Actuated g/C Ratio	0.36	0.36	0.36				0.41	0.33		0.53	0.40	1.00
v/c Ratio	0.79	0.72	0.18				0.51	0.91		0.69	0.61	0.86
Control Delay	27.4	28.1	1.8				17.4	36.2		24.5	22.4	7.2
Queue Delay	0.0	0.0	0.0				0.0	0.0		0.0	0.6	0.0
Total Delay	27.4	28.1	1.8				17.4	36.2		24.5	23.0	7.2
LOS	C	C	A				B	D		C	C	A
Approach Delay		25.8						33.5			12.7	
Approach LOS		C						C			B	
Queue Length 50th (m)	60.0	57.8	0.0				12.5	74.5		15.4	48.6	0.0
Queue Length 95th (m)	77.6	78.7	0.0				18.8	#107.3		27.3	77.1	#5.4
Internal Link Dist (m)		422.3			103.5			153.1			101.8	
Turn Bay Length (m)							110.0			40.0		
Base Capacity (vph)	1190	671	600				356	1188		318	724	1532
Starvation Cap Reductn	0	0	0				0	0		0	73	0
Spillback Cap Reductn	0	0	0				0	0		0	0	0
Storage Cap Reductn	0	0	0				0	0		0	0	0
Reduced v/c Ratio	0.79	0.72	0.18				0.51	0.91		0.69	0.68	0.86

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 70

Control Type: Pretimed

Maximum v/c Ratio: 0.91

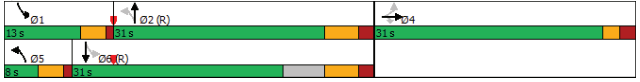
Intersection Signal Delay: 22.4 Intersection LOS: C

Intersection Capacity Utilization 70.9% ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 1: Icomm Dr/Brant Ave & Colborne St



Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
2: Colborne St & King St
09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	100	539	0	0	90	0
Future Volume (vph)	100	539	0	0	90	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.992			0.950	
Satd. Flow (prot)	0	3550	0	0	1789	0
Flt Permitted		0.992			0.950	
Satd. Flow (perm)	0	3550	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		127.5	121.5		114.7	
Travel Time (s)		9.6	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	586	0	0	98	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	695	0	0	98	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 29.5% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis — 2051 AM Peak (1-Way) Preffered.syn
2: Colborne St & King St
09-21-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	100	539	0	0	90	0
Future Volume (Veh/h)	100	539	0	0	90	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	109	586	0	0	98	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)		127				
pX, platoon unblocked						
vC, conflicting volume	0				511	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				511	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				79	100
cM capacity (veh/h)	1622				459	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	304	391	98
Volume Left	109	0	98
Volume Right	0	0	0
cSH	1622	1700	459
Volume to Capacity	0.07	0.23	0.21
Queue Length 95th (m)	1.6	0.0	6.1
Control Delay (s)	3.0	0.0	15.0
Lane LOS	A		B
Approach Delay (s)	1.3		15.0
Approach LOS			B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis — 2051 AM Peak (1-Way) Preffered.syn
3: Colborne St & Queen St
09-21-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	27	602	0	0	78	0
Future Volume (vph)	27	602	0	0	78	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	654	0	0	85	0

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total (vph)	247	436	85
Volume Left (vph)	29	0	85
Volume Right (vph)	0	0	0
Hadj (s)	0.07	0.02	0.22
Departure Headway (s)	4.8	4.8	5.5
Degree Utilization, x	0.33	0.58	0.13
Capacity (veh/h)	738	746	618
Control Delay (s)	9.0	12.9	9.3
Approach Delay (s)	11.5		9.3
Approach LOS	B		A

Intersection Summary			
Delay	11.2		
Level of Service	B		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
3: Colborne St & Queen St
09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	27	602	0	0	78	0
Future Volume (vph)	27	602	0	0	78	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	3608	0	0	1807	0
Flt Permitted		0.998			0.950	
Satd. Flow (perm)	0	3608	0	0	1807	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	29	654	0	0	85	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	683	0	0	85	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 28.4% ICU Level of Service A
Analysis Period (min) 15

Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
4: Market Street IPS/Market St IPS & Colborne St
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	680	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	680	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Flt Permitted												
Satd. Flow (perm)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		183.0			240.0			61.0			43.5	
Travel Time (s)		13.7			18.0			4.6			3.3	
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
Adj. Flow (vph)	0	739	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	739	0	0	0	0	0	0	0	0	0	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2						2			2	
Detector Template		Thru						Thru			Thru	
Leading Detector (m)		10.0						10.0			10.0	
Trailing Detector (m)		0.0						0.0			0.0	
Detector 1 Position(m)		0.0						0.0			0.0	
Detector 1 Size(m)		0.6						0.6			0.6	
Detector 1 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0						0.0			0.0	
Detector 1 Queue (s)		0.0						0.0			0.0	
Detector 1 Delay (s)		0.0						0.0			0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Detector Phase		2						4			4	
Switch Phase												
Minimum Initial (s)		4.0						4.0			4.0	

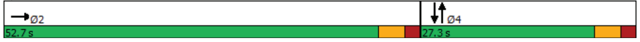
Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
4: Market Street IPS/Market St IPS & Colborne St

09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		27.3						27.3			27.3	
Total Split (s)		52.7						27.3			27.3	
Total Split (%)		65.9%						34.1%			34.1%	
Maximum Green (s)		47.4						22.0			22.0	
Yellow Time (s)		3.3						3.3			3.3	
All-Red Time (s)		2.0						2.0			2.0	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.3						5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0						3.0			3.0	
Recall Mode		Max						None			None	
Walk Time (s)		7.0						7.0			7.0	
Flash Dont Walk (s)		15.0						15.0			15.0	
Pedestrian Calls (#/hr)		0						120			120	
Act Effct Green (s)		64.9										
Actuated g/C Ratio		0.73										
v/c Ratio		0.28										
Control Delay		6.5										
Queue Delay		0.0										
Total Delay		6.5										
LOS		A										
Approach Delay		6.5										
Approach LOS		A										
Queue Length 50th (m)		27.5										
Queue Length 95th (m)		36.2										
Internal Link Dist (m)		159.0			216.0			37.0			19.5	
Turn Bay Length (m)												
Base Capacity (vph)		2596										
Starvation Cap Reductn		0										
Spillback Cap Reductn		0										
Storage Cap Reductn		0										
Reduced v/c Ratio		0.28										

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 89.5	
Natural Cycle: 55	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.28	
Intersection Signal Delay: 6.5	Intersection LOS: A
Intersection Capacity Utilization 23.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: Market Street IPS/Market St IPS & Colborne St



Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
5: Colborne St & Charlotte Street

09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	137	543	0	0	104	0
Future Volume (vph)	137	543	0	0	104	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.990			0.950	
Satd. Flow (prot)	0	3543	0	0	1789	0
Flt Permitted		0.990			0.950	
Satd. Flow (perm)	0	3543	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		240.0	140.5		77.6	
Travel Time (s)		18.0	10.5		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	149	590	0	0	113	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	739	0	0	113	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 31.4%	ICU Level of Service A
Analysis Period (min) 15	

HCM Signalized Intersection Capacity Analysis — 2051 AM Peak (1-Way) Preffered.syn
4: Market Street IPS/Market St IPS & Colborne St

09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	680	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	680	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3										
Lane Util. Factor		0.95										
Frt		1.00										
Flt Protected		1.00										
Satd. Flow (prot)		3579										
Flt Permitted		1.00										
Satd. Flow (perm)		3579										
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)	0	739	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	739	0	0	0	0	0	0	0	0	0	0
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Actuated Green, G (s)		63.6										
Effective Green, g (s)		63.6										
Actuated g/C Ratio		0.70										
Clearance Time (s)		5.3										
Vehicle Extension (s)		3.0										
Lane Grp Cap (vph)		2506										
v/s Ratio Prot		c0.21										
v/s Ratio Perm												
v/c Ratio		0.29										
Uniform Delay, d1		5.1										
Progression Factor		1.00										
Incremental Delay, d2		0.3										
Delay (s)		5.4										
Level of Service		A										
Approach Delay (s)		5.4			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	10.6
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis — 2051 AM Peak (1-Way) Preffered.syn
5: Colborne St & Charlotte Street

09-21-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	137	543	0	0	104	0
Future Volume (Veh/h)	137	543	0	0	104	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	149	590	0	0	113	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)		240	141			
pX, platoon unblocked					0.94	
vC, conflicting volume	0				593	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				451	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				75	100
cM capacity (veh/h)	1622				460	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	346	393	113
Volume Left	149	0	113
Volume Right	0	0	0
cSH	1622	1700	460
Volume to Capacity	0.09	0.23	0.25
Queue Length 95th (m)	2.3	0.0	7.3
Control Delay (s)	3.6	0.0	15.3
Lane LOS	A		C
Approach Delay (s)	1.7		15.3
Approach LOS			C

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	31.4%	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)	94	458	95	0	0	0	0	1429	984	165	1139	0
Future Volume (vph)	94	458	95	0	0	0	0	1429	984	165	1139	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		23.0	0.0		0.0	0.0		0.0	50.0		0.0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.96						0.97			
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1807	3579	1633	0	0	0	0	3614	1601	1825	3614	0
Flt Permitted	0.950									0.102		
Satd. Flow (perm)	1773	3579	1561	0	0	0	0	3614	1559	196	3614	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			56						58			
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		140.5			1204.0			126.9			109.9	
Travel Time (s)		10.5			90.3			9.5			8.2	
Confl. Peds. (#/hr)	12		21						8	8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Adj. Flow (vph)	102	498	103	0	0	0	0	1553	1070	179	1238	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	498	103	0	0	0	0	1553	1070	179	1238	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)		3.7			3.7			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Minimum Split (s)	28.0	28.0	28.0					25.0	25.0	9.0	25.0	
Total Split (s)	28.0	28.0	28.0					85.0	85.0	12.0	92.0	
Total Split (%)	22.4%	22.4%	22.4%					68.0%	68.0%	9.6%	73.6%	
Maximum Green (s)	24.0	24.0	24.0					81.0	81.0	7.0	88.0	
Yellow Time (s)	3.5	3.5	3.5					3.5	3.5	3.0	3.5	
All-Red Time (s)	0.5	0.5	0.5					0.5	0.5	2.0	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0					4.0	4.0	5.0	4.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	17.0	17.0	17.0					14.0	14.0		14.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱					↑↑	↱	↰	↑↑	
Traffic Volume (vph)	94	458	95	0	0	0	0	1429	984	165	1139	0
Future Volume (vph)	94	458	95	0	0	0	0	1429	984	165	1139	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0					4.0	4.0	5.0	4.0	
Lane Util. Factor	1.00	0.95	1.00					0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96					1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.98	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1773	3579	1561					3614	1559	1825	3614	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1773	3579	1561					3614	1559	196	3614	
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)	102	498	103	0	0	0	0	1553	1070	179	1238	0
RTOR Reduction (vph)	0	0	45	0	0	0	0	0	20	0	0	0
Lane Group Flow (vph)	102	498	58	0	0	0	0	1553	1050	179	1238	0
Confl. Peds. (#/hr)	12		21						8	8		
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Actuated Green, G (s)	24.0	24.0	24.0					81.0	81.0	93.0	93.0	
Effective Green, g (s)	24.0	24.0	24.0					81.0	81.0	93.0	93.0	
Actuated g/C Ratio	0.19	0.19	0.19					0.65	0.65	0.74	0.74	
Clearance Time (s)	4.0	4.0	4.0					4.0	4.0	5.0	4.0	
Lane Grp Cap (vph)	340	687	299					2341	1010	237	2688	
v/s Ratio Prot		c0.14						0.43		c0.04	0.34	
v/s Ratio Perm	0.06		0.04						c0.67	0.52		
v/c Ratio	0.30	0.72	0.19					0.66	1.04	0.76	0.46	
Uniform Delay, d1	43.3	47.4	42.4					13.6	22.0	31.0	6.2	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.3	6.6	1.4					1.5	39.0	19.9	0.6	
Delay (s)	45.6	54.0	43.8					15.1	61.0	50.8	6.8	
Level of Service	D	D	D					B	E	D	A	
Approach Delay (s)		51.3			0.0			33.8			12.4	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	30.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	24.0	24.0	24.0					81.0	81.0	92.0	93.0	
Actuated g/C Ratio	0.19	0.19	0.19					0.65	0.65	0.74	0.74	
v/c Ratio	0.30	0.72	0.30					0.66	1.04	0.76	0.46	
Control Delay	46.1	54.3	23.9					15.3	60.5	47.1	6.9	
Queue Delay	0.0	0.0	0.0					0.0	0.0	0.0	3.0	
Total Delay	46.1	54.3	23.9					15.3	60.5	47.1	9.8	
LOS	D	D	C					B	E	D	A	
Approach Delay		48.7						33.7			14.5	
Approach LOS		D						C			B	
Queue Length 50th (m)	21.7	61.0	9.7					115.0	~278.4	11.3	54.4	
Queue Length 95th (m)	38.2	80.1	25.9					137.1	#357.9	#41.4	65.5	
Internal Link Dist (m)		116.5			1180.0			102.9			85.9	
Turn Bay Length (m)	25.0		23.0							50.0		
Base Capacity (vph)	340	687	344					2341	1030	235	2688	
Starvation Cap Reductn	0	0	0					0	0	0	1305	
Spillback Cap Reductn	0	0	0					0	0	0	0	
Storage Cap Reductn	0	0	0					0	0	0	0	
Reduced v/c Ratio	0.30	0.72	0.30					0.66	1.04	0.76	0.90	

Intersection Summary
Area Type: Other
Cycle Length: 125
Actuated Cycle Length: 125
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 120
Control Type: Pretimed
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 30.2 Intersection LOS: C
Intersection Capacity Utilization 101.7% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Clarence Street & Colborne

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑	↱	↰		↱↱	↰↱			
Traffic Volume (vph)	65	1441	0	0	0	922	0	0	0	0
Future Volume (vph)	65	1441	0	0	0	922	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		22.0	48.0		0.0	0.0	0.0	0.0	0.0
Storage Lanes	1		1	1		2	1	0	0	0
Taper Length (m)	7.5			7.5			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	1.00	1.00	1.00
Frt						0.850				
Flt Protected	0.950									
Satd. Flow (prot)	1789	1883	1883	1883	0	2818	1883	0	0	0
Flt Permitted	0.950									
Satd. Flow (perm)	1789	1883	1883	1883	0	2818	1883	0	0	0
Right Turn on Red	Yes		Yes			Yes		Yes		
Satd. Flow (RTOR)	71					1730				
Link Speed (k/h)		48			48		48		48	
Link Distance (m)		1204.0			112.9		111.0		175.7	
Travel Time (s)		90.3			8.5		8.3		13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	1566	0	0	0	1002	0	0	0	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	71	1566	0	0	0	1002	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Right	Left	Right
Median Width(m)		3.7			3.7		3.7		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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24	14	24	14
Number of Detectors	1	2	1	1		1	1			
Detector Template	Left	Thru	Right	Left		Right	Left			
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0	2.0			
Trailing Detector (m)	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			
Detector 1 Size(m)	2.0	0.6	2.0	2.0		2.0	2.0			
Detector 1 Type	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			
Detector 1 Queue (s)	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			
Detector 2 Position(m)		9.4								
Detector 2 Size(m)		0.6								
Detector 2 Type		Cl+Ex								
Detector 2 Channel										
Detector 2 Extend (s)		0.0								
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				

Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
7: Canadian Tire Entrance & Colborne St & Dalhousie Street

09-21-2022

	⤴	→	↘	↙	←	↖	↰	↗	↘	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Detector Phase	2	2	2	2			8			
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0			3.0			
Minimum Split (s)	21.6	21.6	21.6	21.6			8.3			
Total Split (s)	71.7	71.7	71.7	71.7			8.3			
Total Split (%)	89.6%	89.6%	89.6%	89.6%			10.4%			
Maximum Green (s)	66.1	66.1	66.1	66.1			3.0			
Yellow Time (s)	3.3	3.3	3.3	3.3			3.3			
All-Red Time (s)	2.3	2.3	2.3	2.3			2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			0.0			
Total Lost Time (s)	5.6	5.6	5.6	5.6			5.3			
Lead/Lag										
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			
Recall Mode	C-Max	C-Max	C-Max	C-Max			None			
Walk Time (s)	5.0	5.0	5.0	5.0			5.0			
Flash Dont Walk (s)	11.0	11.0	11.0	11.0			11.0			
Pedestrian Calls (#/hr)	0	0	0	0			0			
Act Effct Green (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
v/c Ratio	0.04	0.83				0.36				
Control Delay	0.0	4.6				0.4				
Queue Delay	0.0	0.0				0.0				
Total Delay	0.0	4.6				0.4				
LOS	A	A				A				
Approach Delay		4.4			0.4					
Approach LOS		A			A					
Queue Length 50th (m)	0.0	0.0				0.0				
Queue Length 95th (m)	0.0	0.0				0.0				
Internal Link Dist (m)		1180.0			88.9		87.0		151.7	
Turn Bay Length (m)										
Base Capacity (vph)	1789	1883				2818				
Starvation Cap Reductn	0	0				0				
Spillback Cap Reductn	0	0				0				
Storage Cap Reductn	0	0				0				
Reduced v/c Ratio	0.04	0.83				0.36				

Intersection Summary

Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 2.9	Intersection LOS: A
Intersection Capacity Utilization 80.5%	ICU Level of Service D
Analysis Period (min) 15	

Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
7: Canadian Tire Entrance & Colborne St & Dalhousie Street

09-21-2022

Splits and Phases: 7: Canadian Tire Entrance & Colborne St & Dalhousie Street

HCM Signalized Intersection Capacity Analysis — 2051 AM Peak (1-Way) Preffered.syn
7: Canadian Tire Entrance & Colborne St & Dalhousie Street

09-21-2022

	⤴	→	↘	↙	←	↖	↰	↗	↘	↘
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑	↱	↰		↱↱	↰↱			
Traffic Volume (vph)	65	1441	0	0	0	922	0	0	0	0
Future Volume (vph)	65	1441	0	0	0	922	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6				4.0				
Lane Util. Factor	1.00	1.00				0.88				
Frt	1.00	1.00				0.85				
Flt Protected	0.95	1.00				1.00				
Satd. Flow (prot)	1789	1883				2818				
Flt Permitted	0.95	1.00				1.00				
Satd. Flow (perm)	1789	1883				2818				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	1566	0	0	0	1002	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	71	1566	0	0	0	1002	0	0	0	0
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				
Actuated Green, G (s)	80.0	80.0				80.0				
Effective Green, g (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
Clearance Time (s)	5.6	5.6								
Vehicle Extension (s)	3.0	3.0								
Lane Grp Cap (vph)	1789	1883				2818				
v/s Ratio Prot		c0.83								
v/s Ratio Perm	0.04					0.36				
v/c Ratio	0.04	0.83				0.36				
Uniform Delay, d1	0.0	0.0				0.0				
Progression Factor	1.00	1.00				1.00				
Incremental Delay, d2	0.0	4.5				0.4				
Delay (s)	0.0	4.5				0.4				
Level of Service	A	A				A				
Approach Delay (s)		4.3			0.4		0.0		0.0	
Approach LOS		A			A		A		A	

Intersection Summary

HCM 2000 Control Delay	2.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings — 2051 AM Peak (1-Way) Preffered.syn
8: Clarence Street & Dalhousie St

09-21-2022

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱	↰	↑↑			↑↱	
Traffic Volume (vph)	0	0	0	378	403	162	81	1442	0	0	926	78
Future Volume (vph)	0	0	0	378	403	162	81	1442	0	0	926	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	50.0		50.0	25.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.97		0.97	1.00				1.00	
Frt						0.850					0.988	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1825	3614	1585	1825	3579	0	0	3568	0
Flt Permitted				0.950			0.117					
Satd. Flow (perm)	0	0	0	1779	3614	1538	225	3579	0	0	3568	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						109					13	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		139.0			1069.0			109.9			102.5	
Travel Time (s)		10.4			80.2			8.2			7.7	
Confl. Peds. (#/hr)				23		17	8					8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	411	438	176	88	1567	0	0	1007	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	411	438	176	88	1567	0	0	1092	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)		3.7			3.7			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA	Perm	pm+pt	NA			NA	
Protected Phases					2		7	4			8	
Permitted Phases				2		2	4					
Minimum Split (s)				28.1	28.1	28.1	9.0	31.1			31.1	
Total Split (s)				32.0	32.0	32.0	9.0	48.0			39.0	
Total Split (%)				40.0%	40.0%	40.0%	11.3%	60.0%			48.8%	
Maximum Green (s)				26.0	26.0	26.0	4.0	42.0			33.0	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0			4.0	
All-Red Time (s)				2.0	2.0	2.0	2.0	2.0			2.0	
Lost Time Adjust (s)				0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.0	6.0	6.0	5.0	6.0			6.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Walk Time (s)				7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)				15.0	15.0	15.0		18.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	

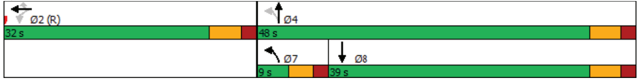
Lanes, Volumes, Timings
8: Clarence Street & Dalhousie St

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)				26.0	26.0	26.0	43.0	42.0			33.0	
Actuated g/C Ratio				0.32	0.32	0.32	0.54	0.52			0.41	
v/c Ratio				0.71	0.37	0.31	0.44	0.83			0.74	
Control Delay				31.5	21.9	10.1	16.0	21.2			23.3	
Queue Delay				0.0	0.0	0.0	0.0	47.5			0.0	
Total Delay				31.5	21.9	10.1	16.0	68.6			23.3	
LOS				C	C	B	B	E			C	
Approach Delay					23.7			65.8			23.3	
Approach LOS					C			E			C	
Queue Length 50th (m)				54.2	26.5	7.1	6.1	99.1			70.7	
Queue Length 95th (m)				85.4	38.4	20.9	12.5	129.5			93.5	
Internal Link Dist (m)		115.0			1045.0			85.9			78.5	
Turn Bay Length (m)				50.0		50.0	25.0					
Base Capacity (vph)				578	1174	573	200	1878			1479	
Starvation Cap Reductn				0	0	0	0	472			0	
Spillback Cap Reductn				0	0	0	0	0			0	
Storage Cap Reductn				0	0	0	0	0			0	
Reduced v/c Ratio				0.71	0.37	0.31	0.44	1.11			0.74	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 74 (93%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 70
Control Type: Pretimed
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 42.1 Intersection LOS: D
Intersection Capacity Utilization 101.7% ICU Level of Service G
Analysis Period (min) 15

Splits and Phases: 8: Clarence Street & Dalhousie St



Lanes, Volumes, Timings
9: Charlotte Street & Dalhousie St

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (vph)	0	0	0	96	438	28	128	71	0	0	41	10
Future Volume (vph)	0	0	0	96	438	28	128	71	0	0	41	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	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.993						0.973	
Flt Protected					0.992			0.969				
Satd. Flow (prot)	0	0	0	0	3525	0	0	1825	0	0	1833	0
Flt Permitted					0.992			0.969				
Satd. Flow (perm)	0	0	0	0	3525	0	0	1825	0	0	1833	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		241.1			139.0			32.3			102.3	
Travel Time (s)		18.1			10.4			2.4			7.7	
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
Adj. Flow (vph)	0	0	0	104	476	30	139	77	0	0	45	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	610	0	0	216	0	0	56	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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 39.9% ICU Level of Service A
Analysis Period (min) 15

HCM Signalized Intersection Capacity Analysis
8: Clarence Street & Dalhousie St

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱	↰	↑↑			↑↱	
Traffic Volume (vph)	0	0	0	378	403	162	81	1442	0	0	926	78
Future Volume (vph)	0	0	0	378	403	162	81	1442	0	0	926	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	5.0	6.0			6.0	
Lane Util. Factor				1.00	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes				1.00	1.00	0.97	1.00	1.00			1.00	
Flpb, ped/bikes				0.97	1.00	1.00	1.00	1.00			1.00	
Frt				1.00	1.00	0.85	1.00	1.00			0.99	
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1779	3614	1538	1825	3579			3569	
Flt Permitted				0.95	1.00	1.00	0.12	1.00			1.00	
Satd. Flow (perm)				1779	3614	1538	224	3579			3569	
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)	0	0	0	411	438	176	88	1567	0	0	1007	85
RTOR Reduction (vph)	0	0	0	0	0	74	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	411	438	102	88	1567	0	0	1084	0
Confl. Peds. (#/hr)				23		17	8					8
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Turn Type				Perm	NA	Perm	pm+pt	NA			NA	
Protected Phases					2		7	4			8	
Permitted Phases				2		2	4					
Actuated Green, G (s)				26.0	26.0	26.0	42.0	42.0			33.0	
Effective Green, g (s)				26.0	26.0	26.0	42.0	42.0			33.0	
Actuated g/C Ratio				0.32	0.32	0.32	0.52	0.52			0.41	
Clearance Time (s)				6.0	6.0	6.0	5.0	6.0			6.0	
Lane Grp Cap (vph)				578	1174	499	197	1878			1472	
v/s Ratio Prot					0.12		0.02	c0.44			0.30	
v/s Ratio Perm				c0.23		0.07	0.21					
v/c Ratio				0.71	0.37	0.21	0.45	0.83			0.74	
Uniform Delay, d1				23.7	20.7	19.5	12.8	16.1			19.8	
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2				7.0	0.9	0.9	7.2	4.6			3.3	
Delay (s)				30.7	21.6	20.4	20.0	20.6			23.2	
Level of Service				C	C	C	C	C			C	
Approach Delay (s)		0.0			25.0			20.6			23.2	
Approach LOS		A			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
9: Charlotte Street & Dalhousie St

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (veh/h)	0	0	0	96	438	28	128	71	0	0	41	10
Future Volume (Veh/h)	0	0	0	96	438	28	128	71	0	0	41	10
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	0	0	104	476	30	139	77	0	0	45	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		241			139							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	506			0			480	714	0	738	699	253
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	276			0			247	503	0	529	486	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			94			74	81	100	100	89	99
cM capacity (veh/h)	1176			1622			542	402	1084	322	411	993

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	342	268	216	56
Volume Left	104	0	139	0
Volume Right	0	30	0	11
cSH	1622	1700	482	464
Volume to Capacity	0.06	0.16	0.45	0.12
Queue Length 95th (m)	1.6	0.0	17.3	3.1
Control Delay (s)	2.6	0.0	18.4	13.8
Lane LOS	A		C	B
Approach Delay (s)	1.5		18.4	13.8
Approach LOS			C	B

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
10: Dalhousie St & Market St

2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↱			↱
Traffic Volume (vph)	0	0	480	96	0	104
Future Volume (vph)	0	0	480	96	0	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0			10.0	0.0	0.0
Storage Lanes	0			0	0	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor			0.97			0.74
Frt			0.975			0.865
Flt Protected						
Satd. Flow (prot)	0	0	3411	0	0	1645
Flt Permitted						
Satd. Flow (perm)	0	0	3411	0	0	1217
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			37			167
Link Speed (k/h)		48	48		48	
Link Distance (m)		182.0	241.1		101.1	
Travel Time (s)		13.7	18.1		7.6	
Confl. Peds. (#/hr)				94		216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Adj. Flow (vph)	0	0	522	104	0	113
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	626	0	0	113
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Turn Type			NA			Perm
Protected Phases			2			
Permitted Phases						4
Minimum Split (s)			29.3			28.3
Total Split (s)			50.0			40.0
Total Split (%)			55.6%			44.4%
Maximum Green (s)			44.7			34.7
Yellow Time (s)			3.3			3.3
All-Red Time (s)			2.0			2.0
Lost Time Adjust (s)			0.0			0.0
Total Lost Time (s)			5.3			5.3
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)			7.0			7.0
Flash Dont Walk (s)			17.0			16.0
Pedestrian Calls (#/hr)			0			0

Lanes, Volumes, Timings
10: Dalhousie St & Market St

2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)			44.7			34.7
Actuated g/C Ratio			0.50			0.39
v/c Ratio			0.37			0.20
Control Delay			13.8			1.8
Queue Delay			0.0			0.0
Total Delay			13.8			1.8
LOS			B			A
Approach Delay			13.8		1.8	
Approach LOS			B		A	
Queue Length 50th (m)			31.2			0.0
Queue Length 95th (m)			43.0			3.8
Internal Link Dist (m)		158.0	217.1		77.1	
Turn Bay Length (m)						
Base Capacity (vph)			1712			571
Starvation Cap Reductn			0			0
Spillback Cap Reductn			0			0
Storage Cap Reductn			0			0
Reduced v/c Ratio			0.37			0.20

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 37 (41%), Referenced to phase 2:WBT and 6:, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.37
Intersection Signal Delay: 11.9 Intersection LOS: B
Intersection Capacity Utilization 48.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 10: Dalhousie St & Market St

HCM Signalized Intersection Capacity Analysis
10: Dalhousie St & Market St

2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↱			↱
Traffic Volume (vph)	0	0	480	96	0	104
Future Volume (vph)	0	0	480	96	0	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			5.3			5.3
Lane Util. Factor			0.95			1.00
Frpb, ped/bikes			0.97			0.74
Flpb, ped/bikes			1.00			1.00
Frt			0.98			0.86
Flt Protected			1.00			1.00
Satd. Flow (prot)			3411			1217
Flt Permitted			1.00			1.00
Satd. Flow (perm)			3411			1217
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	522	104	0	113
RTOR Reduction (vph)	0	0	19	0	0	69
Lane Group Flow (vph)	0	0	607	0	0	44
Confl. Peds. (#/hr)				94		216
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Turn Type			NA			Perm
Protected Phases			2			
Permitted Phases						4
Actuated Green, G (s)			44.7			34.7
Effective Green, g (s)			44.7			34.7
Actuated g/C Ratio			0.50			0.39
Clearance Time (s)			5.3			5.3
Lane Grp Cap (vph)			1694			469
v/s Ratio Prot			c0.18			
v/s Ratio Perm						c0.04
v/c Ratio			0.36			0.09
Uniform Delay, d1			13.9			17.6
Progression Factor			1.00			1.00
Incremental Delay, d2			0.6			0.4
Delay (s)			14.5			18.0
Level of Service			B			B
Approach Delay (s)		0.0	14.5		18.0	
Approach LOS		A	B		B	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰↑			↑	↱
Traffic Volume (vph)	0	0	0	56	504	27	7	17	0	0	30	32
Future Volume (vph)	0	0	0	56	504	27	7	17	0	0	30	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99			0.99				0.97
Frt					0.993							0.850
Flt Protected					0.995			0.985				
Satd. Flow (prot)	0	0	0	0	3594	0	0	1892	0	0	1921	1601
Flt Permitted					0.995			0.947				
Satd. Flow (perm)	0	0	0	0	3578	0	0	1809	0	0	1921	1551
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9							35
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	0	0	0	61	548	29	8	18	0	0	33	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	638	0	0	26	0	0	33	35
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Minimum Split (s)				26.3	26.3		26.3	26.3			26.3	26.3
Total Split (s)				49.0	49.0		31.0	31.0			31.0	31.0
Total Split (%)				61.3%	61.3%		38.8%	38.8%			38.8%	38.8%
Maximum Green (s)				43.7	43.7		25.7	25.7			25.7	25.7
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	3.3
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	2.0
Lost Time Adjust (s)					0.0			0.0			0.0	0.0
Total Lost Time (s)					5.3			5.3			5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)				14.0	14.0		14.0	14.0			14.0	14.0
Pedestrian Calls (#/hr)				0	0		0	0			0	0

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

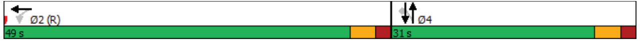
2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)					43.7			25.7			25.7	25.7
Actuated g/C Ratio					0.55			0.32			0.32	0.32
v/c Ratio					0.33			0.04			0.05	0.07
Control Delay					10.4			19.1			19.2	7.4
Queue Delay					0.0			0.0			0.0	0.0
Total Delay					10.4			19.1			19.2	7.4
LOS					B			B			B	A
Approach Delay					10.4			19.1			13.1	
Approach LOS					B			B			B	
Queue Length 50th (m)					25.6			2.7			3.4	0.0
Queue Length 95th (m)					35.6			7.9			9.2	5.8
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)					1958			581			617	522
Starvation Cap Reductn					0			0			0	0
Spillback Cap Reductn					0			0			0	0
Storage Cap Reductn					0			0			0	0
Reduced v/c Ratio					0.33			0.04			0.05	0.07

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 37 (46%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.33
Intersection Signal Delay: 11.0   Intersection LOS: B
Intersection Capacity Utilization 65.8%   ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis
11: Queen St/Queen Street & Dalhousie St

2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰↑			↑	↱
Traffic Volume (vph)	0	0	0	56	504	27	7	17	0	0	30	32
Future Volume (vph)	0	0	0	56	504	27	7	17	0	0	30	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	5.3
Lane Util. Factor					0.95			1.00			1.00	1.00
Frpb, ped/bikes					1.00			1.00			1.00	0.97
Flpb, ped/bikes					1.00			0.99			1.00	1.00
Frt					0.99			1.00			1.00	0.85
Flt Protected					1.00			0.98			1.00	1.00
Satd. Flow (prot)					3579			1881			1921	1551
Flt Permitted					1.00			0.95			1.00	1.00
Satd. Flow (perm)					3579			1809			1921	1551
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)	0	0	0	61	548	29	8	18	0	0	33	35
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	24
Lane Group Flow (vph)	0	0	0	0	634	0	0	26	0	0	33	11
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Actuated Green, G (s)					43.7			25.7			25.7	25.7
Effective Green, g (s)					43.7			25.7			25.7	25.7
Actuated g/C Ratio					0.55			0.32			0.32	0.32
Clearance Time (s)					5.3			5.3			5.3	5.3
Lane Grp Cap (vph)					1955			581			617	498
v/s Ratio Prot											c0.02	
v/s Ratio Perm					0.18			0.01				0.01
v/c Ratio					0.32			0.04			0.05	0.02
Uniform Delay, d1					10.0			18.7			18.8	18.6
Progression Factor					1.00			1.00			1.00	1.00
Incremental Delay, d2					0.4			0.1			0.2	0.1
Delay (s)					10.4			18.8			18.9	18.6
Level of Service					B			B			B	B
Approach Delay (s)		0.0			10.4			18.8			18.8	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰↑			↑↱	
Traffic Volume (vph)	0	0	0	9	482	52	60	58	0	0	43	48
Future Volume (vph)	0	0	0	9	482	52	60	58	0	0	43	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00			1.00			0.99	
Frt					0.986						0.929	
Flt Protected					0.999			0.975				
Satd. Flow (prot)	0	0	0	0	3548	0	0	1873	0	0	1624	0
Flt Permitted					0.999			0.825				
Satd. Flow (perm)	0	0	0	0	3547	0	0	1582	0	0	1624	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					19						52	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		172.6			119.6			114.7			99.2	
Travel Time (s)		12.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	0	0	0	10	524	57	65	63	0	0	47	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	591	0	0	128	0	0	99	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Minimum Split (s)				27.3	27.3		27.3	27.3			27.3	
Total Split (s)				43.0	43.0		37.0	37.0			37.0	
Total Split (%)				53.8%	53.8%		46.3%	46.3%			46.3%	
Maximum Green (s)				37.7	37.7		31.7	31.7			31.7	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				15.0	15.0		15.0	15.0			15.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					37.7			31.7			31.7	
Actuated g/C Ratio					0.47			0.40			0.40	
v/c Ratio					0.35			0.20			0.15	

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

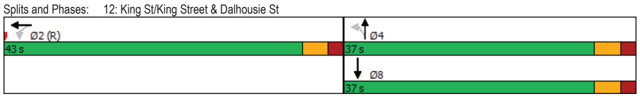
2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					5.4			17.0			9.1	
Queue Delay					0.0			0.0			0.0	
Total Delay					5.4			17.0			9.1	
LOS					A			B			A	
Approach Delay					5.4			17.0			9.1	
Approach LOS					A			B			A	
Queue Length 50th (m)					6.9			12.5			4.3	
Queue Length 95th (m)					10.4			23.8			13.3	
Internal Link Dist (m)		148.6			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)					1681			626			674	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.35			0.20			0.15	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 43 (54%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 7.7   Intersection LOS: A
Intersection Capacity Utilization 45.5%   ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 12: King St/King Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis
12: King St/King Street & Dalhousie St

2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰↑			↑↱	
Traffic Volume (vph)	0	0	0	9	482	52	60	58	0	0	43	48
Future Volume (vph)	0	0	0	9	482	52	60	58	0	0	43	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	
Lane Util. Factor					0.95			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.99	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.99			1.00			0.93	
Flt Protected					1.00			0.98			1.00	
Satd. Flow (prot)					3546			1870			1624	
Flt Permitted					1.00			0.82			1.00	
Satd. Flow (perm)					3546			1581			1624	
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)	0	0	0	10	524	57	65	63	0	0	47	52
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	31	0
Lane Group Flow (vph)	0	0	0	0	581	0	0	128	0	0	68	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Actuated Green, G (s)					37.7			31.7			31.7	
Effective Green, g (s)					37.7			31.7			31.7	
Actuated g/C Ratio					0.47			0.40			0.40	
Clearance Time (s)					5.3			5.3			5.3	
Lane Grp Cap (vph)					1671			626			643	
v/s Ratio Prot											0.04	
v/s Ratio Perm					0.16			c0.08				
v/c Ratio					0.35			0.20			0.11	
Uniform Delay, d1					13.4			15.9			15.2	
Progression Factor					0.37			1.00			1.00	
Incremental Delay, d2					0.6			0.7			0.3	
Delay (s)					5.5			16.6			15.5	
Level of Service					A			B			B	
Approach Delay (s)		0.0			5.5			16.6			15.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Brant Ave & Armoury/Dalhousie St

2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱		↰↰	↑↱			↰↑↑			↑↑↱	
Traffic Volume (vph)	0	0	0	382	3	147	5	1682	0	0	1404	0
Future Volume (vph)	0	0	0	382	3	147	5	1682	0	0	1404	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.99	0.96			1.00				
Frt					0.855							
Flt Protected				0.950								
Satd. Flow (prot)	0	1921	0	3506	1554	0	0	3579	0	0	3614	0
Flt Permitted				0.757				0.934				
Satd. Flow (perm)	0	1921	0	2767	1554	0	0	3343	0	0	3614	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					16							
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		54.4			172.6			125.8			335.3	
Travel Time (s)		4.1			12.9			9.1			24.1	
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Peak Hour Factor	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	406	5	156	15	1809	0	0	1494	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	406	161	0	0	1824	0	0	1494	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)		7.4			7.4			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2					
Minimum Split (s)	28.0	28.0		28.0	28.0		29.1	29.1			29.1	
Total Split (s)	28.0	28.0		28.0	28.0		52.0	52.0			52.0	
Total Split (%)	35.0%	35.0%		35.0%	35.0%		65.0%	65.0%			65.0%	
Maximum Green (s)	22.1	22.1		22.1	22.1		45.9	45.9			45.9	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)	2.6	2.6		2.6	2.6		2.8	2.8			2.8	
Lost Time Adjust (s)		0.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)		5.9		3.9	3.9			4.1			4.1	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		16.0	16.0			16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0			0	
Act Effct Green (s)				24.1	24.1			47.9			47.9	
Actuated g/C Ratio				0.30	0.30			0.60			0.60	

Lanes, Volumes, Timings
13: Brant Ave & Armoury/Dalhousie St

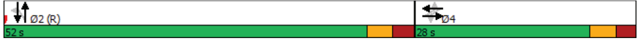
2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio				0.49	0.34			0.91			0.69	
Control Delay				16.9	13.4			22.9			13.1	
Queue Delay				0.0	0.0			45.7			0.0	
Total Delay				16.9	13.4			68.7			13.1	
LOS				B	B			E			B	
Approach Delay					15.9			68.7			13.1	
Approach LOS					B			E			B	
Queue Length 50th (m)				27.5	12.7			116.6			73.9	
Queue Length 95th (m)				41.1	13.1			#180.0			96.3	
Internal Link Dist (m)		30.4			148.6			101.8			311.3	
Turn Bay Length (m)												
Base Capacity (vph)				833	479			2001			2163	
Starvation Cap Reductn				0	0			347			0	
Spillback Cap Reductn				0	0			0			0	
Storage Cap Reductn				0	0			0			0	
Reduced v/c Ratio				0.49	0.34			1.10			0.69	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 12 (15%), Referenced to phase 2:NBSB, Start of Green
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 39.6 Intersection LOS: D
Intersection Capacity Utilization 74.2% 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: 13: Brant Ave & Armoury/Dalhousie St



HCM Signalized Intersection Capacity Analysis
13: Brant Ave & Armoury/Dalhousie St

2051 AM Peak (1-Way) Preffered.syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱		↰↰	↑↱			↰↑↑			↑↑↱	
Traffic Volume (vph)	0	0	0	382	3	147	5	1682	0	0	1404	0
Future Volume (vph)	0	0	0	382	3	147	5	1682	0	0	1404	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.9	3.9			4.1			4.1	
Lane Util. Factor				0.97	1.00			0.95			0.95	
Frpb, ped/bikes				1.00	0.96			1.00			1.00	
Flpb, ped/bikes				0.99	1.00			1.00			1.00	
Frt				1.00	0.85			1.00			1.00	
Flt Protected				0.95	1.00			1.00			1.00	
Satd. Flow (prot)				3472	1554			3578			3614	
Flt Permitted				0.76	1.00			0.93			1.00	
Satd. Flow (perm)				2768	1554			3341			3614	
Peak-hour factor, PHF	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Adj. Flow (vph)	0	0	0	406	5	156	15	1809	0	0	1494	0
RTOR Reduction (vph)	0	0	0	0	11	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	406	150	0	0	1824	0	0	1494	0
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2					
Actuated Green, G (s)				22.1	22.1			45.9			45.9	
Effective Green, g (s)				24.1	24.1			47.9			47.9	
Actuated g/C Ratio				0.30	0.30			0.60			0.60	
Clearance Time (s)				5.9	5.9			6.1			6.1	
Lane Grp Cap (vph)				833	468			2000			2163	
v/s Ratio Prot					0.10						0.41	
v/s Ratio Perm				c0.15				c0.55				
v/c Ratio				0.49	0.32			0.91			0.69	
Uniform Delay, d1				22.9	21.6			14.2			11.0	
Progression Factor				0.64	0.58			1.00			1.00	
Incremental Delay, d2				2.0	1.7			7.8			1.8	
Delay (s)				16.7	14.3			22.0			12.8	
Level of Service				B	B			C			B	
Approach Delay (s)		0.0			16.0			22.0			12.8	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱				↰	↑↱		↰	↑	↱
Traffic Volume (vph)	985	479	152	0	0	0	175	547	81	196	557	1222
Future Volume (vph)	985	479	152	0	0	0	175	547	81	196	557	1222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	110.0		210.0	40.0		0.0
Storage Lanes	2		1	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	0.97		0.93				1.00	1.00		1.00		0.98
Frt			0.850					0.978				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3404	1865	1484	0	0	0	1659	3499	0	1772	1812	1570
Flt Permitted	0.950						0.178			0.268		
Satd. Flow (perm)	3307	1865	1383	0	0	0	310	3499	0	500	1812	1532
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			230					29				850
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		446.3			127.5			177.1			125.8	
Travel Time (s)		33.5			9.6			12.8			9.1	
Confl. Peds. (#/hr)	19		33				9		1	1		9
Peak Hour Factor	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Adj. Flow (vph)	1132	584	230	0	0	0	227	622	107	245	593	1343
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1132	584	230	0	0	0	227	729	0	245	593	1343
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)		7.4			7.4			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm				pm+pt	NA		pm+pt	NA	Free
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4				2			6		Free
Minimum Split (s)	31.0	31.0	31.0				8.0	31.0		8.0	31.0	
Total Split (s)	31.0	31.0	31.0				10.0	33.0		11.0	34.0	
Total Split (%)	41.3%	41.3%	41.3%				13.3%	44.0%		14.7%	45.3%	
Maximum Green (s)	27.0	27.0	27.0				6.0	27.0		7.0	28.0	
Yellow Time (s)	2.0	2.0	2.0				3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0				1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0				4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Walk Time (s)	15.0	15.0	15.0					15.0			15.0	
Flash Dont Walk (s)	10.0	10.0	10.0					10.0			10.0	
Pedestrian Calls (#/hr)	0	0	0					0			0	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑	↱				↰	↑↱		↰	↑	↱
Traffic Volume (vph)	985	479	152	0	0	0	175	547	81	196	557	1222
Future Volume (vph)	985	479	152	0	0	0	175	547	81	196	557	1222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0				4.0	6.0		4.0	6.0	4.0
Lane Util. Factor	0.97	1.00	1.00				1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.93				1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	0.97	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3307	1865	1383				1658	3503		1772	1812	1532
Flt Permitted	0.95	1.00	1.00				0.18	1.00		0.27	1.00	1.00
Satd. Flow (perm)	3307	1865	1383				311	3503		499	1812	1532
Peak-hour factor, PHF	0.87	0.82	0.66	0.25	0.25	0.25	0.77	0.88	0.76	0.80	0.94	0.91
Adj. Flow (vph)	1132	584	230	0	0	0	227	622	107	245	593	1343
RTOR Reduction (vph)	0	0	147	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	1132	584	83	0	0	0	227	710	0	245	593	1343
Confl. Peds. (#/hr)	19		33				9		1	1		9
Heavy Vehicles (%)	4%	3%	10%	0%	0%	0%	10%	2%	0%	3%	6%	4%
Turn Type	Perm	NA	Perm				pm+pt	NA		pm+pt	NA	Free
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4				2			6		Free
Actuated Green, G (s)	27.0	27.0	27.0				33.0	27.0		35.0	28.0	75.0
Effective Green, g (s)	27.0	27.0	27.0				33.0	27.0		35.0	28.0	75.0
Actuated g/C Ratio	0.36	0.36	0.36				0.44	0.36		0.47	0.37	1.00
Clearance Time (s)	4.0	4.0	4.0				4.0	6.0		4.0	6.0	
Lane Grp Cap (vph)	1190	671	497				244	1261		351	676	1532
v/s Ratio Prot		0.31					0.07	0.20		0.07	0.33	
v/s Ratio Perm	0.34		0.06				0.33			0.26		c0.88
v/c Ratio	0.95	0.87	0.17				0.93	0.56		0.70	0.88	0.88
Uniform Delay, d1	23.4	22.4	16.3				17.4	19.3		13.0	21.9	0.0
Progression Factor	1.00	1.00	1.00				1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	16.7	14.4	0.7				42.1	1.8		11.0	15.0	7.4
Delay (s)	40.1	36.8	17.1				59.4	21.1		24.0	36.9	7.4
Level of Service	D	D	B				E	C		C	D	A
Approach Delay (s)		36.4			0.0			30.2			17.3	
Approach LOS		D			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	78.8%	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
Act Effct Green (s)	27.0	27.0	27.0				35.0	27.0		37.0	28.0	75.0
Actuated g/C Ratio	0.36	0.36	0.36				0.47	0.36		0.49	0.37	1.00
v/c Ratio	0.95	0.87	0.36				0.90	0.57		0.67	0.88	0.88
Control Delay	41.7	38.5	4.3				52.4	20.6		20.8	38.7	8.6
Queue Delay	0.0	0.0	0.0				0.0	0.0		0.0	3.0	0.0
Total Delay	41.7	38.5	4.3				52.4	20.6		20.8	41.7	8.6
LOS	D	D	A				D	C		C	D	A
Approach Delay		36.3						28.2			19.0	
Approach LOS		D						C			B	
Queue Length 50th (m)	78.6	75.4	0.0				16.1	41.0		17.4	76.3	0.0
Queue Length 95th (m)	#111.7	#110.5	3.3				#34.6	55.6		25.7	#133.7	#15.9
Internal Link Dist (m)		422.3			103.5			153.1			101.8	
Turn Bay Length (m)							110.0			40.0		
Base Capacity (vph)	1190	671	645				252	1278		365	676	1532
Starvation Cap Reductn	0	0	0				0	0		0	34	0
Spillback Cap Reductn	0	0	0				0	0		0	0	0
Storage Cap Reductn	0	0	0				0	0		0	0	0
Reduced v/c Ratio	0.95	0.87	0.36				0.90	0.57		0.67	0.92	0.88

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 0.95

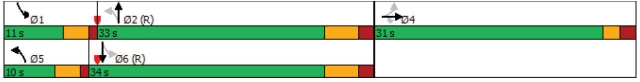
Intersection Signal Delay: 27.3 Intersection LOS: C

Intersection Capacity Utilization 78.8% 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: Icomm Dr/Brant Ave & Colborne St



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	79	677	0	0	74	0
Future Volume (vph)	79	677	0	0	74	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	3561	0	0	1789	0
Flt Permitted		0.995			0.950	
Satd. Flow (perm)	0	3561	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		127.5	121.5		114.7	
Travel Time (s)		9.6	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	736	0	0	80	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	822	0	0	80	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 31.8% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Colborne St & King St

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	79	677	0	0	74	0
Future Volume (Veh/h)	79	677	0	0	74	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	736	0	0	80	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)		127				
pX, platoon unblocked						
vC, conflicting volume	0				540	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				540	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				82	100
cM capacity (veh/h)	1622				447	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	331	491	80
Volume Left	86	0	80
Volume Right	0	0	0
cSH	1622	1700	447
Volume to Capacity	0.05	0.29	0.18
Queue Length 95th (m)	1.3	0.0	4.9
Control Delay (s)	2.2	0.0	14.8
Lane LOS	A		B
Approach Delay (s)	0.9		14.8
Approach LOS			B

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
3: Colborne St & Queen St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	46	705	0	0	105	0
Future Volume (vph)	46	705	0	0	105	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected		0.997			0.950	
Satd. Flow (prot)	0	3605	0	0	1807	0
Flt Permitted		0.997			0.950	
Satd. Flow (perm)	0	3605	0	0	1807	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	50	766	0	0	114	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	816	0	0	114	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 33.3% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
3: Colborne St & Queen St

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	46	705	0	0	105	0
Future Volume (vph)	46	705	0	0	105	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	766	0	0	114	0

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total (vph)	305	511	114
Volume Left (vph)	50	0	114
Volume Right (vph)	0	0	0
Hadj (s)	0.10	0.02	0.22
Departure Headway (s)	4.9	4.9	5.7
Degree Utilization, x	0.42	0.69	0.18
Capacity (veh/h)	721	733	602
Control Delay (s)	10.3	16.8	9.9
Approach Delay (s)	14.3		9.9
Approach LOS	B		A

Intersection Summary			
Delay	13.8		
Level of Service	B		
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
4: Market Street IPS/Market St IPS & Colborne St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	810	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	810	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Flt Permitted												
Satd. Flow (perm)	0	3579	0	0	0	0	0	1883	0	0	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		183.0			240.0			61.0			43.5	
Travel Time (s)		13.7			18.0			4.6			3.3	
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
Adj. Flow (vph)	0	880	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	880	0	0	0	0	0	0	0	0	0	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors		2						2			2	
Detector Template		Thru						Thru			Thru	
Leading Detector (m)		10.0						10.0			10.0	
Trailing Detector (m)		0.0						0.0			0.0	
Detector 1 Position(m)		0.0						0.0			0.0	
Detector 1 Size(m)		0.6						0.6			0.6	
Detector 1 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0						0.0			0.0	
Detector 1 Queue (s)		0.0						0.0			0.0	
Detector 1 Delay (s)		0.0						0.0			0.0	
Detector 2 Position(m)		9.4						9.4			9.4	
Detector 2 Size(m)		0.6						0.6			0.6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Detector Phase		2						4			4	
Switch Phase												
Minimum Initial (s)		4.0						4.0			4.0	

Lanes, Volumes, Timings — 2051 PM Peak (1-Way) Preffered.syn
4: Market Street IPS/Market St IPS & Colborne St

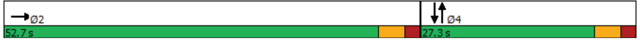
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		27.3						27.3			27.3	
Total Split (s)		52.7						27.3			27.3	
Total Split (%)		65.9%						34.1%			34.1%	
Maximum Green (s)		47.4						22.0			22.0	
Yellow Time (s)		3.3						3.3			3.3	
All-Red Time (s)		2.0						2.0			2.0	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.3						5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0						3.0			3.0	
Recall Mode		Max						None			None	
Walk Time (s)		7.0						7.0			7.0	
Flash Dont Walk (s)		15.0						15.0			15.0	
Pedestrian Calls (#/hr)		0						120			120	
Act Effct Green (s)		64.9										
Actuated g/C Ratio		0.73										
v/c Ratio		0.34										
Control Delay		6.9										
Queue Delay		0.0										
Total Delay		6.9										
LOS		A										
Approach Delay		6.9										
Approach LOS		A										
Queue Length 50th (m)		34.5										
Queue Length 95th (m)		44.6										
Internal Link Dist (m)		159.0			216.0			37.0			19.5	
Turn Bay Length (m)												
Base Capacity (vph)		2596										
Starvation Cap Reductn		0										
Spillback Cap Reductn		0										
Storage Cap Reductn		0										
Reduced v/c Ratio		0.34										

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 89.5
Natural Cycle: 55
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.34
Intersection Signal Delay: 6.9 Intersection LOS: A
Intersection Capacity Utilization 26.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Market Street IPS/Market St IPS & Colborne St



HCM Signalized Intersection Capacity Analysis — 2051 PM Peak (1-Way) Preffered.syn
4: Market Street IPS/Market St IPS & Colborne St

09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑						↑			↑	
Traffic Volume (vph)	0	810	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	810	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3										
Lane Util. Factor		0.95										
Frt		1.00										
Flt Protected		1.00										
Satd. Flow (prot)		3579										
Flt Permitted		1.00										
Satd. Flow (perm)		3579										
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)	0	880	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	880	0	0	0	0	0	0	0	0	0	0
Turn Type		NA										
Protected Phases		2						4			4	
Permitted Phases												
Actuated Green, G (s)		63.6										
Effective Green, g (s)		63.6										
Actuated g/C Ratio		0.70										
Clearance Time (s)		5.3										
Vehicle Extension (s)		3.0										
Lane Grp Cap (vph)		2506										
v/s Ratio Prot		c0.25										
v/s Ratio Perm												
v/c Ratio		0.35										
Uniform Delay, d1		5.4										
Progression Factor		1.00										
Incremental Delay, d2		0.4										
Delay (s)		5.8										
Level of Service		A										
Approach Delay (s)		5.8			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary

HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	10.6
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings — 2051 PM Peak (1-Way) Preffered.syn
5: Colborne St & Charlotte Street

09-21-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	87	723	0	0	91	0
Future Volume (vph)	87	723	0	0	91	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	3561	0	0	1789	0
Flt Permitted		0.995			0.950	
Satd. Flow (perm)	0	3561	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		240.0	140.5		77.6	
Travel Time (s)		18.0	10.5		5.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	786	0	0	99	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	881	0	0	99	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 34.2% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis — 2051 PM Peak (1-Way) Preffered.syn
5: Colborne St & Charlotte Street

09-21-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	87	723	0	0	91	0
Future Volume (Veh/h)	87	723	0	0	91	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	95	786	0	0	99	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)		240	141			
pX, platoon unblocked					0.91	
vC, conflicting volume	0				583	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				356	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				81	100
cM capacity (veh/h)	1622				530	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	357	524	99
Volume Left	95	0	99
Volume Right	0	0	0
cSH	1622	1700	530
Volume to Capacity	0.06	0.31	0.19
Queue Length 95th (m)	1.4	0.0	5.2
Control Delay (s)	2.3	0.0	13.3
Lane LOS	A		B
Approach Delay (s)	0.9		13.3
Approach LOS			B

Intersection Summary

Average Delay	2.2		
Intersection Capacity Utilization	34.2%	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)	98	570	146	0	0	0	0	1663	914	195	2021	0
Future Volume (vph)	98	570	146	0	0	0	0	1663	914	195	2021	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		23.0	0.0		0.0	0.0		0.0	50.0		0.0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.96						0.97			
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1807	3579	1633	0	0	0	0	3614	1601	1825	3614	0
Flt Permitted	0.950									0.051		
Satd. Flow (perm)	1774	3579	1563	0	0	0	0	3614	1560	98	3614	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			55						55			
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		140.5			1204.0			126.9			109.9	
Travel Time (s)		10.5			90.3			9.5			8.2	
Confl. Peds. (#/hr)	12		21						8	8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Adj. Flow (vph)	107	620	159	0	0	0	0	1808	993	212	2197	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	620	159	0	0	0	0	1808	993	212	2197	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)		3.7			3.7			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Minimum Split (s)	28.0	28.0	28.0					25.0	25.0	9.0	25.0	
Total Split (s)	28.0	28.0	28.0					77.0	77.0	15.0	92.0	
Total Split (%)	23.3%	23.3%	23.3%					64.2%	64.2%	12.5%	76.7%	
Maximum Green (s)	24.0	24.0	24.0					73.0	73.0	10.0	88.0	
Yellow Time (s)	3.5	3.5	3.5					3.5	3.5	3.0	3.5	
All-Red Time (s)	0.5	0.5	0.5					0.5	0.5	2.0	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0					4.0	4.0	5.0	4.0	
Lead/Lag								Lead	Lead	Lag		
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0					7.0	7.0		7.0	
Flash Dont Walk (s)	17.0	17.0	17.0					14.0	14.0		14.0	
Pedestrian Calls (#/hr)	0	0	0					0	0		0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	24.0	24.0	24.0					73.0	73.0	87.0	88.0	
Actuated g/C Ratio	0.20	0.20	0.20					0.61	0.61	0.72	0.73	
v/c Ratio	0.30	0.87	0.45					0.82	1.02	0.99	0.83	
Control Delay	43.6	60.2	31.7					22.5	58.2	61.1	6.6	
Queue Delay	0.0	0.0	0.0					3.3	0.0	0.0	13.7	
Total Delay	43.6	60.2	31.7					25.8	58.2	61.1	20.3	
LOS	D	E	C					C	E	E	C	
Approach Delay		53.1						37.3			23.9	
Approach LOS		D						D			C	
Queue Length 50th (m)	21.6	75.0	21.2					164.8	~243.5	32.9	88.6	
Queue Length 95th (m)	38.1	#103.6	42.3					197.9	#321.3	m33.5	m84.5	
Internal Link Dist (m)		116.5			1180.0			102.9			85.9	
Turn Bay Length (m)	25.0		23.0							50.0		
Base Capacity (vph)	354	715	356					2198	970	214	2650	
Starvation Cap Reductn	0	0	0					0	0	0	486	
Spillback Cap Reductn	0	0	0					292	0	0	0	
Storage Cap Reductn	0	0	0					0	0	0	0	
Reduced v/c Ratio	0.30	0.87	0.45					0.95	1.02	0.99	1.02	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 120
Control Type: Pretimed
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 34.3 Intersection LOS: C
Intersection Capacity Utilization 156.1% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Clarence Street & Colborne

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱					↑↑	↱	↰	↑↑	
Traffic Volume (vph)	98	570	146	0	0	0	0	1663	914	195	2021	0
Future Volume (vph)	98	570	146	0	0	0	0	1663	914	195	2021	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0					4.0	4.0	5.0	4.0	
Lane Util. Factor	1.00	0.95	1.00					0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96					1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.98	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1774	3579	1563					3614	1560	1825	3614	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.05	1.00	
Satd. Flow (perm)	1774	3579	1563					3614	1560	99	3614	
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)	107	620	159	0	0	0	0	1808	993	212	2197	0
RTOR Reduction (vph)	0	0	44	0	0	0	0	0	22	0	0	0
Lane Group Flow (vph)	107	620	115	0	0	0	0	1808	971	212	2197	0
Confl. Peds. (#/hr)	12		21						8	8		
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	2%	0%	1%	0%
Turn Type	Perm	NA	Perm					NA	Perm	pm+pt	NA	
Protected Phases		2						8		7	4	
Permitted Phases	2		2						8	4		
Actuated Green, G (s)	24.0	24.0	24.0					73.0	73.0	88.0	88.0	
Effective Green, g (s)	24.0	24.0	24.0					73.0	73.0	88.0	88.0	
Actuated g/C Ratio	0.20	0.20	0.20					0.61	0.61	0.73	0.73	
Clearance Time (s)	4.0	4.0	4.0					4.0	4.0	5.0	4.0	
Lane Grp Cap (vph)	354	715	312					2198	949	216	2650	
v/s Ratio Prot		c0.17						0.50		0.08	c0.61	
v/s Ratio Perm	0.06		0.07						c0.62	0.64		
v/c Ratio	0.30	0.87	0.37					0.82	1.02	0.98	0.83	
Uniform Delay, d1	40.9	46.5	41.5					18.4	23.5	40.1	10.9	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.73	0.51	
Incremental Delay, d2	2.2	13.4	3.3					3.6	35.4	25.9	0.8	
Delay (s)	43.1	59.9	44.8					22.1	58.9	55.1	6.4	
Level of Service	D	E	D					C	E	E	A	
Approach Delay (s)		55.1			0.0			35.1			10.7	
Approach LOS		E			A			D			B	

Intersection Summary			
HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	156.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑	↱	↰		↱↱	Y			
Traffic Volume (vph)	32	1131	0	0	0	1301	0	0	0	0
Future Volume (vph)	32	1131	0	0	0	1301	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		22.0	48.0		0.0	0.0	0.0	0.0	0.0
Storage Lanes	1		1	1		2	1	0	0	0
Taper Length (m)	7.5			7.5			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	1.00	1.00	1.00
Frt						0.850				
Flt Protected	0.950									
Satd. Flow (prot)	1789	1883	1883	1883	0	2818	1883	0	0	0
Flt Permitted	0.950									
Satd. Flow (perm)	1789	1883	1883	1883	0	2818	1883	0	0	0
Right Turn on Red	Yes		Yes			Yes		Yes		
Satd. Flow (RTOR)	35					1824				
Link Speed (k/h)		48			48		48		48	
Link Distance (m)		1204.0			112.9		111.0		175.7	
Travel Time (s)		90.3			8.5		8.3		13.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1229	0	0	0	1414	0	0	0	0
Shared Lane Traffic (%)										
Lane Group Flow (vph)	35	1229	0	0	0	1414	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Right	Left	Right
Median Width(m)		3.7			3.7		3.7		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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24	14	24	14
Number of Detectors	1	2	1	1		1	1			
Detector Template	Left	Thru	Right	Left		Right	Left			
Leading Detector (m)	2.0	10.0	2.0	2.0		2.0	2.0			
Trailing Detector (m)	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			
Detector 1 Size(m)	2.0	0.6	2.0	2.0		2.0	2.0			
Detector 1 Type	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			
Detector 1 Queue (s)	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			
Detector 2 Position(m)		9.4								
Detector 2 Size(m)		0.6								
Detector 2 Type		Cl+Ex								
Detector 2 Channel										
Detector 2 Extend (s)		0.0								
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				

Lanes, Volumes, Timings — 2051 PM Peak (1-Way) Preffered.syn
7: Canadian Tire Entrance & Colborne St & Dalhousie Street
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Detector Phase	2	2	2	2			8			
Switch Phase										
Minimum Initial (s)	4.0	4.0	4.0	4.0			3.0			
Minimum Split (s)	21.6	21.6	21.6	21.6			8.3			
Total Split (s)	64.0	64.0	64.0	64.0			16.0			
Total Split (%)	80.0%	80.0%	80.0%	80.0%			20.0%			
Maximum Green (s)	58.4	58.4	58.4	58.4			10.7			
Yellow Time (s)	3.3	3.3	3.3	3.3			3.3			
All-Red Time (s)	2.3	2.3	2.3	2.3			2.0			
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			0.0			
Total Lost Time (s)	5.6	5.6	5.6	5.6			5.3			
Lead/Lag										
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0			
Recall Mode	C-Max	C-Max	C-Max	C-Max			None			
Walk Time (s)	5.0	5.0	5.0	5.0			5.0			
Flash Dont Walk (s)	11.0	11.0	11.0	11.0			11.0			
Pedestrian Calls (#/hr)	0	0	0	0			0			
Act Effct Green (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
v/c Ratio	0.02	0.65				0.50				
Control Delay	0.0	1.8				0.6				
Queue Delay	0.0	0.0				0.0				
Total Delay	0.0	1.8				0.6				
LOS	A	A				A				
Approach Delay		1.7			0.6					
Approach LOS		A			A					
Queue Length 50th (m)	0.0	0.0				0.0				
Queue Length 95th (m)	0.0	0.0				0.0				
Internal Link Dist (m)		1180.0			88.9		87.0		151.7	
Turn Bay Length (m)										
Base Capacity (vph)	1789	1883				2818				
Starvation Cap Reductn	0	0				0				
Spillback Cap Reductn	0	0				0				
Storage Cap Reductn	0	0				0				
Reduced v/c Ratio	0.02	0.65				0.50				

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 1.2 — Intersection LOS: A
Intersection Capacity Utilization 64.2% — ICU Level of Service C
Analysis Period (min) 15

HCM Signalized Intersection Capacity Analysis — 2051 PM Peak (1-Way) Preffered.syn
7: Canadian Tire Entrance & Colborne St & Dalhousie Street
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations	↰	↑	↱	↰		↱↱	↰↱			
Traffic Volume (vph)	32	1131	0	0	0	1301	0	0	0	0
Future Volume (vph)	32	1131	0	0	0	1301	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6				4.0				
Lane Util. Factor	1.00	1.00				0.88				
Frt	1.00	1.00				0.85				
Flt Protected	0.95	1.00				1.00				
Satd. Flow (prot)	1789	1883				2818				
Flt Permitted	0.95	1.00				1.00				
Satd. Flow (perm)	1789	1883				2818				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1229	0	0	0	1414	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	35	1229	0	0	0	1414	0	0	0	0
Turn Type	Perm	NA	Perm	D.Pm		Free	Prot			
Protected Phases		2					8			
Permitted Phases	2		2	2		Free				
Actuated Green, G (s)	80.0	80.0				80.0				
Effective Green, g (s)	80.0	80.0				80.0				
Actuated g/C Ratio	1.00	1.00				1.00				
Clearance Time (s)	5.6	5.6								
Vehicle Extension (s)	3.0	3.0								
Lane Grp Cap (vph)	1789	1883				2818				
v/s Ratio Prot		c0.65								
v/s Ratio Perm	0.02					0.50				
v/c Ratio	0.02	0.65				0.50				
Uniform Delay, d1	0.0	0.0				0.0				
Progression Factor	1.00	1.00				1.00				
Incremental Delay, d2	0.0	1.8				0.6				
Delay (s)	0.0	1.8				0.6				
Level of Service	A	A				A				
Approach Delay (s)		1.7			0.6		0.0		0.0	
Approach LOS		A			A		A		A	

Intersection Summary			
HCM 2000 Control Delay	1.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.9
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings — 2051 PM Peak (1-Way) Preffered.syn
7: Canadian Tire Entrance & Colborne St & Dalhousie Street
09-21-2022

Splits and Phases: 7: Canadian Tire Entrance & Colborne St & Dalhousie Street

Lanes, Volumes, Timings — 2051 PM Peak (1-Way) Preffered.syn
8: Clarence Street & Dalhousie St
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱	↰	↑↑			↑↱	
Traffic Volume (vph)	0	0	0	520	621	166	79	1682	0	0	1696	51
Future Volume (vph)	0	0	0	520	621	166	79	1682	0	0	1696	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	50.0		50.0	25.0		0.0	0.0		0.0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.96		0.96					1.00	
Frt						0.850					0.996	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1825	3614	1585	1825	3579	0	0	3598	0
Flt Permitted				0.950			0.060					
Satd. Flow (perm)	0	0	0	1756	3614	1523	115	3579	0	0	3598	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						64					4	
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		139.0			1069.0			109.9			102.5	
Travel Time (s)		10.4			80.2			8.2			7.7	
Confl. Peds. (#/hr)				23		17	8					8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	565	675	180	86	1828	0	0	1843	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	565	675	180	86	1828	0	0	1898	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)		3.7			3.7			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				pm+pt	NA	Perm	pm+pt	NA			NA	
Protected Phases				5	2		7	4			8	
Permitted Phases				2		2	4					
Minimum Split (s)				8.0	28.1	28.1	8.0	31.1			31.1	
Total Split (s)				43.0	41.0	41.0	8.0	77.0			69.0	
Total Split (%)				35.8%	34.2%	34.2%	6.7%	64.2%			57.5%	
Maximum Green (s)				39.0	35.0	35.0	4.0	71.0			63.0	
Yellow Time (s)				3.5	4.0	4.0	3.5	4.0			4.0	
All-Red Time (s)				0.5	2.0	2.0	0.5	2.0			2.0	
Lost Time Adjust (s)				0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)				4.0	6.0	6.0	4.0	6.0			6.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Walk Time (s)					7.0	7.0		7.0			7.0	
Flash Dont Walk (s)					15.0	15.0		18.0			18.0	
Pedestrian Calls (#/hr)					0	0		0			0	

Lanes, Volumes, Timings
8: Clarence Street & Dalhousie St

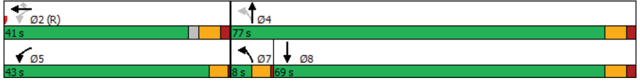
2051 PM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)				39.0	37.0	37.0	73.0	71.0			63.0	
Actuated g/C Ratio				0.32	0.31	0.31	0.61	0.59			0.52	
v/c Ratio				0.95	0.61	0.35	0.68	0.86			1.00	
Control Delay				67.2	38.1	22.5	36.7	12.4			50.5	
Queue Delay				42.9	0.0	0.0	0.0	2.8			0.0	
Total Delay				110.1	38.1	22.5	36.7	15.3			50.5	
LOS				F	D	C	D	B			D	
Approach Delay					64.8			16.2			50.5	
Approach LOS					E			B			D	
Queue Length 50th (m)				129.6	71.0	20.5	3.1	203.5			~229.4	
Queue Length 95th (m)				#198.2	90.4	40.0	m7.7	182.8			#288.4	
Internal Link Dist (m)		115.0			1045.0			85.9			78.5	
Turn Bay Length (m)				50.0		50.0	25.0					
Base Capacity (vph)				593	1114	513	126	2117			1890	
Starvation Cap Reductn				0	0	0	0	191			0	
Spillback Cap Reductn				87	0	0	0	0			0	
Storage Cap Reductn				0	0	0	0	0			0	
Reduced v/c Ratio				1.12	0.61	0.35	0.68	0.95			1.00	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 110
Control Type: Pretimed
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 41.8 Intersection LOS: D
Intersection Capacity Utilization 156.1% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Clarence Street & Dalhousie St



Lanes, Volumes, Timings
9: Charlotte Street & Dalhousie St

2051 PM Peak (1-Way) Preffered.syn
09-21-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑			↰			↱	
Traffic Volume (vph)	0	0	0	56	678	17	28	29	0	0	132	51
Future Volume (vph)	0	0	0	56	678	17	28	29	0	0	132	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.997						0.962	
Flt Protected					0.996			0.976				
Satd. Flow (prot)	0	0	0	0	3554	0	0	1838	0	0	1812	0
Flt Permitted					0.996			0.976				
Satd. Flow (perm)	0	0	0	0	3554	0	0	1838	0	0	1812	0
Link Speed (k/h)		48			48			48			48	
Link Distance (m)		241.1			139.0			32.3			102.3	
Travel Time (s)		18.1			10.4			2.4			7.7	
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
Adj. Flow (vph)	0	0	0	61	737	18	30	32	0	0	143	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	816	0	0	62	0	0	198	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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 44.3% ICU Level of Service A
Analysis Period (min) 15

HCM Signalized Intersection Capacity Analysis
8: Clarence Street & Dalhousie St

2051 PM Peak (1-Way) Preffered.syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↑↑	↱	↰	↑↑			↑↱	
Traffic Volume (vph)	0	0	0	520	621	166	79	1682	0	0	1696	51
Future Volume (vph)	0	0	0	520	621	166	79	1682	0	0	1696	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	6.0	6.0	4.0	6.0			6.0	
Lane Util. Factor				1.00	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	
Frt				1.00	1.00	0.85	1.00	1.00			1.00	
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1825	3614	1523	1825	3579			3597	
Flt Permitted				0.95	1.00	1.00	0.06	1.00			1.00	
Satd. Flow (perm)				1825	3614	1523	115	3579			3597	
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)	0	0	0	565	675	180	86	1828	0	0	1843	55
RTOR Reduction (vph)	0	0	0	0	0	44	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	565	675	136	86	1828	0	0	1896	0
Confl. Peds. (#/hr)				23		17	8					8
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	2%	0%	0%	1%	0%
Turn Type				pm+pt	NA	Perm	pm+pt	NA			NA	
Protected Phases				5	2		7	4			8	
Permitted Phases				2		2	4					
Actuated Green, G (s)				39.0	37.0	37.0	71.0	71.0			63.0	
Effective Green, g (s)				39.0	37.0	37.0	71.0	71.0			63.0	
Actuated g/C Ratio				0.32	0.31	0.31	0.59	0.59			0.52	
Clearance Time (s)				4.0	6.0	6.0	4.0	6.0			6.0	
Lane Grp Cap (vph)				593	1114	469	125	2117			1888	
v/s Ratio Prot				c0.31	0.19		0.02	c0.51			c0.53	
v/s Ratio Perm						0.09	0.39					
v/c Ratio				0.95	0.61	0.29	0.69	0.86			1.00	
Uniform Delay, d1				39.6	35.3	31.5	27.8	20.5			28.5	
Progression Factor				1.00	1.00	1.00	1.64	0.45			1.00	
Incremental Delay, d2				27.0	2.5	1.6	16.6	3.0			21.7	
Delay (s)				66.6	37.7	33.1	62.2	12.1			50.2	
Level of Service				E	D	C	E	B			D	
Approach Delay (s)		0.0			48.6			14.4			50.2	
Approach LOS		A			D			B			D	

Intersection Summary

HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	156.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
9: Charlotte Street & Dalhousie St

2051 PM Peak (1-Way) Preffered.syn
09-21-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑			↰			↱	
Traffic Volume (veh/h)	0	0	0	56	678	17	28	29	0	0	132	51
Future Volume (Veh/h)	0	0	0	56	678	17	28	29	0	0	132	51
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	0	0	61	737	18	30	32	0	0	143	55
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		241			139							
pX, platoon unblocked	0.84						0.84	0.84		0.84	0.84	0.84
vC, conflicting volume	755			0			617	877	0	884	868	378
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	332			0			168	477	0	485	466	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
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			96			93	92	100	100	64	94
cM capacity (veh/h)	1030			1622			433	393	1084	356	399	912

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	430	386	62	198
Volume Left	61	0	30	0
Volume Right	0	18	0	55
cSH	1622	1700	411	473
Volume to Capacity	0.04	0.23	0.15	0.42
Queue Length 95th (m)	0.9	0.0	4.0	15.5
Control Delay (s)	1.3	0.0	15.3	18.0
Lane LOS	A		C	C
Approach Delay (s)	0.7		15.3	18.0
Approach LOS			C	C

Intersection Summary

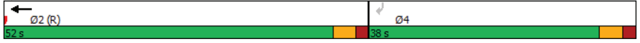
Average Delay	4.7		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↱			↱
Traffic Volume (vph)	0	0	659	98	0	120
Future Volume (vph)	0	0	659	98	0	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0			10.0	0.0	0.0
Storage Lanes	0			0	0	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Ped Bike Factor			0.97			0.74
Frt			0.980			0.865
Flt Protected						
Satd. Flow (prot)	0	0	3453	0	0	1645
Flt Permitted						
Satd. Flow (perm)	0	0	3453	0	0	1217
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			27			109
Link Speed (k/h)		48	48		48	
Link Distance (m)		182.0	241.1		101.1	
Travel Time (s)		13.7	18.1		7.6	
Confl. Peds. (#/hr)				94		216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Adj. Flow (vph)	0	0	716	107	0	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	823	0	0	130
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Turn Type			NA			Perm
Protected Phases			2			
Permitted Phases						4
Minimum Split (s)			29.3			28.3
Total Split (s)			52.0			38.0
Total Split (%)			57.8%			42.2%
Maximum Green (s)			46.7			32.7
Yellow Time (s)			3.3			3.3
All-Red Time (s)			2.0			2.0
Lost Time Adjust (s)			0.0			0.0
Total Lost Time (s)			5.3			5.3
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)			7.0			7.0
Flash Dont Walk (s)			17.0			16.0
Pedestrian Calls (#/hr)			0			0

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Act Effct Green (s)			46.7			32.7
Actuated g/C Ratio			0.52			0.36
v/c Ratio			0.46			0.25
Control Delay			14.2			7.1
Queue Delay			0.0			0.0
Total Delay			14.2			7.1
LOS			B			A
Approach Delay			14.2		7.1	
Approach LOS			B		A	
Queue Length 50th (m)			43.1			2.3
Queue Length 95th (m)			57.2			13.8
Internal Link Dist (m)		158.0	217.1		77.1	
Turn Bay Length (m)						
Base Capacity (vph)			1804			511
Starvation Cap Reductn			0			0
Spillback Cap Reductn			0			0
Storage Cap Reductn			0			0
Reduced v/c Ratio			0.46			0.25

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 37 (41%), Referenced to phase 2:WBT and 6:, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 13.2	Intersection LOS: B
Intersection Capacity Utilization 50.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Dalhousie St & Market St



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↱			↱
Traffic Volume (vph)	0	0	659	98	0	120
Future Volume (vph)	0	0	659	98	0	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			5.3			5.3
Lane Util. Factor			0.95			1.00
Frpb, ped/bikes			0.97			0.74
Flpb, ped/bikes			1.00			1.00
Frt			0.98			0.86
Flt Protected			1.00			1.00
Satd. Flow (prot)			3455			1217
Flt Permitted			1.00			1.00
Satd. Flow (perm)			3455			1217
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	716	107	0	130
RTOR Reduction (vph)	0	0	13	0	0	69
Lane Group Flow (vph)	0	0	810	0	0	61
Confl. Peds. (#/hr)				94		216
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%
Turn Type			NA			Perm
Protected Phases			2			
Permitted Phases						4
Actuated Green, G (s)			46.7			32.7
Effective Green, g (s)			46.7			32.7
Actuated g/C Ratio			0.52			0.36
Clearance Time (s)			5.3			5.3
Lane Grp Cap (vph)			1792			442
v/s Ratio Prot			c0.23			
v/s Ratio Perm						c0.05
v/c Ratio			0.45			0.14
Uniform Delay, d1			13.6			19.2
Progression Factor			1.00			1.00
Incremental Delay, d2			0.8			0.6
Delay (s)			14.4			19.8
Level of Service			B			B
Approach Delay (s)		0.0	14.4		19.8	
Approach LOS		A	B		B	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↑	↱
Traffic Volume (vph)	0	0	0	58	687	34	9	28	0	0	41	76
Future Volume (vph)	0	0	0	58	687	34	9	28	0	0	41	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99			1.00				0.97
Frt					0.993							0.850
Flt Protected					0.996			0.988				
Satd. Flow (prot)	0	0	0	0	3598	0	0	1898	0	0	1921	1601
Flt Permitted					0.996			0.952				
Satd. Flow (perm)	0	0	0	0	3585	0	0	1821	0	0	1921	1551
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9							83
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	0	0	0	63	747	37	10	30	0	0	45	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	847	0	0	40	0	0	45	83
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Minimum Split (s)				26.3	26.3		26.3	26.3			26.3	26.3
Total Split (s)				48.0	48.0		32.0	32.0			32.0	32.0
Total Split (%)				60.0%	60.0%		40.0%	40.0%			40.0%	40.0%
Maximum Green (s)				42.7	42.7		26.7	26.7			26.7	26.7
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	3.3
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	2.0
Lost Time Adjust (s)					0.0			0.0			0.0	0.0
Total Lost Time (s)					5.3			5.3			5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)				14.0	14.0		14.0	14.0			14.0	14.0
Pedestrian Calls (#/hr)				0	0		0	0			0	0

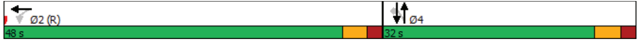
Lanes, Volumes, Timings

11: Queen St/Queen Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)					42.7			26.7			26.7	26.7
Actuated g/C Ratio					0.53			0.33			0.33	0.33
v/c Ratio					0.44			0.07			0.07	0.15
Control Delay					12.2			18.6			18.7	5.4
Queue Delay					0.0			0.0			0.0	0.0
Total Delay					12.2			18.6			18.7	5.4
LOS					B			B			B	A
Approach Delay					12.2			18.6			10.1	
Approach LOS					B			B			B	
Queue Length 50th (m)					38.1			4.1			4.6	0.0
Queue Length 95th (m)					51.2			10.5			11.3	8.8
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)					1917			607			641	572
Starvation Cap Reductn					0			0			0	0
Spillback Cap Reductn					0			0			0	0
Storage Cap Reductn					0			0			0	0
Reduced v/c Ratio					0.44			0.07			0.07	0.15

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 37 (46%), Referenced to phase 2:WBTL, Start of Green	
Natural Cycle: 55	
Control Type: Pretimed	
Maximum v/c Ratio: 0.44	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 70.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis

11: Queen St/Queen Street & Dalhousie St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰↑			↑	↱
Traffic Volume (vph)	0	0	0	58	687	34	9	28	0	0	41	76
Future Volume (vph)	0	0	0	58	687	34	9	28	0	0	41	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	5.3
Lane Util. Factor					0.95			1.00			1.00	1.00
Frpb, ped/bikes					1.00			1.00			1.00	0.97
Flpb, ped/bikes					1.00			1.00			1.00	1.00
Frt					0.99			1.00			1.00	0.85
Flt Protected					1.00			0.99			1.00	1.00
Satd. Flow (prot)					3588			1889			1921	1551
Flt Permitted					1.00			0.95			1.00	1.00
Satd. Flow (perm)					3588			1820			1921	1551
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)	0	0	0	63	747	37	10	30	0	0	45	83
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	55
Lane Group Flow (vph)	0	0	0	0	843	0	0	40	0	0	45	28
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type				Perm	NA		Perm	NA			NA	Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Actuated Green, G (s)					42.7			26.7			26.7	26.7
Effective Green, g (s)					42.7			26.7			26.7	26.7
Actuated g/C Ratio					0.53			0.33			0.33	0.33
Clearance Time (s)					5.3			5.3			5.3	5.3
Lane Grp Cap (vph)					1915			607			641	517
v/s Ratio Prot											c0.02	
v/s Ratio Perm					0.23			0.02				0.02
v/c Ratio					0.44			0.07			0.07	0.05
Uniform Delay, d1					11.4			18.2			18.2	18.1
Progression Factor					1.00			1.00			1.00	1.00
Incremental Delay, d2					0.7			0.2			0.2	0.2
Delay (s)					12.1			18.4			18.4	18.3
Level of Service					B			B			B	B
Approach Delay (s)		0.0			12.1			18.4			18.3	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

12: King St/King Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰↑			↑↱	
Traffic Volume (vph)	0	0	0	24	748	40	25	25	0	0	14	62
Future Volume (vph)	0	0	0	24	748	40	25	25	0	0	14	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00			1.00			0.99	
Frt					0.993						0.890	
Flt Protected					0.999			0.976				
Satd. Flow (prot)	0	0	0	0	3580	0	0	1875	0	0	1557	0
Flt Permitted					0.999			0.867				
Satd. Flow (perm)	0	0	0	0	3579	0	0	1662	0	0	1557	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					10						67	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		172.6			119.6			114.7			99.2	
Travel Time (s)		12.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	0	0	0	26	813	43	27	27	0	0	15	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	882	0	0	54	0	0	82	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Minimum Split (s)				27.3	27.3		27.3	27.3			27.3	
Total Split (s)				48.0	48.0		32.0	32.0			32.0	
Total Split (%)				60.0%	60.0%		40.0%	40.0%			40.0%	
Maximum Green (s)				42.7	42.7		26.7	26.7			26.7	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				15.0	15.0		15.0	15.0			15.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					42.7			26.7			26.7	
Actuated g/C Ratio					0.53			0.33			0.33	
v/c Ratio					0.46			0.10			0.15	

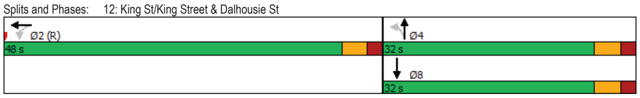
Lanes, Volumes, Timings

12: King St/King Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					3.6			19.1			7.6	
Queue Delay					0.1			0.0			0.0	
Total Delay					3.7			19.1			7.6	
LOS					A			B			A	
Approach Delay					3.7			19.1			7.6	
Approach LOS					A			B			A	
Queue Length 50th (m)					7.5			5.6			1.5	
Queue Length 95th (m)					12.0			13.2			10.3	
Internal Link Dist (m)		148.6			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)					1914			554			564	
Starvation Cap Reductn					167			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.50			0.10			0.15	

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 43 (54%), Referenced to phase 2:WBTL, Start of Green	
Natural Cycle: 55	
Control Type: Pretimed	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 4.8	Intersection LOS: A
Intersection Capacity Utilization 49.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 12: King St/King Street & Dalhousie St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (vph)	0	0	0	24	748	40	25	25	0	0	14	62
Future Volume (vph)	0	0	0	24	748	40	25	25	0	0	14	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	
Lane Util. Factor					0.95			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.99	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.99			1.00			0.89	
Flt Protected					1.00			0.98			1.00	
Satd. Flow (prot)					3576			1871			1556	
Flt Permitted					1.00			0.87			1.00	
Satd. Flow (perm)					3576			1663			1556	
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)	0	0	0	26	813	43	27	27	0	0	15	67
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	45	0
Lane Group Flow (vph)	0	0	0	0	877	0	0	54	0	0	37	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Actuated Green, G (s)					42.7			26.7			26.7	
Effective Green, g (s)					42.7			26.7			26.7	
Actuated g/C Ratio					0.53			0.33			0.33	
Clearance Time (s)					5.3			5.3			5.3	
Lane Grp Cap (vph)					1908			555			519	
v/s Ratio Prot											0.02	
v/s Ratio Perm					0.25			c0.03				
v/c Ratio					0.46			0.10			0.07	
Uniform Delay, d1					11.5			18.4			18.2	
Progression Factor					0.25			1.00			1.00	
Incremental Delay, d2					0.8			0.3			0.3	
Delay (s)					3.6			18.7			18.5	
Level of Service					A			B			B	
Approach Delay (s)		0.0			3.6			18.7			18.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

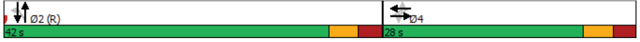
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio				0.75	0.45			0.91			0.71	
Control Delay				26.3	19.7			23.9			14.5	
Queue Delay				0.0	0.0			21.6			0.0	
Total Delay				26.3	19.7			45.4			14.5	
LOS				C	B			D			B	
Approach Delay					24.6			45.4			14.5	
Approach LOS					C			D			B	
Queue Length 50th (m)				41.9	22.6			94.4			65.1	
Queue Length 95th (m)				60.7	23.1			#148.4			87.4	
Internal Link Dist (m)		30.4			148.6			101.8			311.3	
Turn Bay Length (m)												
Base Capacity (vph)				953	548			1821			1956	
Starvation Cap Reductn				0	0			229			0	
Spillback Cap Reductn				0	0			0			0	
Storage Cap Reductn				0	0			0			0	
Reduced v/c Ratio				0.75	0.45			1.04			0.71	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Green
Natural Cycle: 70
Control Type: Pretimed
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 29.7 Intersection LOS: C
Intersection Capacity Utilization 71.0% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Brant Ave & Armoury/Dalhousie St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰↰	↱			↰↑			↑↱	
Traffic Volume (vph)	0	0	0	673	6	221	4	1528	0	0	1302	0
Future Volume (vph)	0	0	0	673	6	221	4	1528	0	0	1302	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor				0.99	0.96			1.00				
Frt					0.856							
Flt Protected				0.950								
Satd. Flow (prot)	0	1921	0	3506	1564	0	0	3579	0	0	3614	0
Flt Permitted				0.757				0.940				
Satd. Flow (perm)	0	1921	0	2770	1564	0	0	3364	0	0	3614	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					16							
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		54.4			172.6			125.8			335.3	
Travel Time (s)		4.1			12.9			9.1			24.1	
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Peak Hour Factor	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	0	0	0	716	10	235	12	1643	0	0	1385	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	716	245	0	0	1655	0	0	1385	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)		7.4			7.4			3.7			3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2					
Minimum Split (s)	28.0	28.0		28.0	28.0		29.1	29.1			29.1	
Total Split (s)	28.0	28.0		28.0	28.0		42.0	42.0			42.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%			60.0%	
Maximum Green (s)	22.1	22.1		22.1	22.1		35.9	35.9			35.9	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)	2.6	2.6		2.6	2.6		2.8	2.8			2.8	
Lost Time Adjust (s)		0.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)		5.9		3.9	3.9			4.1			4.1	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		16.0	16.0			16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0			0	
Act Effct Green (s)				24.1	24.1			37.9			37.9	
Actuated g/C Ratio				0.34	0.34			0.54			0.54	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥		↰↰	↱			↰↑			↑↱	
Traffic Volume (vph)	0	0	0	673	6	221	4	1528	0	0	1302	0
Future Volume (vph)	0	0	0	673	6	221	4	1528	0	0	1302	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.9	3.9			4.1			4.1	
Lane Util. Factor				0.97	1.00			0.95			0.95	
Frpb, ped/bikes				1.00	0.96			1.00			1.00	
Flpb, ped/bikes				0.99	1.00			1.00			1.00	
Frt				1.00	0.86			1.00			1.00	
Flt Protected				0.95	1.00			1.00			1.00	
Satd. Flow (prot)				3476	1564			3578			3614	
Flt Permitted				0.76	1.00			0.94			1.00	
Satd. Flow (perm)				2771	1564			3363			3614	
Peak-hour factor, PHF	0.25	0.25	0.25	0.94	0.58	0.94	0.33	0.93	0.25	0.25	0.94	0.50
Adj. Flow (vph)	0	0	0	716	10	235	12	1643	0	0	1385	0
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	716	235	0	0	1655	0	0	1385	0
Confl. Peds. (#/hr)				5		13	24		16	16		24
Confl. Bikes (#/hr)						27			19			43
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	0%	1%	0%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2					
Actuated Green, G (s)				22.1	22.1			35.9			35.9	
Effective Green, g (s)				24.1	24.1			37.9			37.9	
Actuated g/C Ratio				0.34	0.34			0.54			0.54	
Clearance Time (s)				5.9	5.9			6.1			6.1	
Lane Grp Cap (vph)				954	538			1820			1956	
v/s Ratio Prot					0.15						0.38	
v/s Ratio Perm				c0.26				c0.49				
v/c Ratio				0.75	0.44			0.91			0.71	
Uniform Delay, d1				20.3	17.7			14.5			11.9	
Progression Factor				1.00	1.00			1.00			1.00	
Incremental Delay, d2				5.4	2.6			8.3			2.2	
Delay (s)				25.7	20.3			22.7			14.1	
Level of Service				C	C			C			B	
Approach Delay (s)		0.0			24.3			22.7			14.1	
Approach LOS		A			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Appendix H

Future Traffic Operations (Queen Closed)

Lanes, Volumes, Timings
2: Colborne St & King St

2051 AM Peak (1-Way) Queen Closed.syn
09-27-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	127	512	0	0	168	0
Future Volume (vph)	127	512	0	0	168	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.990			0.950	
Satd. Flow (prot)	0	3543	0	0	1789	0
Flt Permitted		0.990			0.950	
Satd. Flow (perm)	0	3543	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		127.5	121.5		114.7	
Travel Time (s)		9.6	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	557	0	0	183	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	695	0	0	183	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 33.8% ICU Level of Service A
Analysis Period (min) 15

Lanes, Volumes, Timings
3: Colborne St & Queen St

2051 AM Peak (1-Way) Queen Closed.syn
09-27-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	0	608	0	0	0	0
Future Volume (vph)	0	608	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	0	3614	0	0	1902	0
Flt Permitted						
Satd. Flow (perm)	0	3614	0	0	1902	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	0	661	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	661	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 43.8% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Colborne St & King St

2051 AM Peak (1-Way) Queen Closed.syn
09-27-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	127	512	0	0	168	0
Future Volume (Veh/h)	127	512	0	0	168	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	138	557	0	0	183	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)		127				
pX, platoon unblocked						
vC, conflicting volume	0				554	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				554	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				57	100
cM capacity (veh/h)	1622				423	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	324	371	183
Volume Left	138	0	183
Volume Right	0	0	0
cSH	1622	1700	423
Volume to Capacity	0.09	0.22	0.43
Queue Length 95th (m)	2.1	0.0	16.2
Control Delay (s)	3.6	0.0	19.9
Lane LOS	A		C
Approach Delay (s)	1.7		19.9
Approach LOS			C

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Colborne St & Queen St

2051 AM Peak (1-Way) Queen Closed.syn
09-27-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	608	0	0	0	0
Future Volume (vph)	0	608	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	661	0	0	0	0

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total (vph)	220	441	0
Volume Left (vph)	0	0	0
Volume Right (vph)	0	0	0
Hadj (s)	0.02	0.02	0.00
Departure Headway (s)	4.5	4.5	5.2
Degree Utilization, x	0.28	0.55	0.00
Capacity (veh/h)	792	791	654
Control Delay (s)	8.0	11.8	8.2
Approach Delay (s)	10.5		0.0
Approach LOS	B		A

Intersection Summary			
Delay	10.5		
Level of Service	B		
Intersection Capacity Utilization	43.8%	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	0	0	0	560	27	0	0	0	0	0	32
Future Volume (vph)	0	0	0	0	560	27	0	0	0	0	0	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00							0.97
Frt					0.993							0.850
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3612	0	0	1921	0	0	1921	1601
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3612	0	0	1921	0	0	1921	1551
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9							220
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	0	0	0	0	609	29	0	0	0	0	0	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	638	0	0	0	0	0	0	35
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type					NA							Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Minimum Split (s)				26.3	26.3		26.3	26.3			26.3	26.3
Total Split (s)				49.0	49.0		31.0	31.0			31.0	31.0
Total Split (%)				61.3%	61.3%		38.8%	38.8%			38.8%	38.8%
Maximum Green (s)				43.7	43.7		25.7	25.7			25.7	25.7
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	3.3
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	2.0
Lost Time Adjust (s)					0.0			0.0			0.0	0.0
Total Lost Time (s)					5.3			5.3			5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)				14.0	14.0		14.0	14.0			14.0	14.0
Pedestrian Calls (#/hr)				0	0		0	0			0	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↑	↱
Traffic Volume (vph)	0	0	0	0	560	27	0	0	0	0	0	32
Future Volume (vph)	0	0	0	0	560	27	0	0	0	0	0	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3							5.3
Lane Util. Factor					0.95							1.00
Frpb, ped/bikes					1.00							0.97
Flpb, ped/bikes					1.00							1.00
Frt					0.99							0.85
Flt Protected					1.00							1.00
Satd. Flow (prot)					3613							1551
Flt Permitted					1.00							1.00
Satd. Flow (perm)					3613							1551
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)	0	0	0	0	609	29	0	0	0	0	0	35
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	24
Lane Group Flow (vph)	0	0	0	0	634	0	0	0	0	0	0	11
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type					NA							Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Actuated Green, G (s)					43.7							25.7
Effective Green, g (s)					43.7							25.7
Actuated g/C Ratio					0.55							0.32
Clearance Time (s)					5.3							5.3
Lane Grp Cap (vph)					1973							498
v/s Ratio Prot					c0.18							
v/s Ratio Perm												c0.01
v/c Ratio					0.32							0.02
Uniform Delay, d1					10.0							18.6
Progression Factor					1.00							1.00
Incremental Delay, d2					0.4							0.1
Delay (s)					10.4							18.6
Level of Service					B							B
Approach Delay (s)		0.0			10.4			0.0			18.6	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)					43.7							25.7
Actuated g/C Ratio					0.55							0.32
v/c Ratio					0.32							0.05
Control Delay					10.4							0.2
Queue Delay					0.0							0.0
Total Delay					10.4							0.2
LOS					B							A
Approach Delay					10.4						0.2	
Approach LOS					B						A	
Queue Length 50th (m)					25.6							0.0
Queue Length 95th (m)					35.5							0.0
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)					1977							647
Starvation Cap Reductn					0							0
Spillback Cap Reductn					0							0
Storage Cap Reductn					0							0
Reduced v/c Ratio					0.32							0.05

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 37 (46%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.32
Intersection Signal Delay: 9.9 Intersection LOS: A
Intersection Capacity Utilization 43.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↱	
Traffic Volume (vph)	0	0	0	35	475	52	67	75	0	0	73	48
Future Volume (vph)	0	0	0	35	475	52	67	75	0	0	73	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99			1.00			0.99	
Frt					0.986						0.946	
Flt Protected					0.997			0.977				
Satd. Flow (prot)	0	0	0	0	3543	0	0	1877	0	0	1653	0
Flt Permitted					0.997			0.816				
Satd. Flow (perm)	0	0	0	0	3540	0	0	1565	0	0	1653	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					18						49	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		172.6			119.6			114.7			99.2	
Travel Time (s)		12.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	0	0	0	38	516	57	73	82	0	0	79	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	611	0	0	155	0	0	131	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Minimum Split (s)				27.3	27.3		27.3	27.3			27.3	
Total Split (s)				43.0	43.0		37.0	37.0			37.0	
Total Split (%)				53.8%	53.8%		46.3%	46.3%			46.3%	
Maximum Green (s)				37.7	37.7		31.7	31.7			31.7	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				15.0	15.0		15.0	15.0			15.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					37.7			31.7			31.7	
Actuated g/C Ratio					0.47			0.40			0.40	
v/c Ratio					0.36			0.25			0.19	

Lanes, Volumes, Timings
12: King St/King Street & Dalhousie St

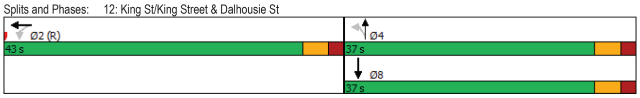
2051 AM Peak (1-Way) Queen Closed.syn
09-27-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					5.0			17.6			11.0	
Queue Delay					0.0			0.0			0.0	
Total Delay					5.0			17.6			11.0	
LOS					A			B			B	
Approach Delay					5.0			17.6			11.0	
Approach LOS					A			B			B	
Queue Length 50th (m)					6.4			15.4			7.7	
Queue Length 95th (m)					8.5			28.2			18.3	
Internal Link Dist (m)		148.6			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)					1677			620			684	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.36			0.25			0.19	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 43 (54%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.36
Intersection Signal Delay: 8.0 Intersection LOS: A
Intersection Capacity Utilization 68.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 12: King St/King Street & Dalhousie St



Lanes, Volumes, Timings
2: Colborne St & King St

2051 PM Peak (1-Way) Queen Closed.syn
09-27-2022

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	125	631	0	0	179	0
Future Volume (vph)	125	631	0	0	179	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.992			0.950	
Satd. Flow (prot)	0	3550	0	0	1789	0
Flt Permitted		0.992			0.950	
Satd. Flow (perm)	0	3550	0	0	1789	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		127.5	121.5		114.7	
Travel Time (s)		9.6	9.1		8.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	686	0	0	195	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	822	0	0	195	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 37.7% ICU Level of Service A
Analysis Period (min) 15

HCM Signalized Intersection Capacity Analysis
12: King St/King Street & Dalhousie St

2051 AM Peak (1-Way) Queen Closed.syn
09-27-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↱			↰			↱	
Traffic Volume (vph)	0	0	0	35	475	52	67	75	0	0	73	48
Future Volume (vph)	0	0	0	35	475	52	67	75	0	0	73	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	
Lane Util. Factor					0.95			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.99	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.99			1.00			0.95	
Flt Protected					1.00			0.98			1.00	
Satd. Flow (prot)					3540			1874			1654	
Flt Permitted					1.00			0.82			1.00	
Satd. Flow (perm)					3540			1566			1654	
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)	0	0	0	38	516	57	73	82	0	0	79	52
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	30	0
Lane Group Flow (vph)	0	0	0	0	601	0	0	155	0	0	101	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Actuated Green, G (s)					37.7			31.7			31.7	
Effective Green, g (s)					37.7			31.7			31.7	
Actuated g/C Ratio					0.47			0.40			0.40	
Clearance Time (s)					5.3			5.3			5.3	
Lane Grp Cap (vph)					1668			620			655	
v/s Ratio Prot											0.06	
v/s Ratio Perm					0.17			c0.10				
v/c Ratio					0.36			0.25			0.15	
Uniform Delay, d1					13.5			16.2			15.5	
Progression Factor					0.33			1.00			1.00	
Incremental Delay, d2					0.6			1.0			0.5	
Delay (s)					5.0			17.1			16.0	
Level of Service					A			B			B	
Approach Delay (s)		0.0			5.0			17.1			16.0	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
2: Colborne St & King St

2051 PM Peak (1-Way) Queen Closed.syn
09-27-2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (veh/h)	125	631	0	0	179	0
Future Volume (Veh/h)	125	631	0	0	179	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	136	686	0	0	195	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)		127				
pX, platoon unblocked						
vC, conflicting volume	0				615	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				615	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				50	100
cM capacity (veh/h)	1622				388	1084

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total	365	457	195
Volume Left	136	0	195
Volume Right	0	0	0
cSH	1622	1700	388
Volume to Capacity	0.08	0.27	0.50
Queue Length 95th (m)	2.1	0.0	20.7
Control Delay (s)	3.2	0.0	23.3
Lane LOS	A		C
Approach Delay (s)	1.4		23.3
Approach LOS			C

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
3: Colborne St & Queen St

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Traffic Volume (vph)	0	810	0	0	0	0
Future Volume (vph)	0	810	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	0	3614	0	0	1902	0
Flt Permitted						
Satd. Flow (perm)	0	3614	0	0	1902	0
Link Speed (k/h)		48	48		48	
Link Distance (m)		121.5	183.0		113.0	
Travel Time (s)		9.1	13.7		8.5	
Confl. Bikes (#/hr)						4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	0	880	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	880	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
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	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24			14	24	14
Sign Control		Stop	Stop		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 48.1% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
3: Colborne St & Queen St

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑			↰	
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	810	0	0	0	0
Future Volume (vph)	0	810	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	880	0	0	0	0

Direction, Lane #	EB 1	EB 2	SB 1
Volume Total (vph)	293	587	0
Volume Left (vph)	0	0	0
Volume Right (vph)	0	0	0
Hadj (s)	0.02	0.02	0.00
Departure Headway (s)	4.5	4.5	5.5
Degree Utilization, x	0.37	0.74	0.00
Capacity (veh/h)	792	784	631
Control Delay (s)	8.9	17.8	8.5
Approach Delay (s)	14.8		0.0
Approach LOS	B		A

Intersection Summary			
Delay	14.8		
Level of Service	B		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱			↰			↑	↱
Traffic Volume (vph)	0	0	0	0	745	34	0	0	0	0	0	76
Future Volume (vph)	0	0	0	0	745	34	0	0	0	0	0	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00							0.97
Frt					0.993							0.850
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3613	0	0	1921	0	0	1921	1601
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3613	0	0	1921	0	0	1921	1551
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9							127
Link Speed (k/h)		48			50			48			48	
Link Distance (m)		119.6			182.0			113.0			100.2	
Travel Time (s)		9.0			13.1			8.5			7.5	
Confl. Peds. (#/hr)				25		30	17		23	23		17
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%	0%	0%	0%	0%	0%	2%
Adj. Flow (vph)	0	0	0	0	810	37	0	0	0	0	0	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	847	0	0	0	0	0	0	83
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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type					NA							Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Minimum Split (s)				26.3	26.3		26.3	26.3			26.3	26.3
Total Split (s)				48.0	48.0		32.0	32.0			32.0	32.0
Total Split (%)				60.0%	60.0%		40.0%	40.0%			40.0%	40.0%
Maximum Green (s)				42.7	42.7		26.7	26.7			26.7	26.7
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	3.3
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	2.0
Lost Time Adjust (s)					0.0			0.0			0.0	0.0
Total Lost Time (s)					5.3			5.3			5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	7.0
Flash Dont Walk (s)				14.0	14.0		14.0	14.0			14.0	14.0
Pedestrian Calls (#/hr)				0	0		0	0			0	0

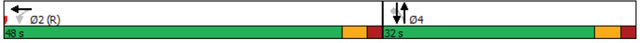
Lanes, Volumes, Timings
11: Queen St/Queen Street & Dalhousie St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)					42.7							26.7
Actuated g/C Ratio					0.53							0.33
v/c Ratio					0.44							0.14
Control Delay					12.1							2.0
Queue Delay					0.0							0.0
Total Delay					12.1							2.0
LOS					B							A
Approach Delay					12.1						2.0	
Approach LOS					B						A	
Queue Length 50th (m)					38.0							0.0
Queue Length 95th (m)					51.0							4.0
Internal Link Dist (m)		95.6			158.0			89.0			76.2	
Turn Bay Length (m)												
Base Capacity (vph)					1932							602
Starvation Cap Reductn					0							0
Spillback Cap Reductn					0							0
Storage Cap Reductn					0							0
Reduced v/c Ratio					0.44							0.14

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 37 (46%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 11.2 Intersection LOS: B
Intersection Capacity Utilization 48.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 11: Queen St/Queen Street & Dalhousie St



HCM Signalized Intersection Capacity Analysis — 2051 PM Peak (1-Way) Queen Closed.syn
11: Queen St/Queen Street & Dalhousie St

09-27-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↑↱			↰↑			↑	↱
Traffic Volume (vph)	0	0	0	0	745	34	0	0	0	0	0	76
Future Volume (vph)	0	0	0	0	745	34	0	0	0	0	0	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3							5.3
Lane Util. Factor					0.95							1.00
Frpb, ped/bikes					1.00							0.97
Flpb, ped/bikes					1.00							1.00
Frt					0.99							0.85
Flt Protected					1.00							1.00
Satd. Flow (prot)					3614							1551
Flt Permitted					1.00							1.00
Satd. Flow (perm)					3614							1551
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)	0	0	0	0	810	37	0	0	0	0	0	83
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	55
Lane Group Flow (vph)	0	0	0	0	843	0	0	0	0	0	0	28
Confl. Peds. (#/hr)				25		30	17		23	23		17
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Turn Type					NA							Perm
Protected Phases					2			4			4	
Permitted Phases				2			4					4
Actuated Green, G (s)					42.7							26.7
Effective Green, g (s)					42.7							26.7
Actuated g/C Ratio					0.53							0.33
Clearance Time (s)					5.3							5.3
Lane Grp Cap (vph)					1928							517
v/s Ratio Prot					c0.23							
v/s Ratio Perm												c0.02
v/c Ratio					0.44							0.05
Uniform Delay, d1					11.3							18.1
Progression Factor					1.00							1.00
Incremental Delay, d2					0.7							0.2
Delay (s)					12.1							18.3
Level of Service					B							B
Approach Delay (s)		0.0			12.1			0.0			18.3	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings — 2051 PM Peak (1-Way) Queen Closed.syn
12: King St/King Street & Dalhousie St

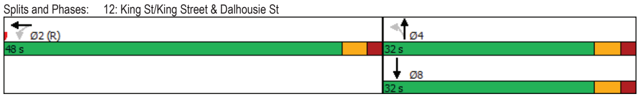
09-27-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					3.2			19.9			11.0	
Queue Delay					0.1			0.0			0.0	
Total Delay					3.3			19.9			11.0	
LOS					A			B			B	
Approach Delay					3.3			19.9			11.0	
Approach LOS					A			B			B	
Queue Length 50th (m)					6.8			10.1			6.2	
Queue Length 95th (m)					9.6			20.5			17.6	
Internal Link Dist (m)		148.6			95.6			90.7			75.2	
Turn Bay Length (m)												
Base Capacity (vph)					1906			554			586	
Starvation Cap Reductn					108			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.52			0.17			0.22	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 43 (54%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 5.5 Intersection LOS: A
Intersection Capacity Utilization 51.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 12: King St/King Street & Dalhousie St



Lanes, Volumes, Timings — 2051 PM Peak (1-Way) Queen Closed.syn
12: King St/King Street & Dalhousie St

09-27-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↑↱			↰↑			↑↱	
Traffic Volume (vph)	0	0	0	82	739	40	34	53	0	0	55	62
Future Volume (vph)	0	0	0	82	739	40	34	53	0	0	55	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00			1.00			0.99	
Frt					0.993						0.929	
Flt Protected					0.995			0.981				
Satd. Flow (prot)	0	0	0	0	3568	0	0	1885	0	0	1624	0
Flt Permitted					0.995			0.866				
Satd. Flow (perm)	0	0	0	0	3564	0	0	1661	0	0	1624	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9						67	
Link Speed (k/h)		50			50			48			48	
Link Distance (m)		172.6			119.6			114.7			99.2	
Travel Time (s)		12.4			8.6			8.6			7.4	
Confl. Peds. (#/hr)				6		15	4		9	9		4
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%	1%	0%	0%	0%	0%	0%	10%	8%
Adj. Flow (vph)	0	0	0	89	803	43	37	58	0	0	60	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	935	0	0	95	0	0	127	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	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Minimum Split (s)				27.3	27.3		27.3	27.3			27.3	
Total Split (s)				48.0	48.0		32.0	32.0			32.0	
Total Split (%)				60.0%	60.0%		40.0%	40.0%			40.0%	
Maximum Green (s)				42.7	42.7		26.7	26.7			26.7	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.0	2.0		2.0	2.0			2.0	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)				15.0	15.0		15.0	15.0			15.0	
Pedestrian Calls (#/hr)				0	0		0	0			0	
Act Effct Green (s)					42.7			26.7			26.7	
Actuated g/C Ratio					0.53			0.33			0.33	
v/c Ratio					0.49			0.17			0.22	

HCM Signalized Intersection Capacity Analysis — 2051 PM Peak (1-Way) Queen Closed.syn
12: King St/King Street & Dalhousie St

09-27-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↑↱			↰↑			↑↱	
Traffic Volume (vph)	0	0	0	82	739	40	34	53	0	0	55	62
Future Volume (vph)	0	0	0	82	739	40	34	53	0	0	55	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.3			5.3			5.3	
Lane Util. Factor					0.95			1.00			1.00	
Frpb, ped/bikes					1.00			1.00			0.99	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.99			1.00			0.93	
Flt Protected					1.00			0.98			1.00	
Satd. Flow (prot)					3566			1882			1624	
Flt Permitted					1.00			0.87			1.00	
Satd. Flow (perm)					3566			1662			1624	
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)	0	0	0	89	803	43	37	58	0	0	60	67
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	45	0
Lane Group Flow (vph)	0	0	0	0	931	0	0	95	0	0	82	0
Confl. Peds. (#/hr)				6		15	4		9	9		4
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	10%	8%
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2			4					
Actuated Green, G (s)					42.7			26.7			26.7	
Effective Green, g (s)					42.7			26.7			26.7	
Actuated g/C Ratio					0.53			0.33			0.33	
Clearance Time (s)					5.3			5.3			5.3	
Lane Grp Cap (vph)					1903			554			542	
v/s Ratio Prot											0.05	
v/s Ratio Perm					0.26			c0.06				
v/c Ratio					0.49			0.17			0.15	
Uniform Delay, d1					11.8			18.8			18.7	
Progression Factor					0.20			1.00			1.00	
Incremental Delay, d2					0.8			0.7			0.6	
Delay (s)					3.2			19.5			19.3	
Level of Service					A			B			B	
Approach Delay (s)		0.0			3.2			19.5			19.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			