354 King Street West, Hamilton, ON
Transportation Impact & Transportation Demand Management Study Update

Paradigm Transportation Solutions Limited

November 2020
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ptsl.com

Project Summary

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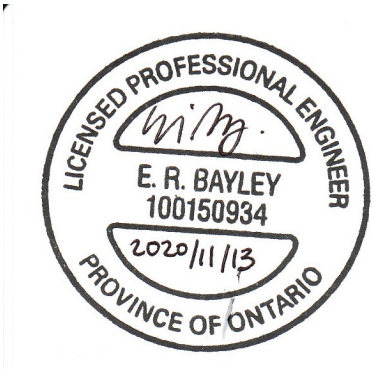
354 King Street West, Hamilton Transportation Impact & Transportation Demand Management Study Update

Signatures



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Executive Summary

Content

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Study (TIS) and Transportation Demand Management (TDM) study for the Official Plan and Zoning by-law amendment.

The study includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts, recommendations to improve future traffic conditions and strategies to reduce dependency on single occupancy vehicle travel through transportation demand management.

A 6-storey residential building and 10-storey hotel development is approved for 354 King Street West by the City of Hamilton; Site Plan Approval (File DA-18-096). Access to the development is proposed by two connections to King Street West, one connection to Queen Street North and one connection to Market Street. These access locations have been deemed acceptable by the City of Hamilton.

The Applicant is seeking an Official Plan and Zoning by-law amendment to the original plans to permit a 25-storey residential building and 12-storey hotel.

Conclusions

This study evaluated the transportation impacts associated within the construction of 154 hotel suites and 325 residential units on the northwest corner of King Street West and Queen Street North. The proposed development is projected to generate between 178 – 239 new vehicle trips during the peak hours. Vehicle access is proposed by four driveway connections to King Street West, Queen Street North, and Market Street. A preliminary review of the proposed driveway locations has also been undertaken:

- The full movement driveway connection (Driveway D) to Market Street is spaced between 60 m – 90 m from adjacent unsignalized intersections and is adequately positioned.
- The restricted driveway connections (Driveway A, B and C) will be spaced between 45 m to 90 m from the signalized intersection of King Street West and Queen Street and between 25 m to 95 m from adjacent unsignalized intersections. Given the limited frontage along King Street West and Queen Street North, and these driveways being restricted to right in/out, these driveways are forecast to operate efficiently and safely without any issues related to sightlines, corner clearance, access conflicts, heavy truck movements and transit operational conflicts.

Transportation Impacts

Detailed traffic analysis was conducted for each of the study area intersections under Base Year (2020) traffic conditions and 2027 Background and Total traffic conditions. As requested by the City of Hamilton, two scenarios for the 2027 horizon have been undertaken. An interim scenario that assumes Queen Street south of King Street West is converted to two-way operation and a secondary scenario that assumes rapid transit is implemented along King Street West. Based on traffic data and analyses completed, the following is noted:

- **King Street West at Queen Street** – Individual movements at the signalized intersection of Queen Street at King Street West operate at LOS C or better under the Base year traffic conditions. Under the 2027 interim and rapid transit scenario, increased delay is projected for a number of movements (with or without the development). A feasible improvement option would be optimizing signal timings to better reflect the changes in traffic patterns.

  In addition to the operation assessment, a queue assessment has been completed along Queen Street North. The 95th percentile queue length as reported by SimTraffic for the southbound approach is 51 metres under the interim scenario and 73 metres under the rapid transit scenario. The upstream unsignalized intersection of Queen Street and Market Street is located 75 metres and not anticipated to encounter vehicle blockages.

- **King Street West at Ray Street** – Individual movements at the unsignalized intersection of Ray Street at King Street West operate at LOS C or better under the Base year traffic conditions with similar operation expected under the 2027 interim scenario. However, under the 2027 rapid transit scenario, the intersection is expected to see increased delay and queue lengths for the southbound right turn movement during the weekday PM peak hour.

  Reviewing existing traffic volumes for this intersection notes the southbound right turn volume during the weekday PM peak hour is unusually high. As Ray Street North provides access to a predominately residential neighbourhood, the directional distribution of trips should have a higher number of inbound trips (i.e. vehicles returning home from work). However, the existing volumes suggest the opposite, with a higher number of outbound trips occurring. The high volume of southbound right turns is most likely a result of traffic travelling southbound on Queen Street North, cutting through the local roadways and continuing westward along King Street West to avoid delay at the signalized intersection of King Street West and Queen Street. The cut-through vehicles are most likely contributing to reduced capacity under the rapid transit scenario.

  A feasible improvement option to address cut-through traffic could be through a number of traffic calming measures. As these measures

have the potential to reduce traffic volumes along the area roadway, improved capacity and operations are expected to occur for the King Street West and Ray Street North intersection. As this is an existing issue, further review by the City of Hamilton is recommended.

- **Neighbourhood Impacts -** The local area intersection that will see the largest increase in traffic is Ray Street North at Market Street. With the expected increase in traffic due to development, there is a negligible increase in delay during the peak hours. In terms of traffic north of the study area, the additional traffic resulting from the proposed development is expected to be up to 25 vehicles during the respective peak hours. It is recognized that the development will increase traffic on the study area roadways and this traffic may be noticed by at least some of the adjacent residents who will perceive it to be a nuisance, however the increased traffic volumes are not expected to be sufficient that motorists will notice any major deterioration in level of service. However, based on feedback received from the area residents, the Applicant is proposing to implement the following initiatives:
  - implementing a number of Transportation Demand Management measures to curb the developments dependency towards vehicular traffic.
  - Traffic calming improvements along Ray Street, north of Market Street to discourage development traffic infiltrating the local roadway network.

Transportation Demand Management

The site plan proposes several TDM measures as identified by the City of Hamilton's TDM Guide for Development. These measures include:

- Sidewalk connections linking the dwelling units to the existing municipal sidewalks;
- Located adjacent to Light Rail Transit;
- 166 Long-term bicycle parking spaces;
- 5 Short-term bicycle parking spaces;
- Welcome packet provided to residents outlining schedules for local and regional transit services, bicycle and trail networks and the location of retail and recreational establishments;
- Unbundled parking for the residential units;
- Should the SOBI wish to locate a station on the property at their own expense, the development would work with SOBI to accommodate a mutual aggregable location; and
- Allocate two (2) surface parking spaces for the use of a carshare vehicle.

Recommendations

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

- City of Hamilton optimize signals at King Street West and Queen Street, if necessary, after occupancy to better support the future traffic volumes and travel patterns.
- City of Hamilton review traffic within the Strathcona neighbourhood to identify if cut-through traffic is occurring.
- The TDM strategies proposed and through design as outlined in Chapter 7 be implemented by the development to encourage sustainable travel modes.
- The Applicant provide traffic calming measures along Ray Street, north of Market Street to discourage development traffic infiltrating the local roadway network.

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1 Introduction

1.1 Overview

Paradigm Transportation Solutions Limited (Paradigm) was retained to conduct this Transportation Impact Study (TIS) and Transportation Demand Management (TDM) study for the Official Plan and Zoning by-law amendment.

The study includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts, recommendations to improve future traffic conditions and strategies to reduce dependency on single occupancy vehicle travel through transportation demand management.

A 6-storey residential building and 10-storey hotel development is approved for 354 King Street West by the City of Hamilton; Site Plan Approval (File DA-18-096). Access to the development is proposed by two connections to King Street West, one connection to Queen Street North and one connection to Market Street. These access locations have been deemed acceptable by the City of Hamilton.

The Applicant is seeking an Official Plan and Zoning by-law amendment to permit a 25-storey residential building and 12-storey hotel.

The proposed development is expected to be fully built and occupied in 2021. This study analyzes the study area road network under existing traffic conditions (2019), future background traffic conditions and, total traffic conditions for five (5) years beyond opening (2027). **Figure 1.1** illustrates the location of the proposed development.

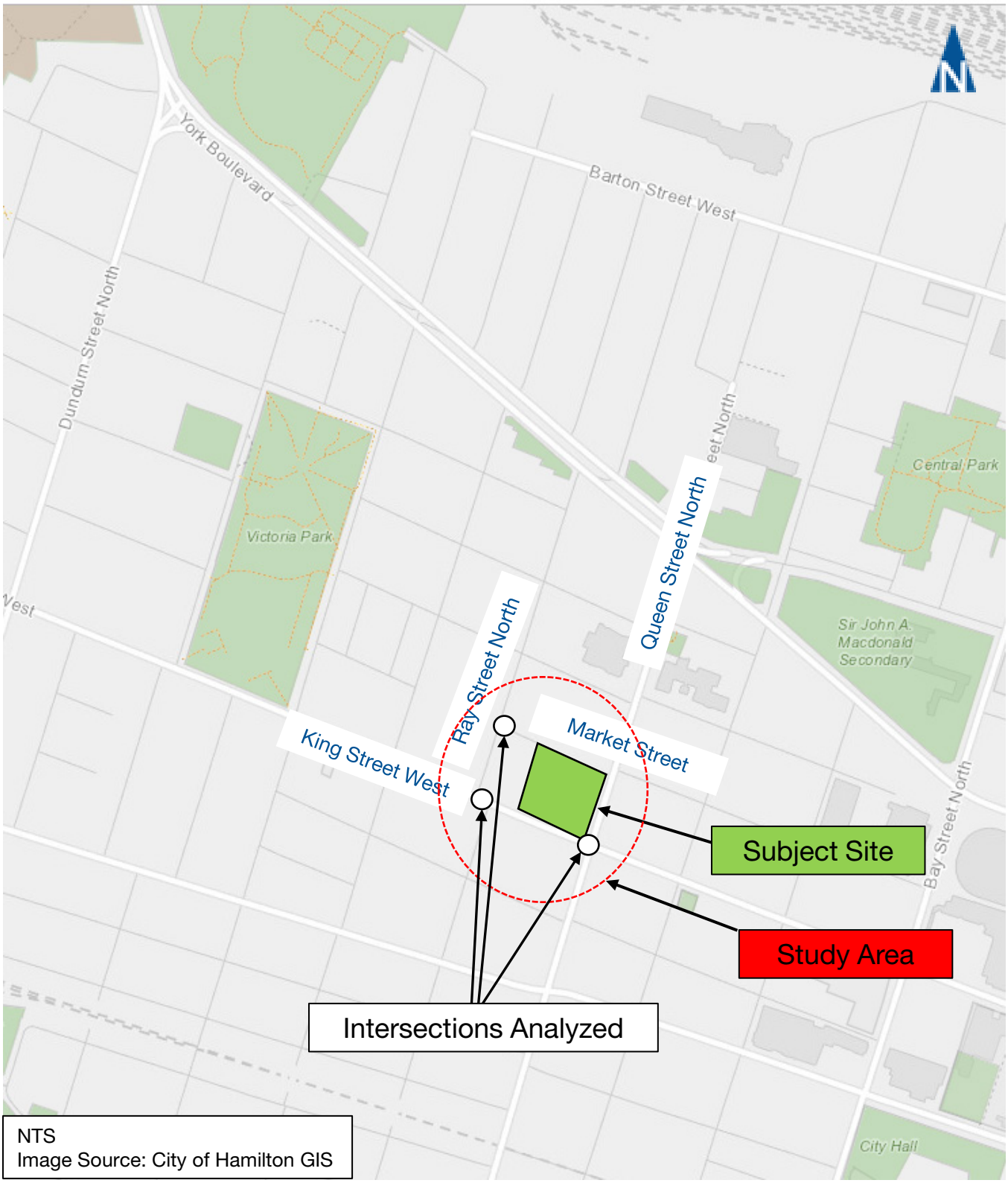

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Image Source: City of Hamilton GIS

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Subject Site Location

1.2 Scope and Study Area

The study has followed the City of Hamilton's Traffic Impact Study Guidelines[1] and terms of reference developed by Paradigm and approved by the City which can be found in **Appendix A** of the report. More specifically, the scope and intent of this study is to:

- Assessments of the current traffic and site conditions within the study area;
- Estimates of background traffic growth;
- Estimates of the additional traffic generated by the subject site;
- Analysis of the impact(s) of the future traffic on the surrounding road network
- Recommendations necessary to mitigate the site generated traffic in a satisfactory manner; and
- Identification and recommendations of Transportation Demand Management (TDM) measures specific to this site.

1.3 Study Area

Based on a review of the anticipated trip generation and trip distribution for the proposed development, a study area was established through consultation with the City. The project study area includes the following intersections:

- King Street West at Queen Street North/South (signalized);
- King Street West at Ray Street North/South (unsignalized);
- Market Street at Ray Street North (unsignalized); and
- Four (4) site driveways (unsignalized).

[1] Ministry of Transportation, Ontario – Traffic Impact Study Guideline (2014)

2 Existing Conditions

The existing conditions evaluation consisted of an inventory of the traffic control; roadway and intersection geometry in the study area and the collection of peak period traffic volumes.

2.1 Road Network

The main roadways within the study area are described below. **Figure 2.1** shows the existing geometry at they study area intersections.

- **King Street West** is an east-west four-lane major arterial road under City of Hamilton jurisdiction. The roadway operates with one-way operation in the westbound direction and is a designated truck route. In the study area, on-street parking is permitted on the north side of the roadway and sidewalks are provided on both sides of the roadway. The speed limit is 50 kilometres per hour.
- **Queen Street North** is a north-south three-lane minor arterial roadway under City of Hamilton jurisdiction. The roadway operates with one-way operation in the southbound direction and is a designated truck route north of King Street West. In the study area, on-street parking is permitted on the east side of the roadway and sidewalks are provided on both sides of the roadway. The speed limit is 50 kilometres per hour.
- **Ray Street North** is a north-south two-lane local roadway under City of Hamilton jurisdiction. In the study area, on-street parking is permitted on the west side of the roadway and sidewalks are provided on both sides of the roadway. The speed limit is 40 kilometres per hour.
- **Market Street** is an east-west two-lane local roadway under City of Hamilton jurisdiction. In the study area, on-street parking is permitted on the south side of the roadway and sidewalks are provided on both sides of the roadway. The speed limit is 40 kilometres per hour.

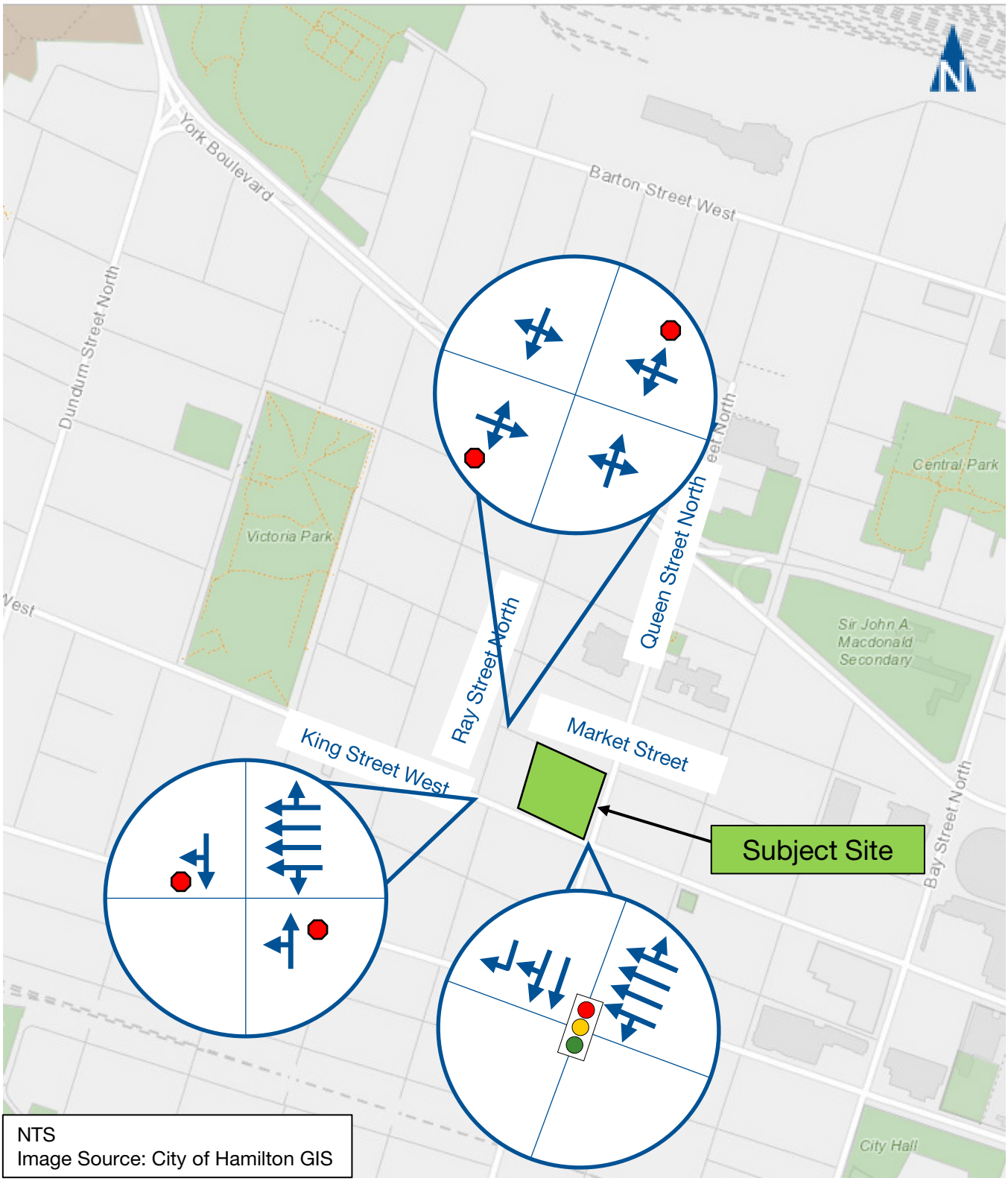

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Image Source: City of Hamilton GIS

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Existing Lane Configuration

2.2 Existing Transit Service

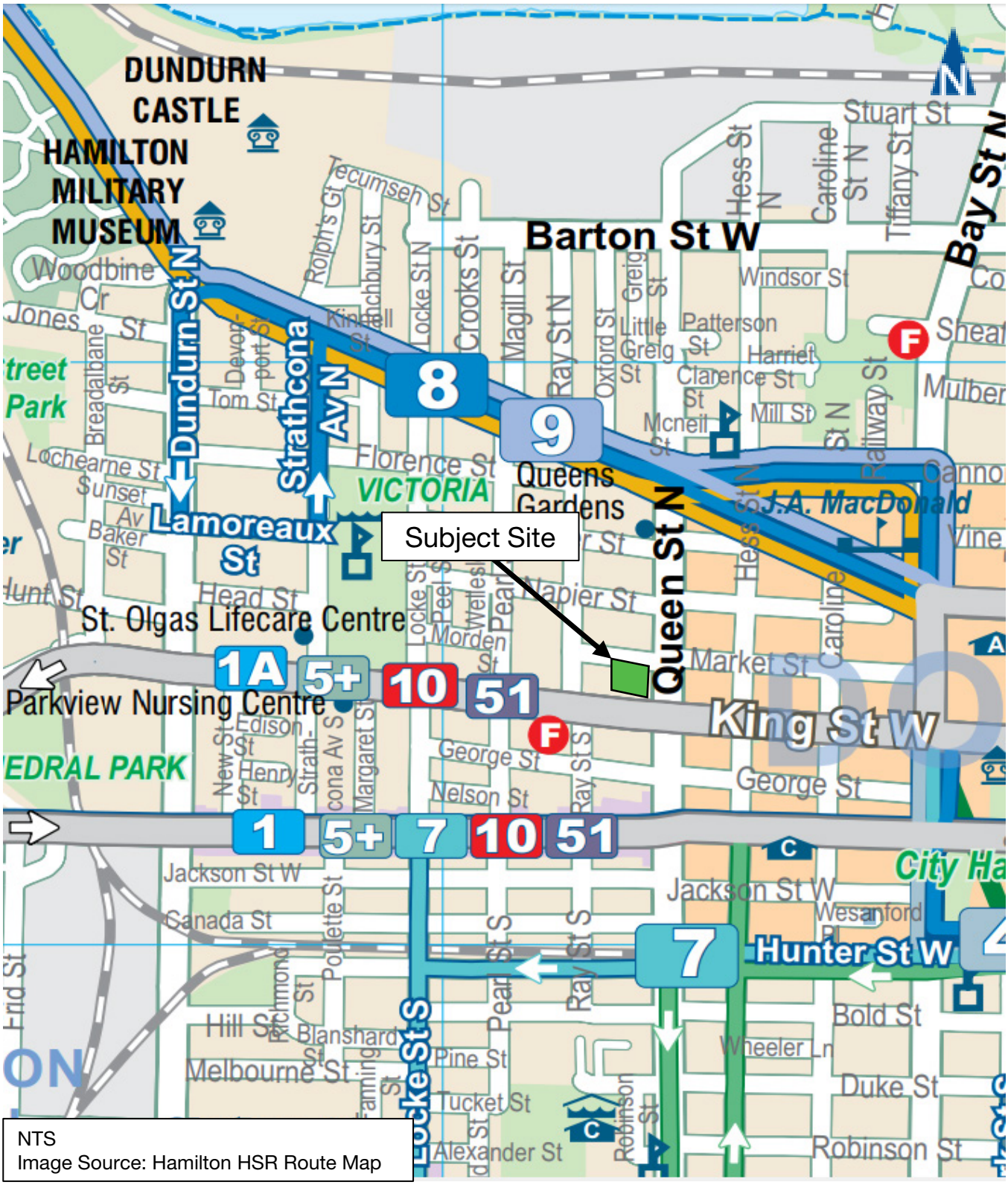
2.2.1 Hamilton Street Railway

Hamilton Street Railway (HSR) owns and operates the public transit system in Hamilton, Ontario. The development is located between Main Street West and King Street West which provide access to five separate transit routes. In addition, the development is 1.1 kilometres (less than 15-minute walk) to the MacNab Street Bus Terminal which provides significant access to all local routes. The five transit routes are noted as follows:

- **Route 1 (King):** This bus route serves lower Hamilton in an east-west direction from McMaster Medical Centre to Eastgate Square. Monday to Sunday service is operated from early morning until after midnight.
- **Route 5 (Delaware):** This bus route serves east-west lower Hamilton including Dundas, Ancaster, and Stoney Creek. Monday to Sunday service is operated from early morning until after midnight.
- **Route 7 (Locke):** This bus route is both an east-west and a north-south route servicing the south-west end of the city from Downtown. Monday to Sunday service is operated from early morning until after midnight.
- **Route 10 (B Line Express):** This bus route is an east-west route traveling from University Plaza to Eastgate Square. Monday to Sunday service is operated from early morning until after midnight.
- **Route 51 (University):** This bus route travels east-west from Downtown Hamilton to the west Hamilton Loop. This route operates from the beginning of September to the end of April six days a week (Monday to Saturday).

All HSR transit routes are noted to be Accessible Low Floor (ALF) as the buses serve riders with at-grade entry/exit. Regularly scheduled public transit services are available for users of wheelchairs, scooters, and walkers, and buses are equipped with front bumper bicycle racks.

Figure 2.2 illustrates the existing transit network.



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Existing Transit Network

2.2.2 Rapid Transit

Future transit plans for the City include the implementation of rail transit corridors throughout the City. A total of five corridors will form Hamilton's "B-L-A-S-T" network:

- B-Line – McMaster University to Eastgate Square;
- L-Line – Downtown to Waterdown;
- A-Line – Downtown to Airport;
- S-Line – Centennial to Ancaster Business Park; and
- T-Line – Mohawk to Meadowlands.

The B-Line was identified in The Big Move, a Regional Transportation Plan, as a Metrolinx "priority" project. The project envisions rail transit between Eastgate Square and McMaster University via Downtown Hamilton along the Main Street/King Street corridor.

The Benefits Case Analysis (BCA) demonstrates this line will generate positive benefits for Hamilton and the region and will accommodate long-term travel demand growth in the corridor.

The first phase of the line will run from McMaster University to Eastgate Square[2] and will provide for 17 stops.

The proposed rapid transit line will link to GO Transit, VIA Rail services as well as walking and cycling trails to help provide sustainable transportation choices to residents of Hamilton. A stop for the rapid transit line could be located at the intersection of King Street and Queen Street; directly adjacent to the development.

Figure 2.3 illustrates a conceptual rapid transit route in relation to the proposed development.

[2] www.hamilton.ca/city-initiatives/prioritiy-projects/light-rail-transit-lrt

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Proposed Rail Transit Network
B-Line

2.3 Pedestrian and Cycling Environment

2.3.1 Pedestrians

Sidewalks are provided along both sides of streets throughout the study area.

Walk Score is an online tool that assigns a numerical walkability score between 0 and 100 for addresses in Australia, Canada, United States, and New Zealand. Walk Score ranks communities nationwide based on how many businesses, parks, theatres, schools, and other common destinations are within walking distance of any given address. Currently, the development is noted to have a Walk Score of 94 and is considered a "Walker's Paradise" which means daily errands do not require a personal vehicle[3].

The development is located within walking distance of numerous and significant employment, retail, cultural and recreational opportunities. This provides for a range of destinations for prospective residents of the proposed development that can be readily accessed without the use of a car. The development is, for instance, located approximately 1 kilometre (a 15-minute walk) of the employment and retail areas centred around the King Street West and James Street North/South intersection.

The proximity of the development to such a range of amenities and destinations within walking distance serves to reduce the need for residents and visitors of the development to travel on a regular basis using a car and, in fact, to own a vehicle.

2.3.2 Cycling

On-road cycling lanes are not provided on any of the roadways surrounding the development. The closet cycling infrastructure is a signed bike route on Napier Street and Market Street on the other side of Queen Street North . The nearest protect bike lanes are located on York Boulevard/Cannon Street West. Paradigm reviewed the City's Shifting Gears[4] cycling master plan to determine if cycling facilities are planned in the long term.

A review of this report further confirms that no on road bicycle facilities are planned in the study area.

Figure 2.4 illustrates the proposed cycling network near the development.

[3] www.walkscore.com/score/354-king-st-w-hamilton-on-canada
[4] Hamilton's Cycling Master Plan 2009, Prepared by for City of Hamilton, 2009.

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Image Source: Hamilton Cycling Map

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Existing Cycling Network

2.3.3 SOBI

The City of Hamilton, in partnership with Social Bicycles (SOBI), has implemented a bike share program. The bike share program provides bicycles at a number of locations across the Downtown area, including in close proximity to the development, for use by members of the program on a short-term rental basis.

Members can pick up and drop off bicycles at different bike share stations, as desired, providing convenient and ready access to an increasingly well used non-automotive travel mode. The availability of bicycles for use by residents of the building on a short-term rental basis supports the viability of bicycle travel as a convenient alternate travel mode option for people living within the proposed building and general area.

Figure 2.5 illustrates the bike share locations near the development.

2.4 Traffic Volumes

To assess intersection operations, turning movement counts are used to quantify the movement of vehicles. Existing traffic data at an intersection or on a road section forms the foundation for analysis. The counts are usually taken during peak periods to complete level of service analysis. **Table 2.1** outlines the counts utilized for the traffic analysis. **Appendix B** contains the traffic data.

TABLE 2.1: TRAFFIC DATA

Intersection	Type	Date	Conduced By
King Street West at Ray Street	Weekday Saturday	May 2019 May 2019	Paradigm Paradigm
King Street West at Queen Street	Weekday Saturday	December 2019 May 2019	City Paradigm
Ray Street North at Market Street	Weekday Saturday	May 2019 May 2019	Paradigm Paradigm

2.4.1 Adjustments

As the turning movement counts were conducted in 2019, the volumes have been factored to represent 2020 conditions using a 2.0% per annum growth rate. Further, as there are no major access points along King Street West between Ray Street and Queen Street, volume balancing has been applied. The 2019 weekday turning movement count at the intersection of King Street West and Queen Street was used as the reference intersection for adjustments. **Figure 2.6** illustrate the base year traffic volumes with adjustments incorporated as described herein.

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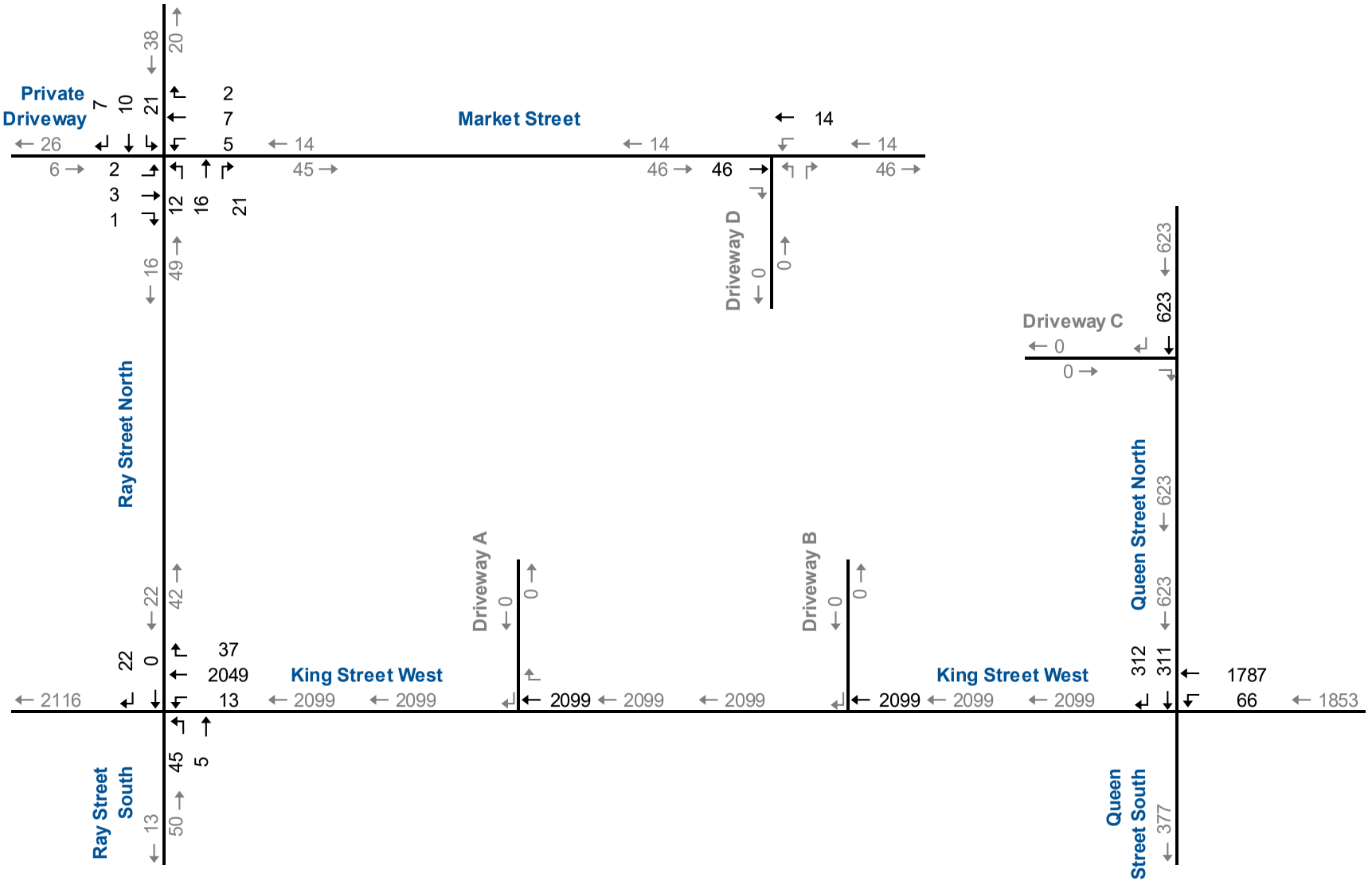
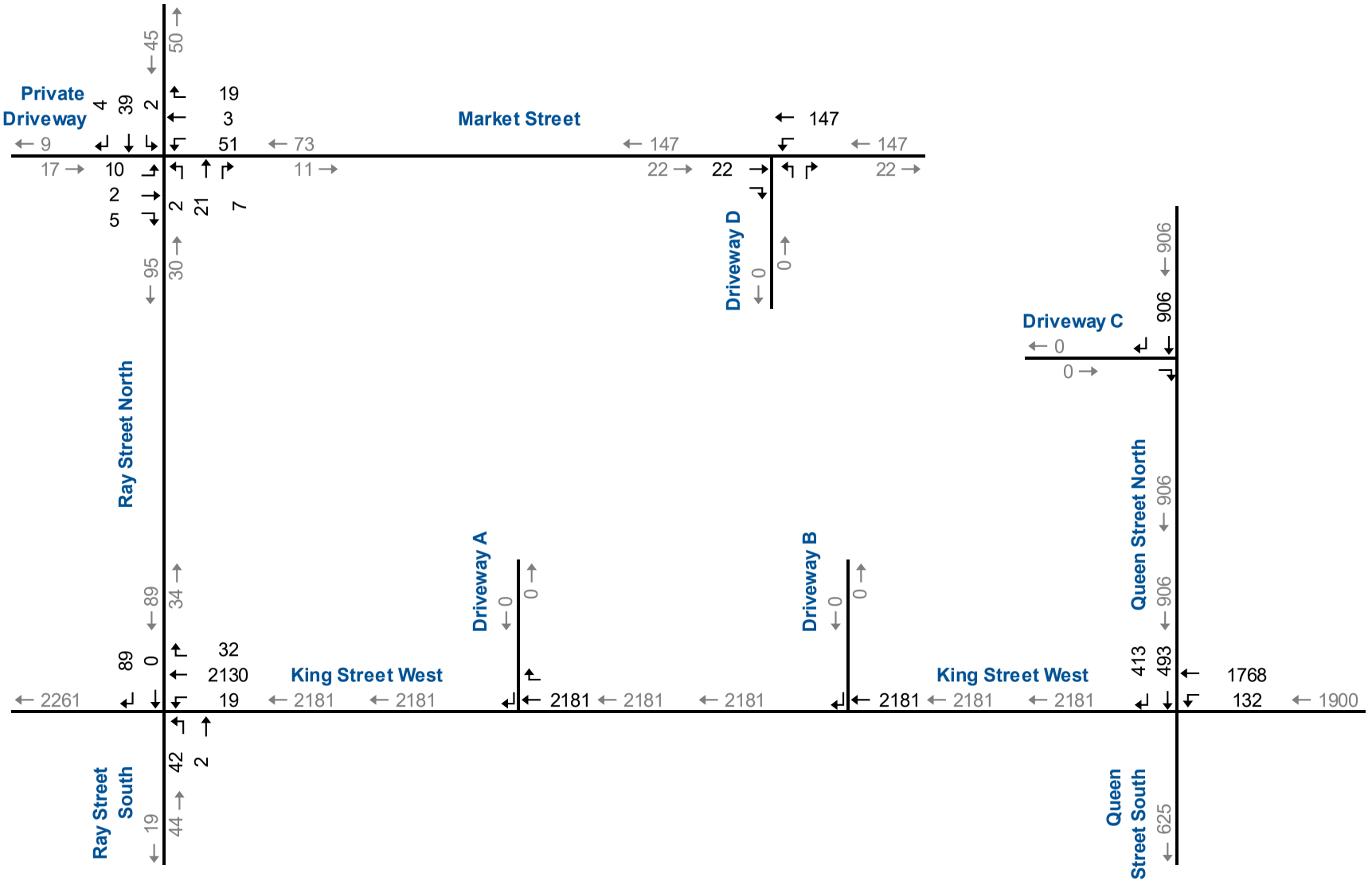
Image Source: SoBi Hamilton Network Map

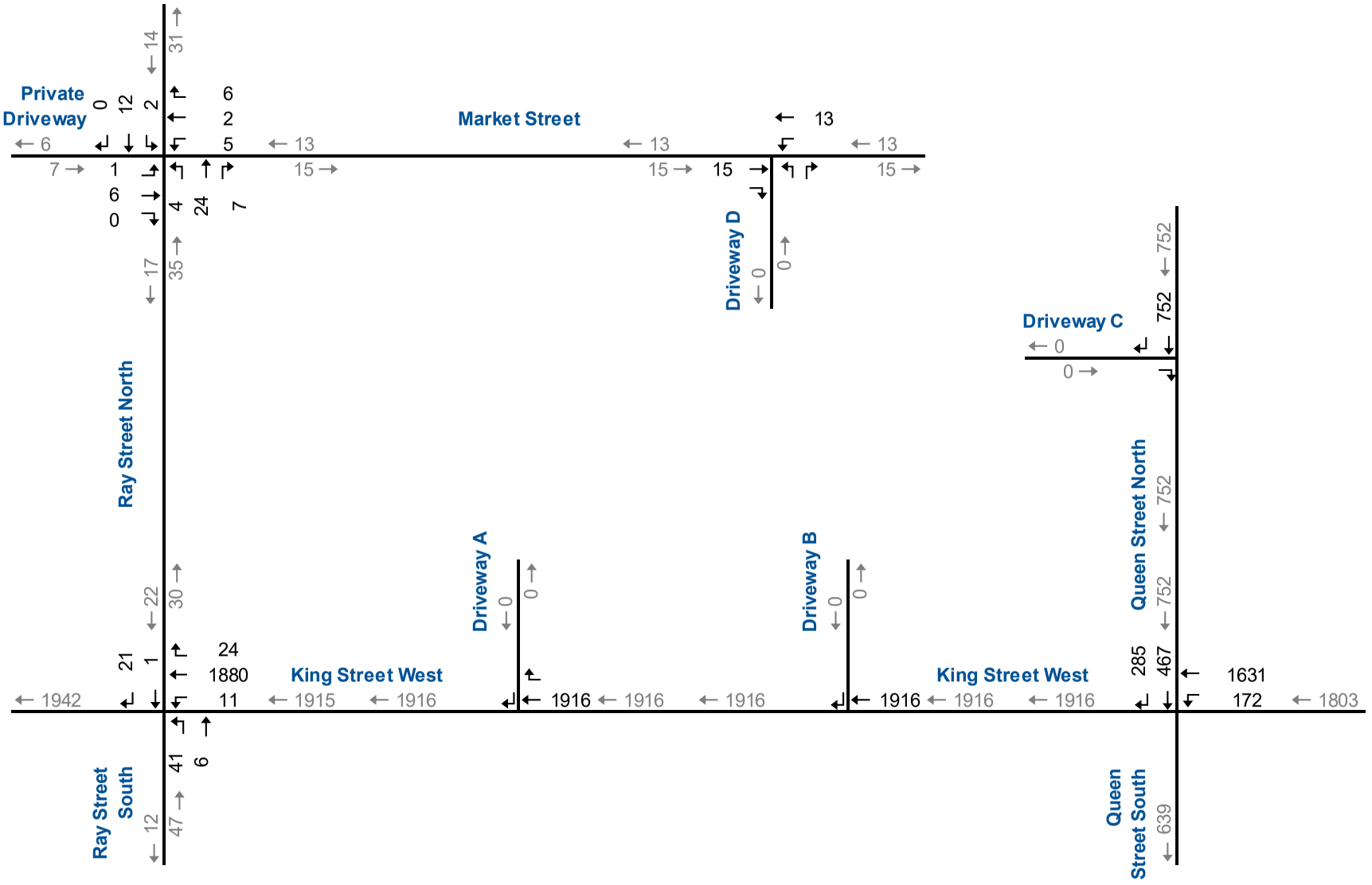
SoBi Hamilton Bikeshare Map



Base Year AM Peak Hour Traffic Volumes



Base Year PM Peak Hour Traffic Volumes



Base Year Sat. Peak Hour Traffic Volumes

3 Development Concept

3.1 Development Description

A 6-storey residential building and 10-storey hotel development is approved for 354 King Street West by the City of Hamilton; Site Plan Approval (File DA-18-096). The Applicant is seeking an Official Plan and Zoning by-law amendment to permit a 25-storey residential building and 12-storey hotel.

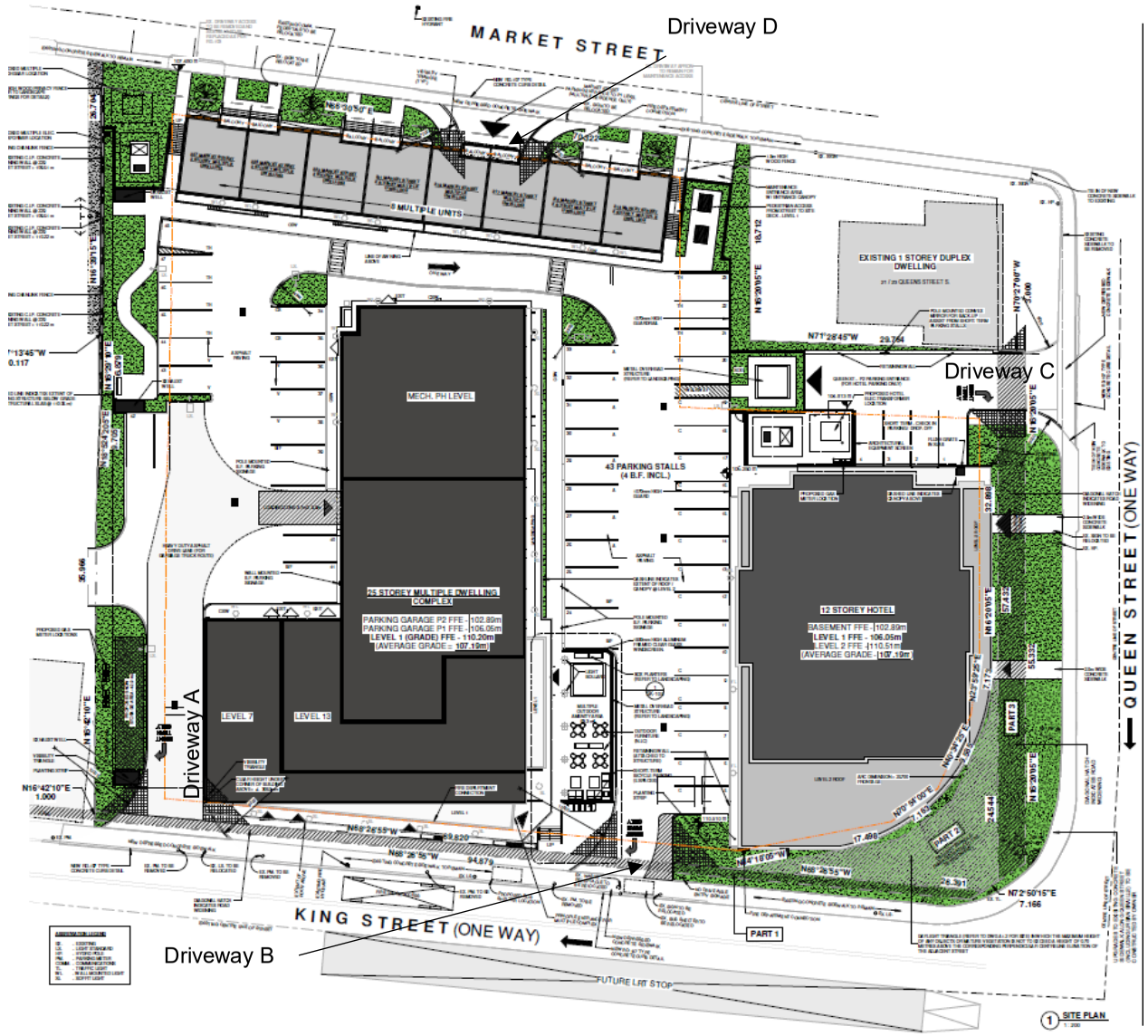
The development program entails a hotel for the eastern building pad, apartment residence for the western building pad and street townhouses along Market Street. The unit count for the development comprises of 154 hotel suites, 317 multiple dwelling units and 8 townhouses units. Build-out is proposed at or before 2022.

Vehicle access is proposed by four driveway connections to King Street West, Queen Street North, and Market Street. The primary driveways are as follows:

- **Driveway A** is located along King Street West approximately 90 metres west of the Queen Street intersection (curb radii to curb radii). Driveway A will be designed with a single inbound and outbound lane that will be restricted to right in/out operation. Driveway A will provide access to a surface parking area.
- **Driveway B** is located along King Street West approximately 45 metres west of the Queen Street intersection (curb radii to curb radii). Driveway B will be designed with a single outbound lane that will be restricted to right out operation. Driveway B will provide access to a surface parking area.
- **Driveway C** is located along Queen Street North approximately 55 metres north of the King Street West intersection (curb radii to curb radii). Driveway C will be designed with a single inbound and outbound lane that will be restricted to right in/out operation. Driveway C will provide access to the hotel's underground parking area.
- **Driveway D** is located along Market Street approximately 60 metres west of the Queen Street North intersection (curb radii to curb radii). Driveway D will be designed with a single inbound and outbound lane that will be restricted to right in/out operation. Driveway D will provide access to the residential building underground parking area.

A connection is proposed at the western edge of the property to provide internal connection to an adjacent property to the west (360-370 King Street West). As 360-370 King Street West presently does not have vehicle access to the external roadway network, and t avoid "land locking" 360-374 King Street West, the internal connection is required.

Figure 3.1 illustrates the development site plan.



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Site Plan

3.2 Access Review

Careful consideration to maintain the mobility in this area and accommodate development traffic is essential and is a vital element to the success of the project. Access management and corridor planning is largely a balancing act where safety and congestion issues must be addressed in the context of land use visions, economic development goals, environmental resource preservation, and funding constraints.

The proposed new driveway connections have been assessed to determine whether there are design issues and/or safety-related concerns that may be affected by the location, and whether an alternative location would be preferred from a design perspective. The key design issues to consider with respect to the driveway location are discussed in the sections below.

3.2.1 Sight Distance

The subject section of King Street West, Queen Street North and Market Street is relatively straight and flat, and consequently there are no sight distance issues with respect to the road geometry. Appropriate daylight triangles will need to be considered on the subject site.

3.2.2 Corner Clearance

The Transportation Association of Canada – Geometric Design Guide for Canadian Roads (TAC-GDGCR) has been reviewed to determine sufficiency of the corner clearance from a major intersection. The suggested corner clearances as stipulated by TAC are as follows:

- Arterials
  - 70 metres upstream and downstream of a signalized intersection;
  - 35 metres downstream of a stop-controlled intersection; and
  - 25 metres upstream of a stop-controlled intersection.
- Locals
  - 15 metres (curb radii to curb radii) downstream and upstream of a stop-controlled intersection.

The following is noted regarding the proposed driveways:

- Driveway A to King Street West is located at approximately 90 m from the through edge of Queen Street North and approximately 50 m from the through edge of Ray Street North. The clearances satisfy the requirements.
- Driveway B to King Street West is located at approximately 45 m from the through edge of Queen Street North and approximately 95 m from the through edge of Ray Street North. The clearances satisfy the

requirements from Ray Street North however the clearance from Queen Street North does not satisfy the required 70 m.

- Driveway C to Queen Street North is located at approximately 55 m from the through edge of King Street West and approximately 25 m from the through edge of Market Street. The clearances do not satisfy the requirement of 70 m from King Street West and 35 m from Market Street.
- Driveway D to Market Street is located at approximately 60 m from the through edge of Queen Street North and approximately 90 m from the through edge of Ray Street North. The clearances satisfy the requirements.

While these are suggested spacing distances; Driveway B and Driveway C will be limited to right in/out movements only and, the new connections are expected to operate in a sufficient manner as indicated by the traffic analysis in **Section 4**. The reduced corner clearance is not expected to create any operational issues. Additionally, access connections within 45 m of signalized intersections are common on the surrounding road network. Three examples are listed below:

- The access from the Tim Hortons located at 239 King Street West has approximately 38 m clearance from Caroline Street.
- The access from the La Luna restaurant located at 306 King Street West has approximately 25 m clearance from Queen Street North.
- The access from the A&W located at 194 King Street West has approximately 50 m clearance from Caroline Street.

3.2.3 Access Spacing

As TAC-GDGCR does not describe spacing criteria along arterial roadways, the Region of York's Access Guideline for Regional Roads has been referenced[5]. The minimum spacing between driveways is measured between the end and the start of the curb radii on the adjacent driveways.

For a typical arterial a minimum spacing of 40 metres is suggested for the separation of full-movement driveways whereas a reduced separation of 30-35 metres is suggested if one of the driveways has turning restrictions implemented. The proposed driveways along King Street West are separated by 45 metres and meets the spacing criteria for driveways.

[5] Access Guideline for Regional Roads, York Region, 2007

3.3 Lay-By

Curbside space, the access point between the road and the sidewalk, is increasingly in high-demand for a number of competing users including motor vehicle drivers, cyclists, transit, taxis, motor-coaches, couriers, other goods movement operators, parking (including accessible parking), Wheel-Trans, filming, food trucks, local businesses, and emergency services. These demands have increased with the recent rise in ecommerce and associated delivery systems[6].

As it is recognized that hotel guests will be arriving to check in prior to parking their vehicle, a future lay-by along Queen Street North could be considered within the City's Right of Way (ROW). Providing a lay-by is expected to reduce incident of vehicles illegally stopping and blocking lanes or, alternatively, circling around the block unnecessarily trying to locate a temporary parking area to complete the check in process. Additionally, with the growth of for-hire vehicle activity (uber, lyft, etc.) it is expected that hotel guests will be utilizing these services. The provision of a lay-by would be able to accommodate these users.

This is further echoed within the City of Hamilton's Transit Oriented Development (TOD) Guidelines[7]. The guidelines state that "Passenger drop-off zones may also be appropriate" in the immediate station area. As the lay-by is located to the north of a potential future rapid transit stop along King Street West, the provision of a lay-by is in keeping with the intent of the TOD guidelines.

[6] Curbside Management Strategy: Improving How Curbside Space is Used, November 2017, City of Toronto.
[7] Transit Oriented Development Guidelines, City of Hamilton, Background Paper on Transit Oriented Development, Volume 1, August 2010.

3.4 Development Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual[8] was used to estimate the peak hour traffic volumes that will be generated by this development. The description for the Land Use Codes (LUC) used in this study, as given by the Trip Generation Manual are as follows:

- **LUC 222 – Multifamily Housing (High-Rise)**: High-rise multifamily housing includes apartments, townhouses, and condominiums that have more than 10 levels (floors). They are likely to have one or more elevators.
- **LUC 220 – Multifamily Housing (Low-Rise)**: Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have one or two levels (floors).
- **LUC 310 – Hotel**: A hotel is a place of lodging that provides sleeping accommodations and supporting facilities such as restaurants, cocktail lounges, meeting and banquet rooms or convention facilities, limited recreational facilities (pool, fitness room), and/or other retail and service shops.

Table 3.1 summarizes the projected trip generation associated with the build-out of the development. These estimates were based on the standardized ITE rates without any modal split assumptions as directed by the City. As shown, with build-out of the development approximately 178 - 239 new trips during the respective peak hours are forecast to be added to the area roadways.

TABLE 3.1: TRIP GENERATION

Land Use	Units	AM Peak Hour				PM Peak Hour				Sat. Peak Hour			
		Rate	In	Out	Total	Rate	In	Out	Total	Rate	In	Out	Total
Multifamily Housing (High-Rise) (222)	317	Eqn.	24	78	**102**	Eqn.	71	45	**116**	Eqn.	67	55	**122**
Multifamily Housing (Low-Rise) (220)	8	Eqn.	1	3	**4**	Eqn.	4	2	**6**	0.7	3	3	**6**
Hotel (310)	154	0.47	42	30	**72**	0.60	47	45	**92**	0.72	62	49	**111**
Total Generation			**67**	**111**	**178**		**122**	**92**	**214**		**132**	**107**	**239**

Equations			
Peak Hour	AM Peak Hour	PM Peak Hour	Sat. Peak Hour
Multifamily Housing (High-Rise) (222)	T = 0.28(X) + 12.86	T = 0.34(X) + 8.56	T = 0.31(X) + 24.03
Multifamily Housing (Low-Rise) (220)	Ln(T) = 0.95 Ln(X) - 0.51	Ln(T) = 0.89 Ln(X) - 0.02	Not Used as Yields Negative Value

With the net new forecast volume of traffic traveling within the study area being determined, these new trips can be assigned to the surrounding roadway network as described in the following sections.

[8] Trip Generation Manual, 10th Edition, Institute of Transportation Engineers, 2017.

3.5 Development Trip Distribution and Assignment

The trip distribution for the hotel was developed based on the 2016 Transportation Tomorrow Survey (TTS). For the Hamilton Zones, the trip distribution was further refined based on existing travel patterns within the study area. The distribution takes into consideration the future roadway network as described in **Sub-Section 4.1.3.**

In terms of access to Highway 403, it is assumed:

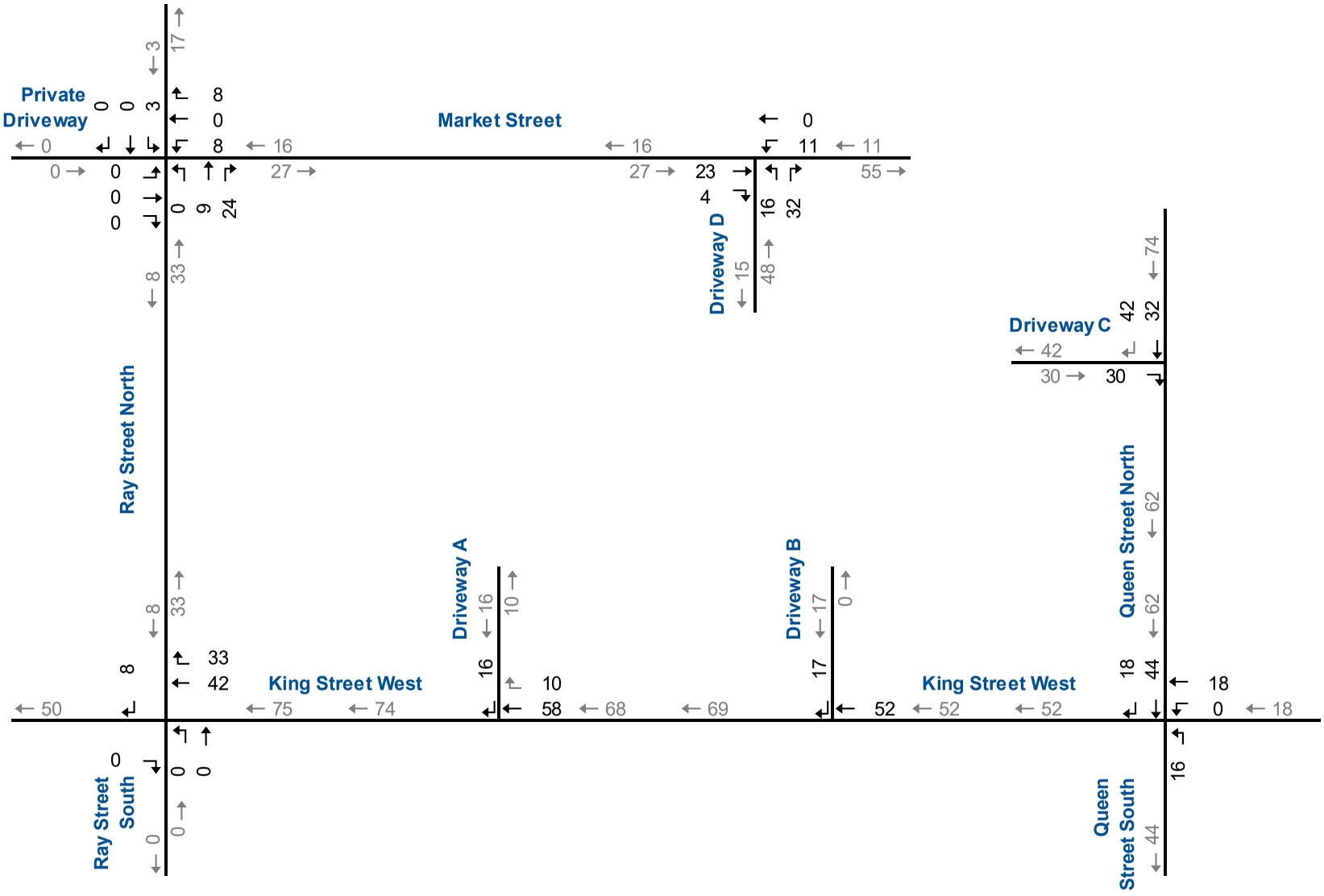
- Inbound vehicles travelling southbound along Highway 403 will utilize the York Boulevard ramp terminal and vehicles travelling northbound along Highway 403 will utilized the Main Street East ramp terminal.
- Outbound vehicles travelling southbound along Highway 403 will utilize the King Street West ramp terminal while vehicles travelling northbound along Highway 403 will utilize both the King Street and York Boulevard ramp terminals.

Table 3.2 summarizes the estimated trip distribution for the development.

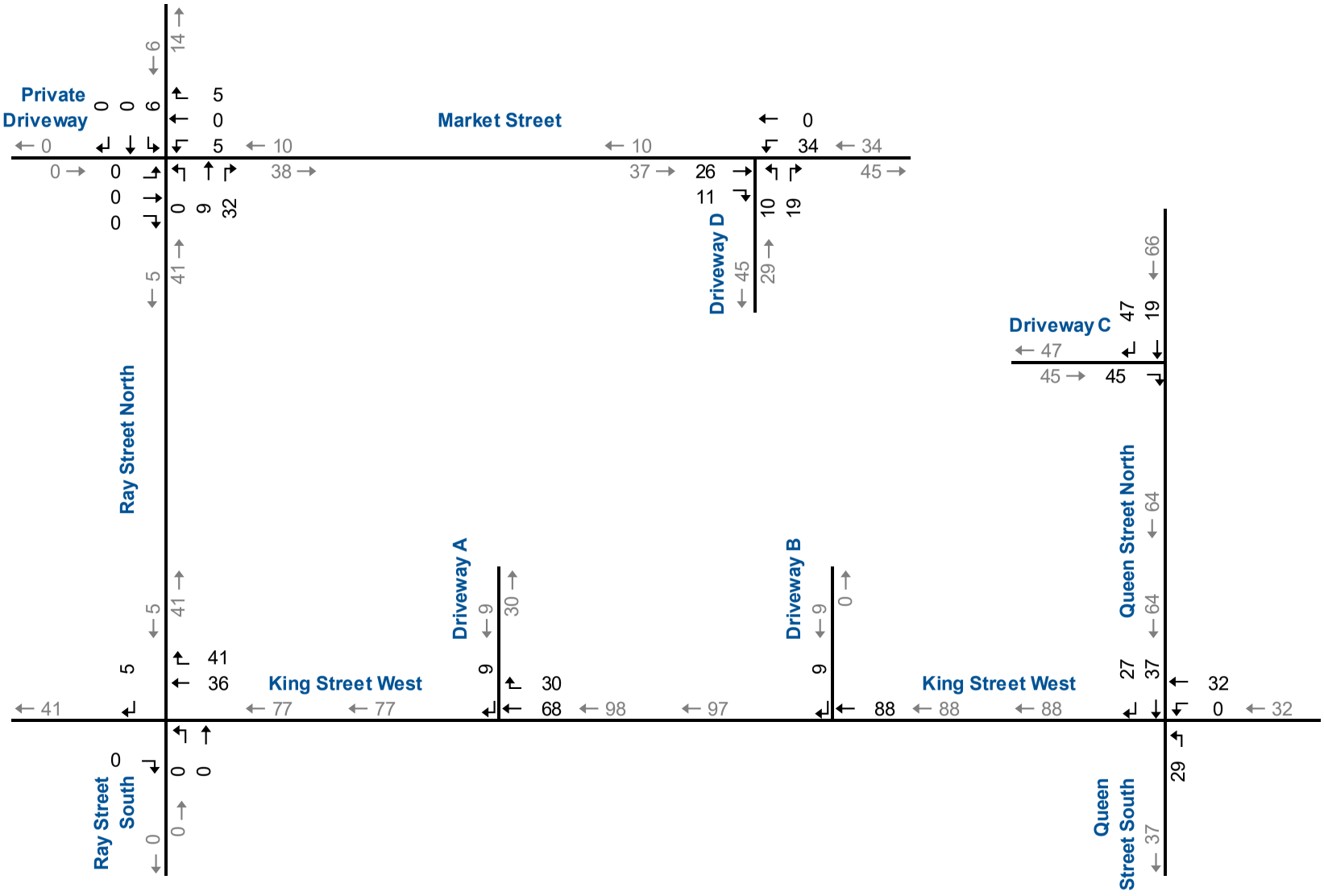
TABLE 3.2: TRIP DISTRIBUTION

Direction (To/From)	Travel Route	% Assigned To Route	
		In	Out
North	Ray Street North	5%	15%
	Queen Street North	45%	-
South	Queen Street South	24%	51%
East	King Street West	26%	-
West	King Street West	-	34%
Total		**100%**	**100%**

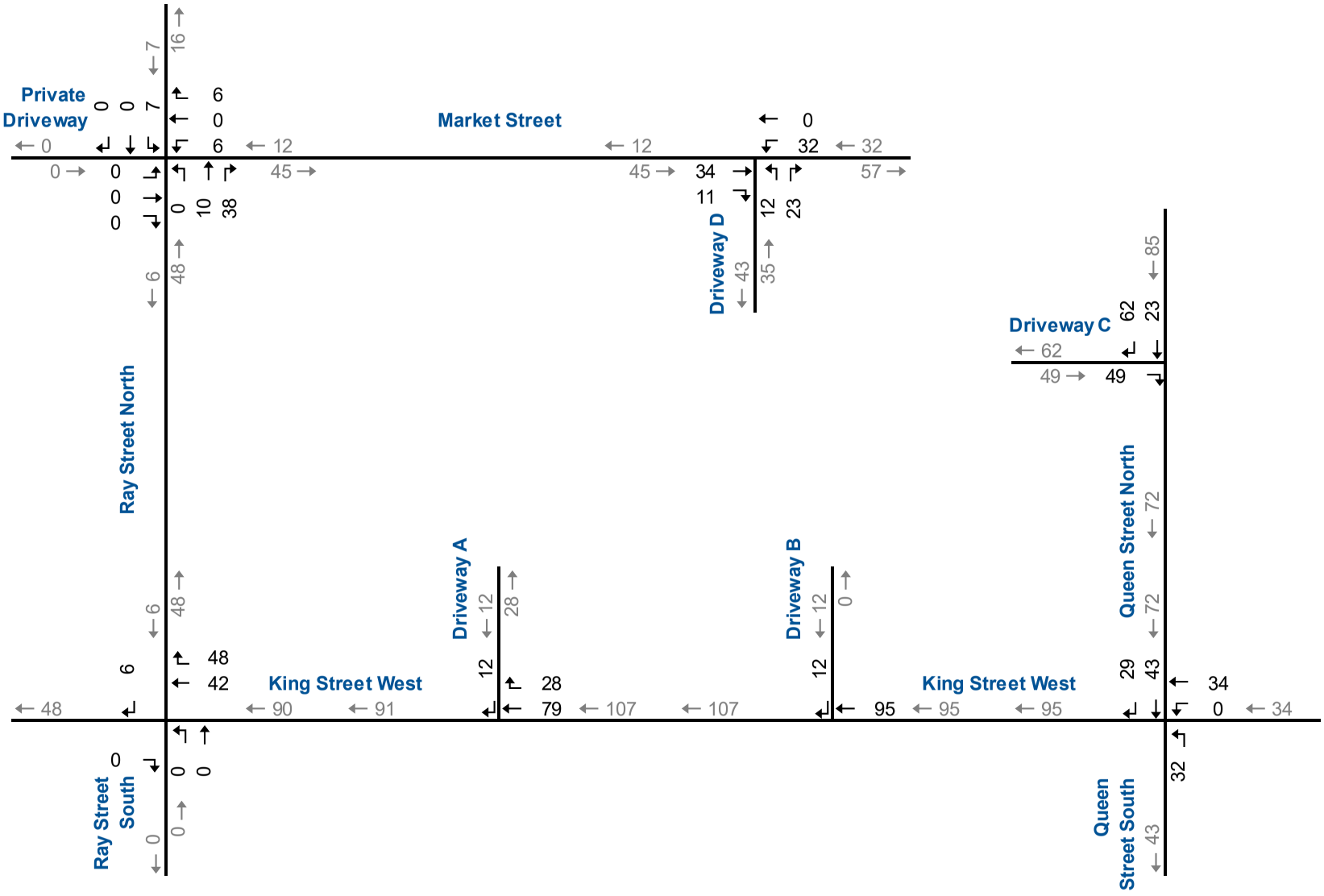
The peak hour site generated traffic volumes are illustrated in **Figures 3.2.** The trip distribution calculations are provided in **Appendix C**.



Development AM Peak Hour Traffic Volumes



Development PM Peak Hour Traffic Volumes



Development Sat. Peak Hour Traffic Volumes

4 Future Conditions

The assessment of future traffic conditions contained in this section includes estimates of future background and total traffic and analysis for the 2027 horizon. The future traffic volumes near the development will likely consist of increased non-development traffic volumes (background traffic), traffic generated by other developments, and the traffic forecast to be generated by the proposed development.

4.1 Background Traffic

4.1.1 General Growth

Based on discussions with City Staff a general growth rate of 2 percent was applied to the area roadways to account for population and employment growth.

4.1.2 Site Specific Growth

It was agreed with the City that traffic associated with 200 Market Street South and 15 Queen Street South developments are to be included in the background traffic projections. The development details are noted as follows:

- 200 Market Street South: 150 residential units and 2,053 square metres (22,098 square feet) of commercial space.
- 15 Queen Street South: 292 residential units and 197 square metres (2,120 square feet) of commercial space.

As Paradigm does not have access to these traffic studies, the trip generation has been calculated. The distribution followed the distribution outlined in **Table 3.2**. **Appendix D** provides the forecasts traffic volumes for the above noted development applications

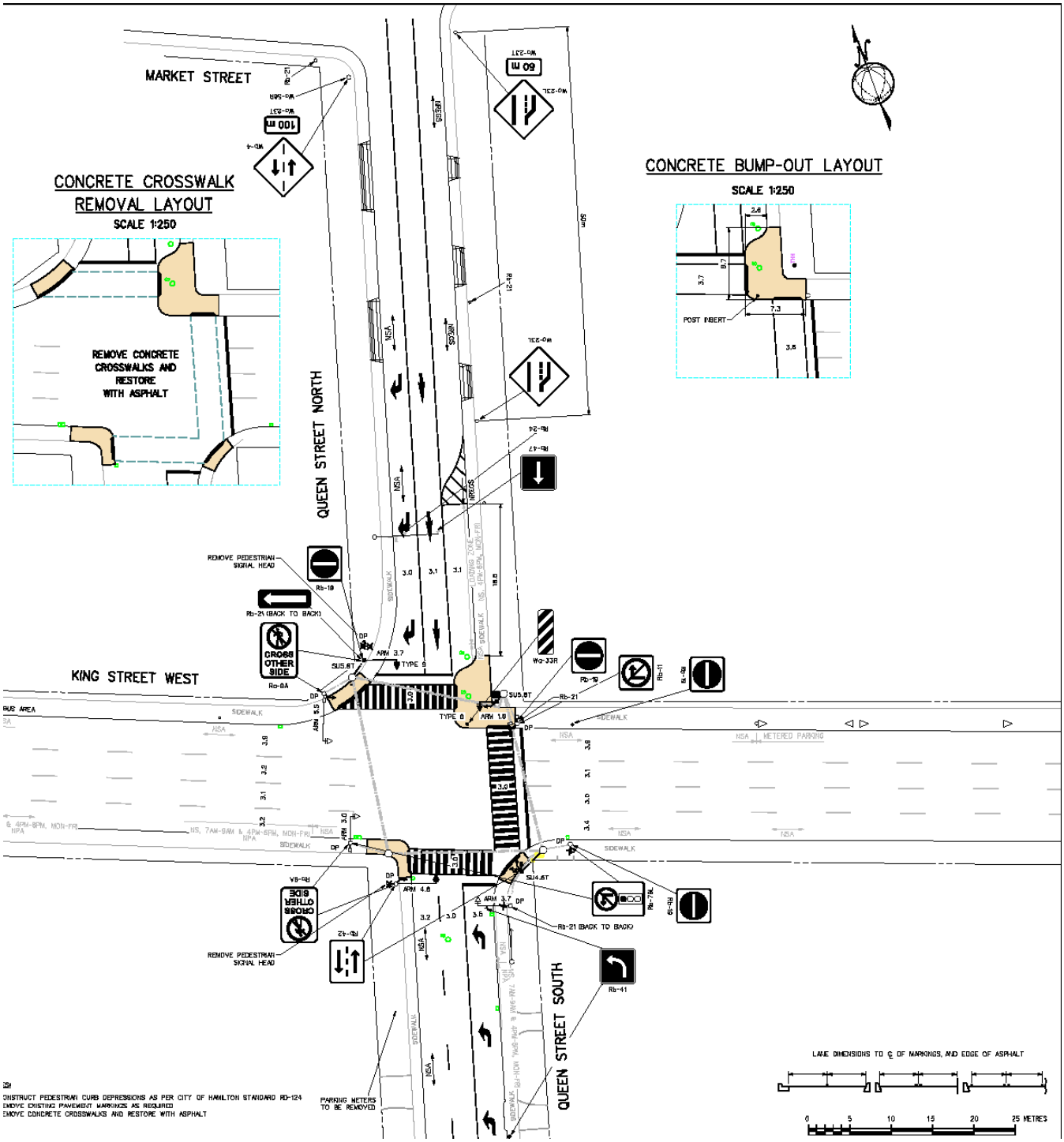
4.2 Roadway Network Changes

4.2.1 Interim Scenario

The proposed two-way conversion of Queen Street between King Street and Main Street is scheduled to occur at or before 2022 and needs to be reflected within the 2027 future horizon. With two-way conversion implemented, changes to the surrounding road network will be realized including the following changes to intersection of King Street West and Queen Street:

- One (1) southbound through lane;
- One (1) southbound right-turn lane; and
- One (1) northbound left-turn lane.

Figure 4.1 illustrates the lane configuration for the intersection of King Street West and Queen Street under the two-way traffic scenario.



King Street and Queen Street (Two-Way Conversion) Layout

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Figure 4.1

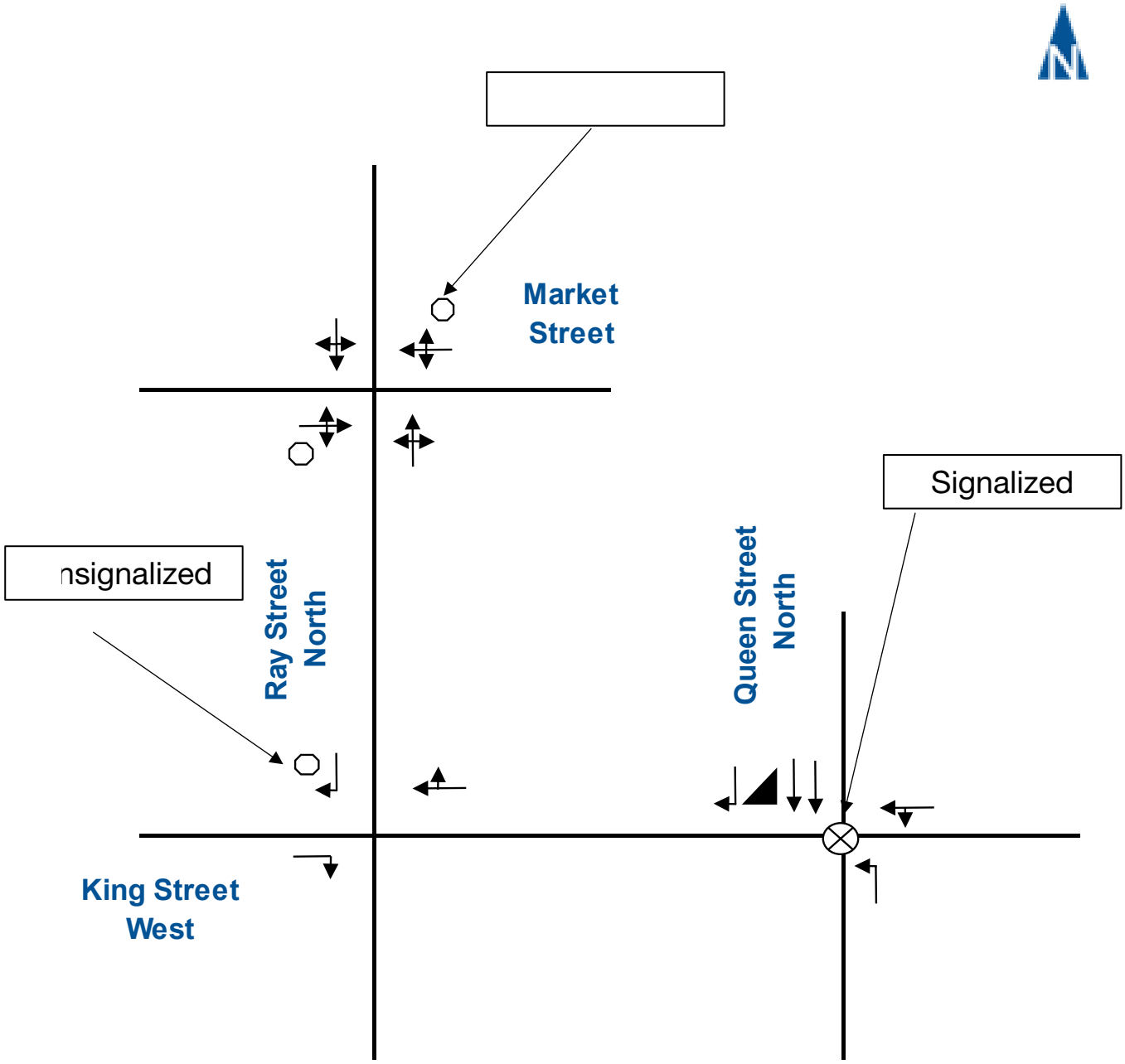
4.2.2 Rapid Transit Scenario

Rapid Transit along King Street West has been halted at the moment by the Provincial government as a result of the projected cost. Even though the project is paused at the moment, King Street West is still identified as a future rapid transit corridor within the City's long-term planning documents. As the City envisions rapid transit to be implemented in the near term, it is important to look at the future impacts of the area under the assumption that rapid transit will be operational.

As with the interim scenario, changes to the surrounding road network are expected to be created through the addition of rapid transit. Prior to the LRT project being halted, the City was well into design of the system and identified the following changes to the road network would occur:

- King Street West from Margaret Street to Ray Street North will have one (1) westbound traffic lane and one (1) eastbound traffic lane.
- Due to the alignment of the LRT, eastbound traffic on King Street West will be required to turn right and travel southbound on Ray Street North;
- King Street West from Ray Street North to Queen Street North will have one (1) westbound traffic lane on the north side;
- Queen Street North between Market Street and King Street West will have two (2) southbound through lanes plus a southbound channelized right turn lane to facilitate truck movements to King Street West;

Figure 4.2 illustrates the assumed roadway network with rapid transit provided along King Street West.



Assumed Rapid Transit Lane Configuration

Figure 4.2

4.3 Travel Pattern Adjustments

4.3.1 Interim Scenario

Once Queen Street South is converted to two-way traffic, traffic patterns will need to be adjusted to reflect the changed capacity and lane configuration of the network. The Queen Street South Conversion Report[9] provided guidance on how to account for the two-way conversion. The projected southbound traffic was inverted to represent the proportionate northbound volumes during the respective peak hours assuming two lanes southbound and one lane northbound.

As outlined in the conversion report, two-way traffic between King Street West and Herkimer Street is projected with a directional split of southbound to northbound as (AM - 72/28 and PM - 88/12). As the report did not provide any data for weekend volumes, it is assumed the Saturday peak hour would follow a similar trend as the PM peak hour.

4.3.2 Rapid Transit Scenario

As with the two-way conversion of Queen Street impacting traffic patterns, the implementation of rapid transit along King Street West will have a similar and more noticeable effect. Due to a reduction of capacity on King Street, some westbound traffic will divert onto parallel routes. Consequently, there are intersections along the rapid transit alignment that may end up with an improved level of service and traffic volumes are reduced and conflicted turns are removed.

The EMME plots as contained in the Hamilton Light Rail Transit (LRT) Environmental Project Report (EPR) Addendum[10] were used to develop the travel pattern adjustments assuming rapid transit is implemented along King Street West. The EMME traffic model includes AM and PM peak hour traffic assignment data for 2031 with and without the LRT implemented. As the forecasts only include AM and PM peaks, the PM peak has also been utilized for the Saturday scenario. The EMME link volumes with and without the LRT implemented were reviewed and utilized to account for the changes in traffic patterns. **Appendix E** illustrates the EMME forecasts.

As it is recognized that data from EMME model is not as necessarily accurate for individual movements; but rather, the model projects overall travel characteristics along transportation corridors, the adjustments have been further refined to be reflective of individual movements at the study area intersections. Furthermore, as the EMME plots do not take into account the conversion of Queen Street South to two-way traffic the methodology as

[9] Queen Street South One-Way to Two-Way Conversion Feasibility Study, King Street to Aberdeen Avenue, AECOM, June 2017

[10] City of Hamilton and Metrolinx Hamilton Light Rail Transit (LRT) Environmental Project Report (EPR) Addendum – Appendix E-2 Wider Area Impacts, Steer Davies Gleave & J. Bruin Associates Inc., February 2017.

outlined in sub-section 4.3.1 has been utilized to further adjust the traffic patterns to be reflective of two-way operation along Queen Street South.

4.4 Future Projections

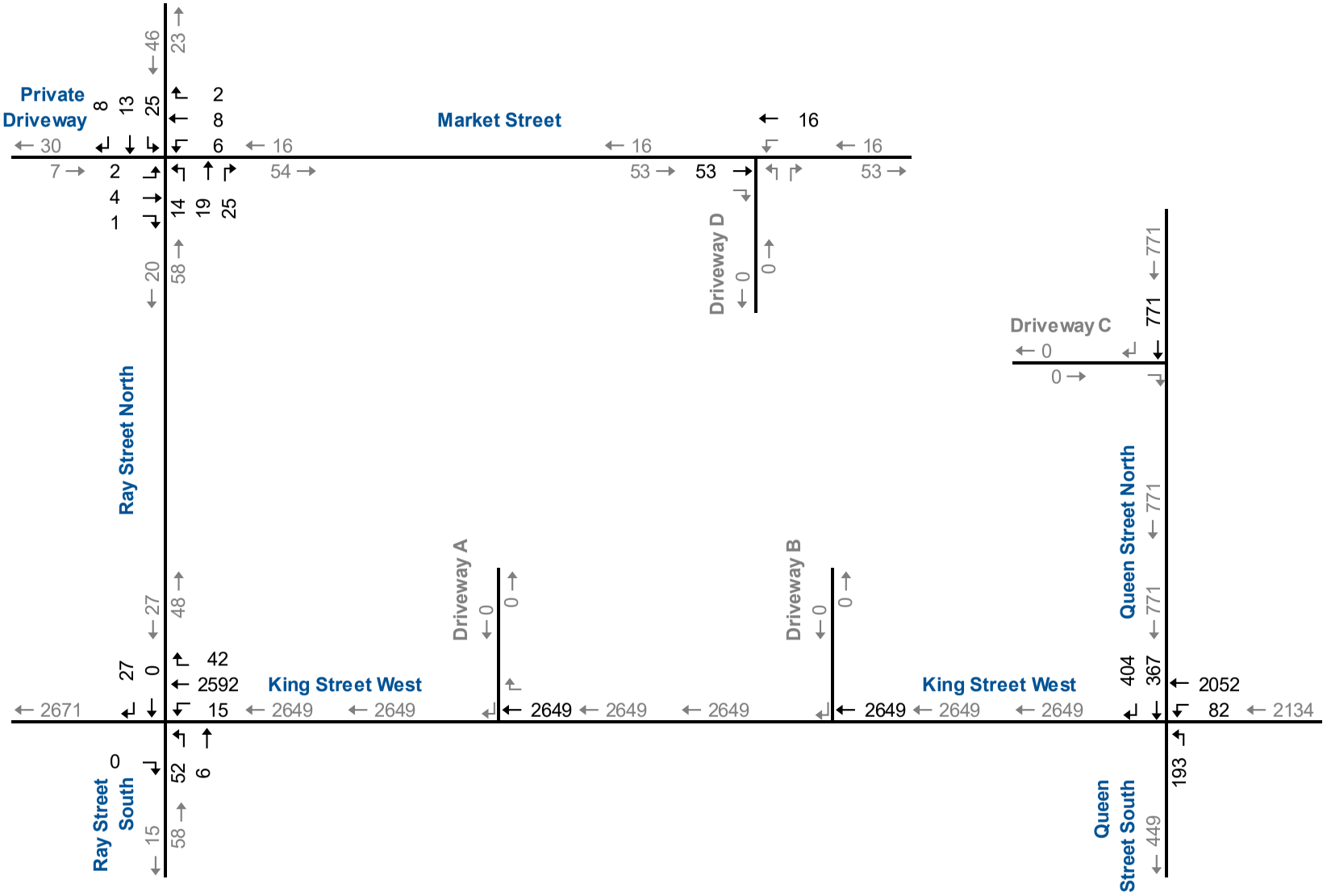
As noted above, two scenarios have been developed to assess the impacts to the study area roadways with and without rapid transit implemented.

4.4.1 Background Projections

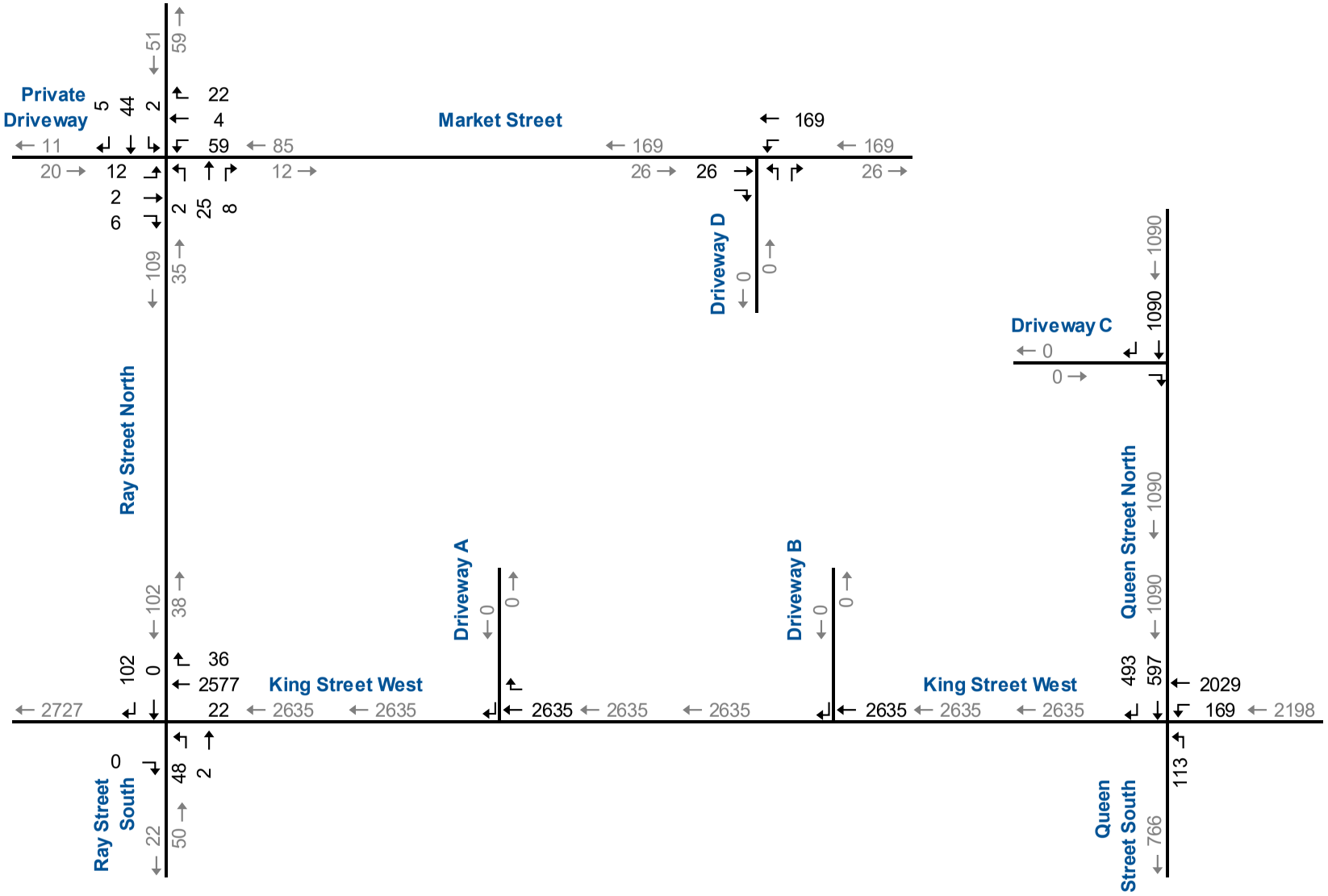
The forecast background traffic volumes within the study area are estimated to consist of generalized background traffic growth and other planned developments. **Figures 4.3** and **4.4** illustrates the forecast background traffic volumes for the two scenarios.

4.4.2 Total Projections

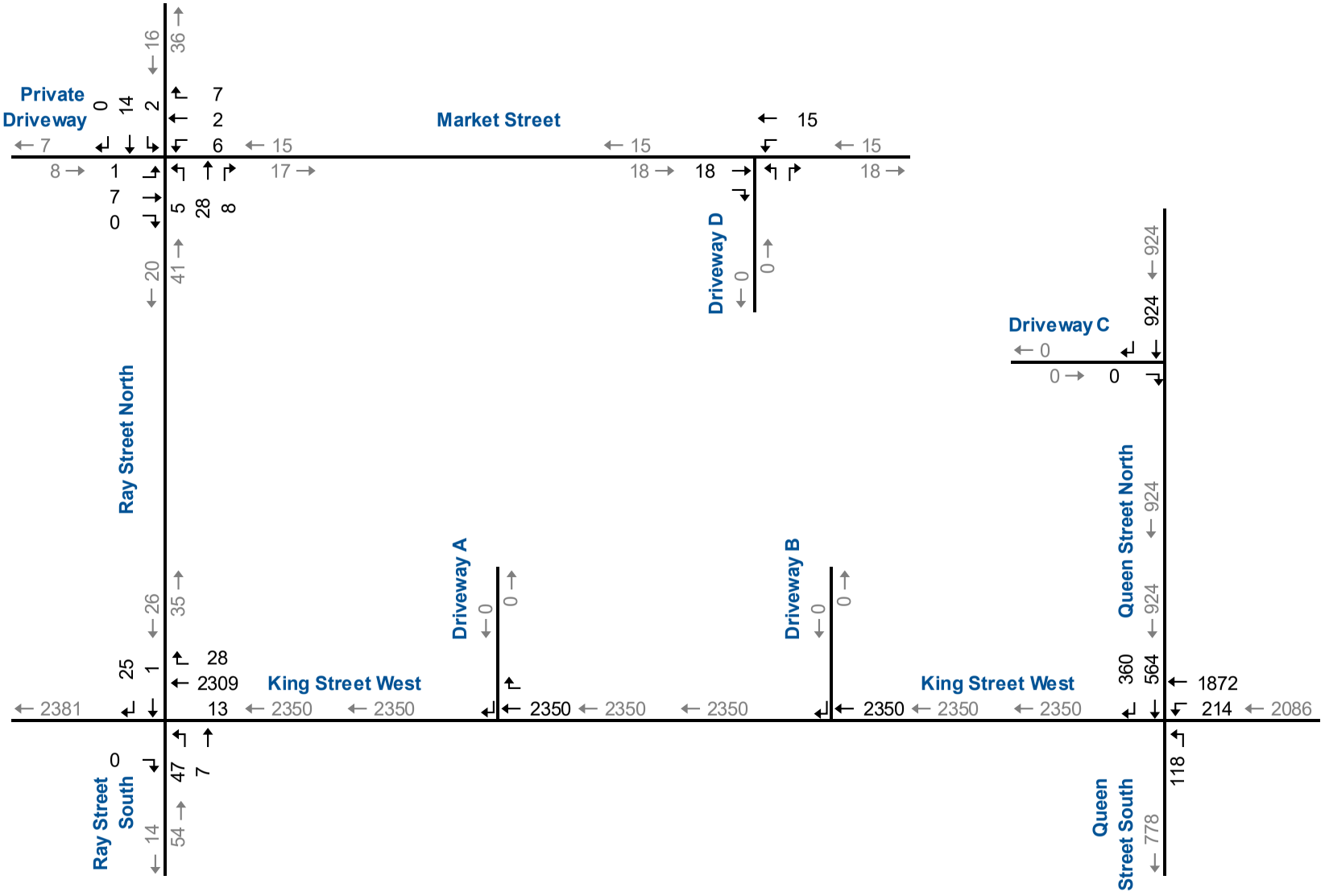
The total traffic volumes within the study area are estimated to consist of generalized forecast background traffic growth, other planned developments, and site generated traffic. **Figures 4.5** and **4.6** illustrates the total traffic forecasts for the two scenarios.



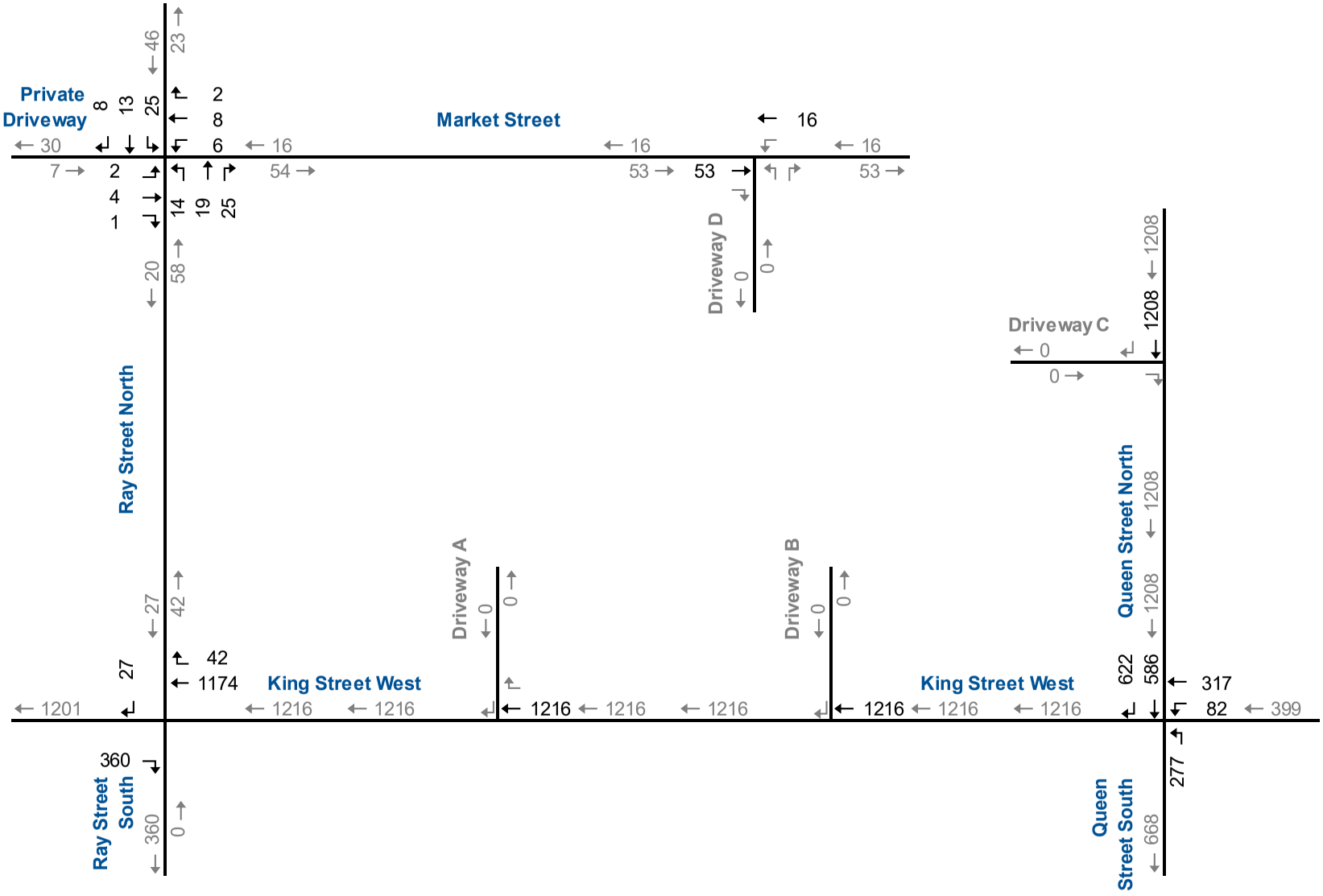
2027 Background AM Peak Hour Traffic Volumes (Interim)



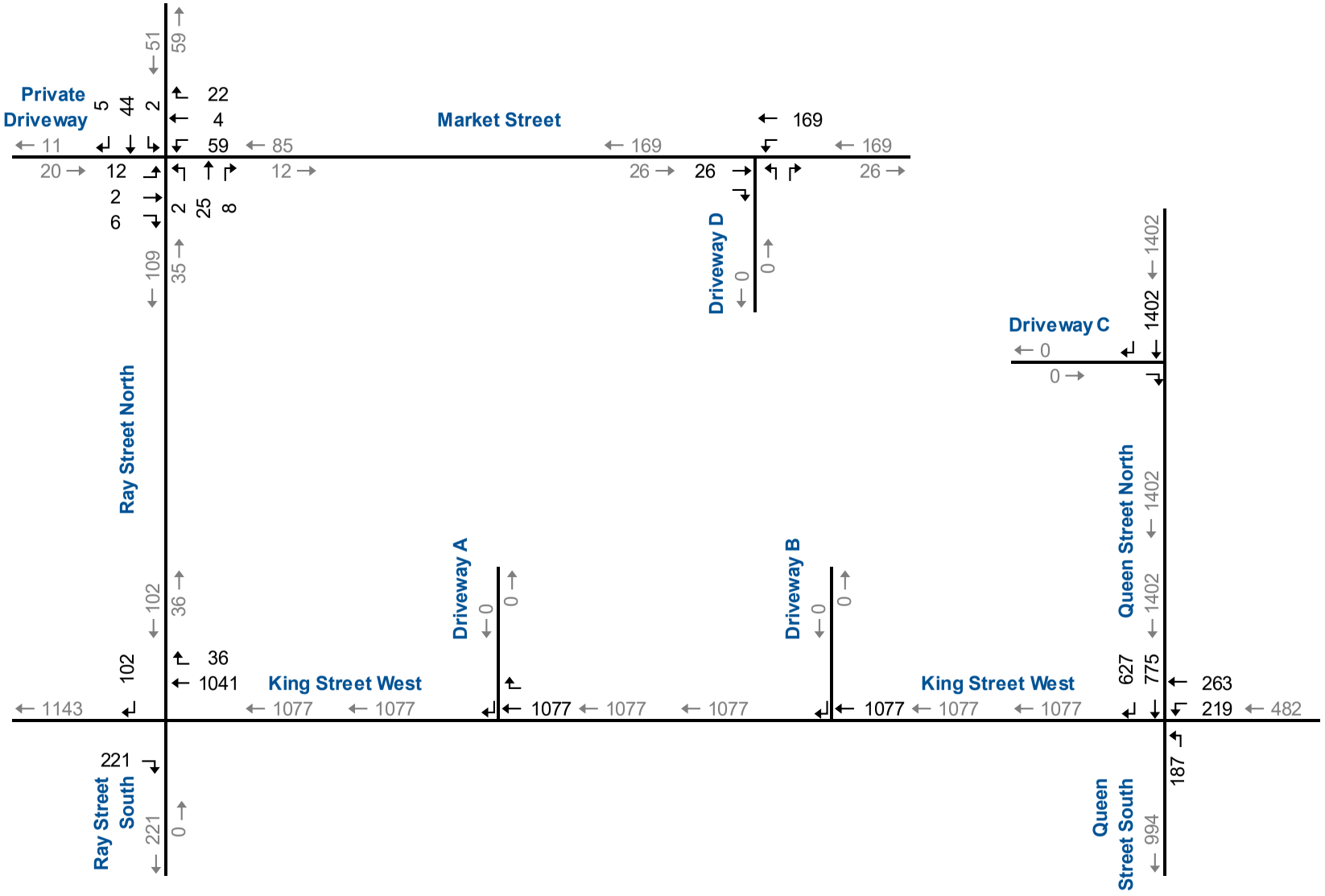
2027 Background PM Peak Hour Traffic Volumes (Interim)



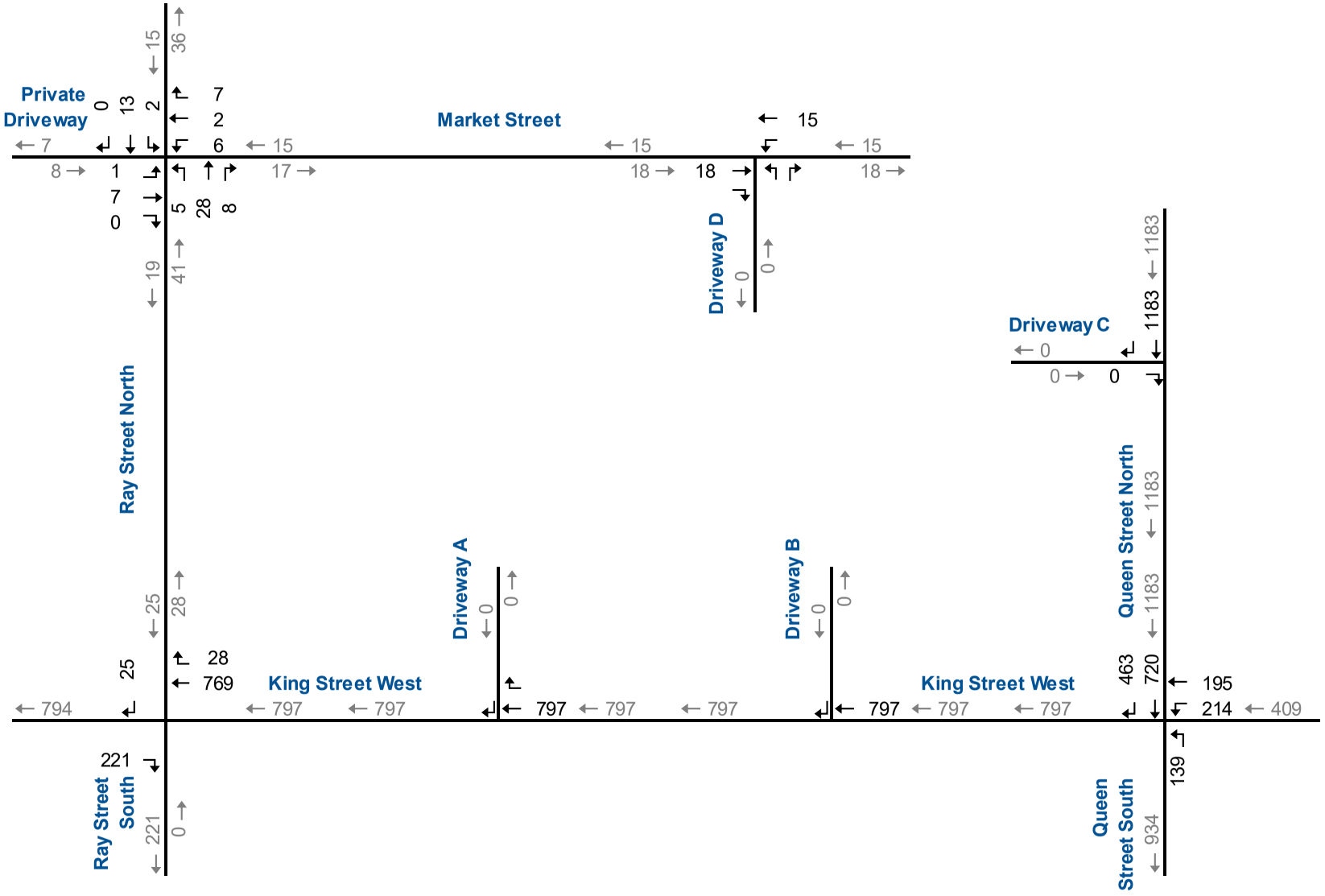
2027 Background Sat. Peak Hour Traffic Volumes (Interim)



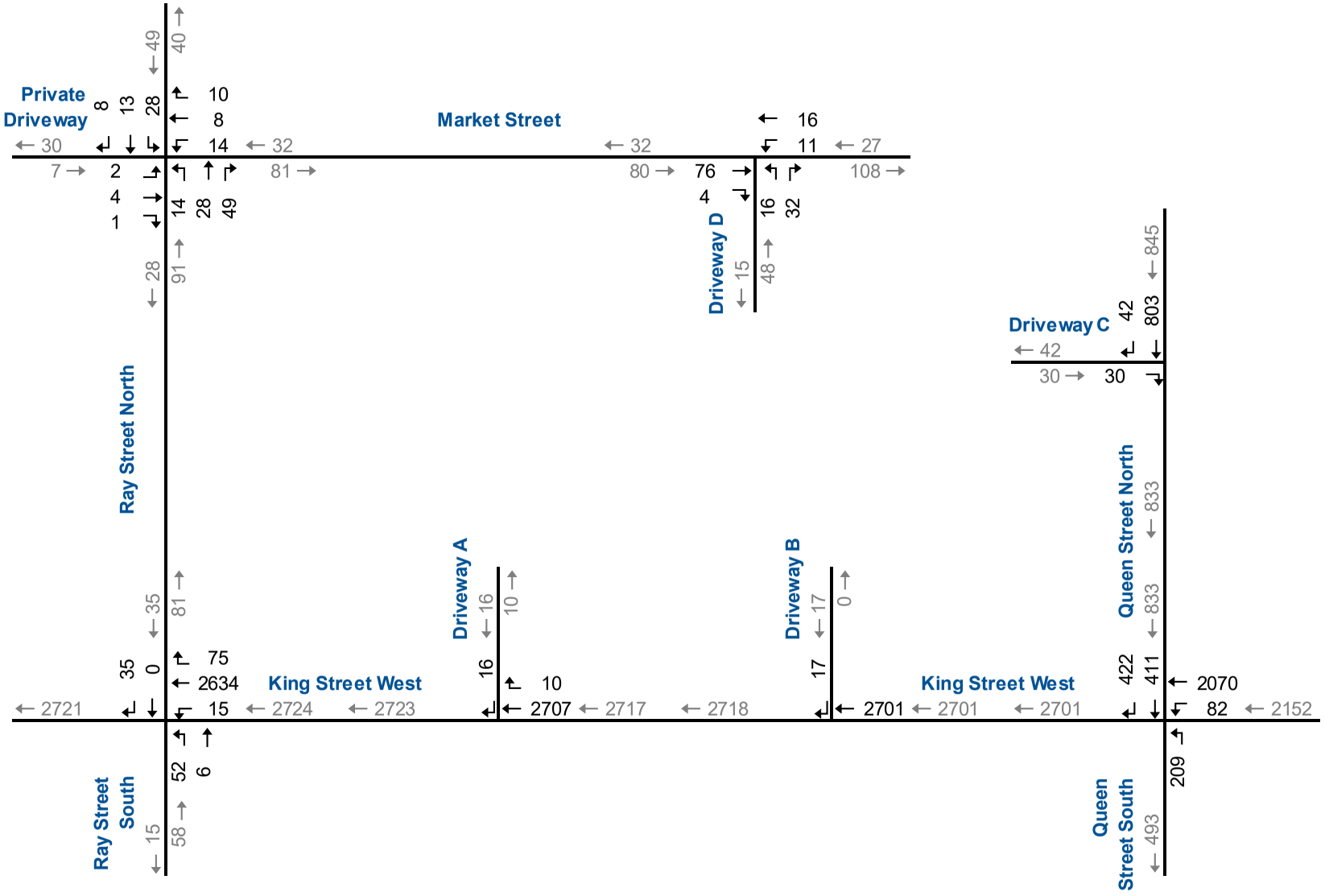
2027 Background AM Peak Hour Traffic Volumes (Rapid Transit)



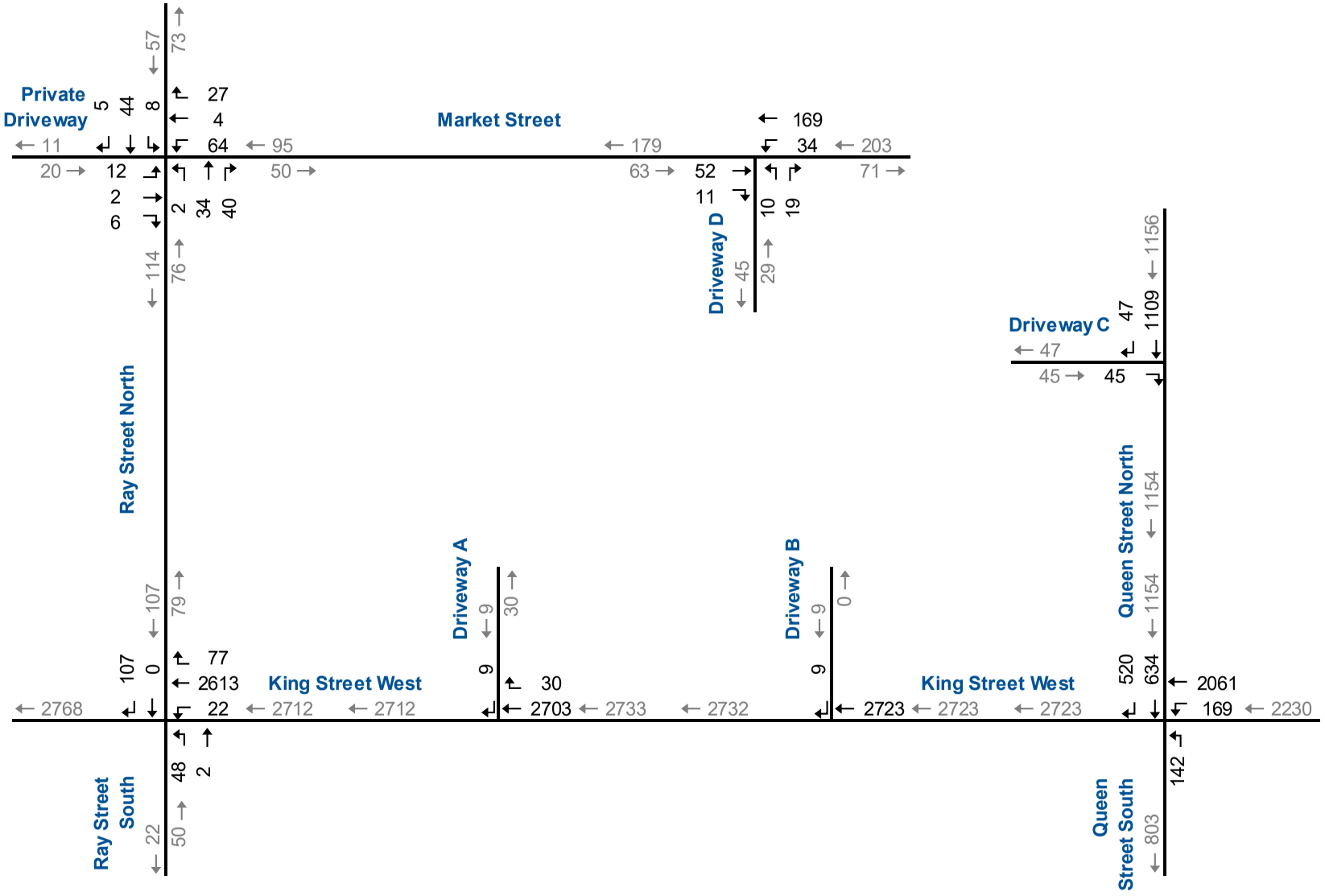
2027 Background PM Peak Hour Traffic Volumes (Rapid Transit)



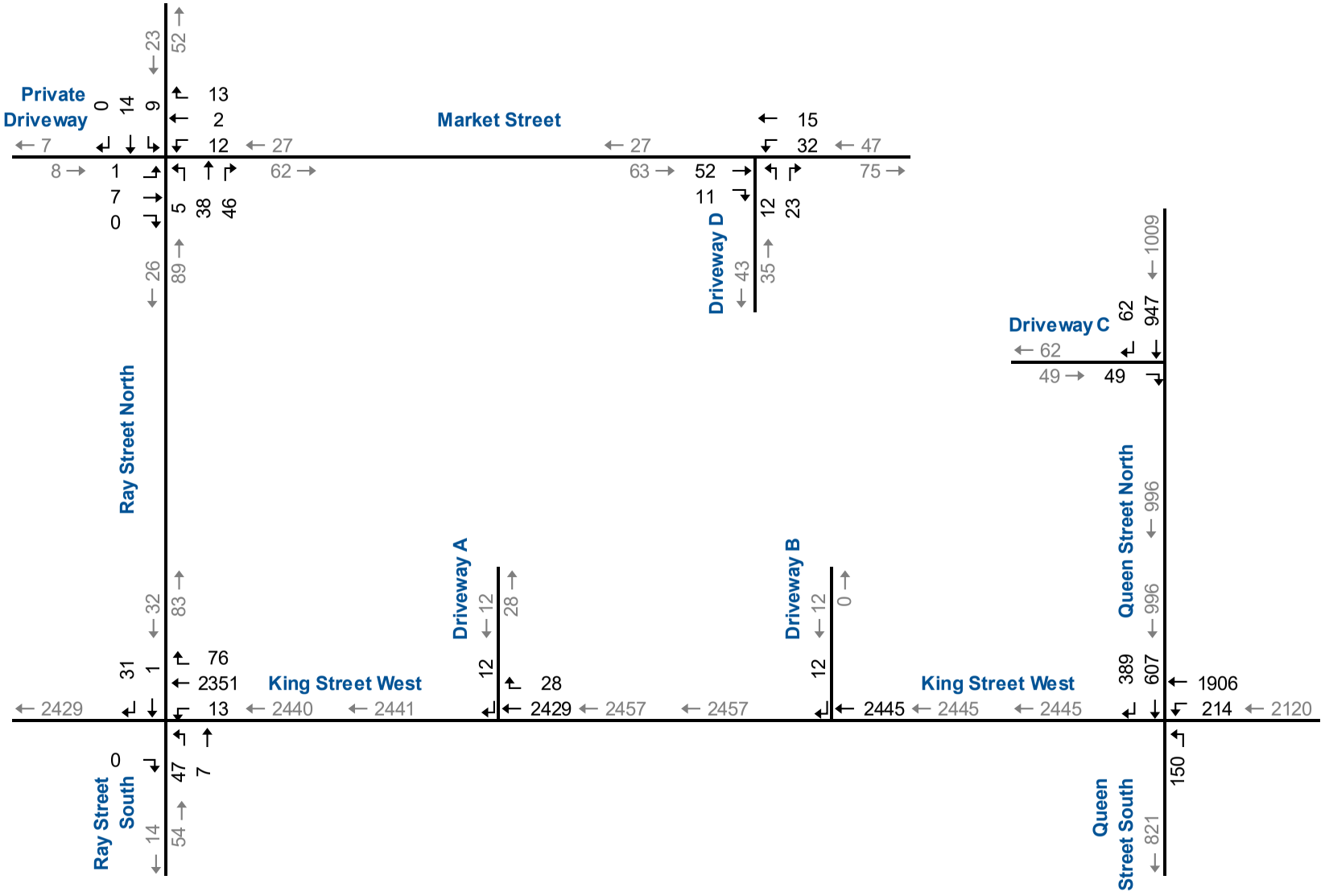
2027 Background Sat. Peak Hour Traffic Volumes (Rapid Transit)



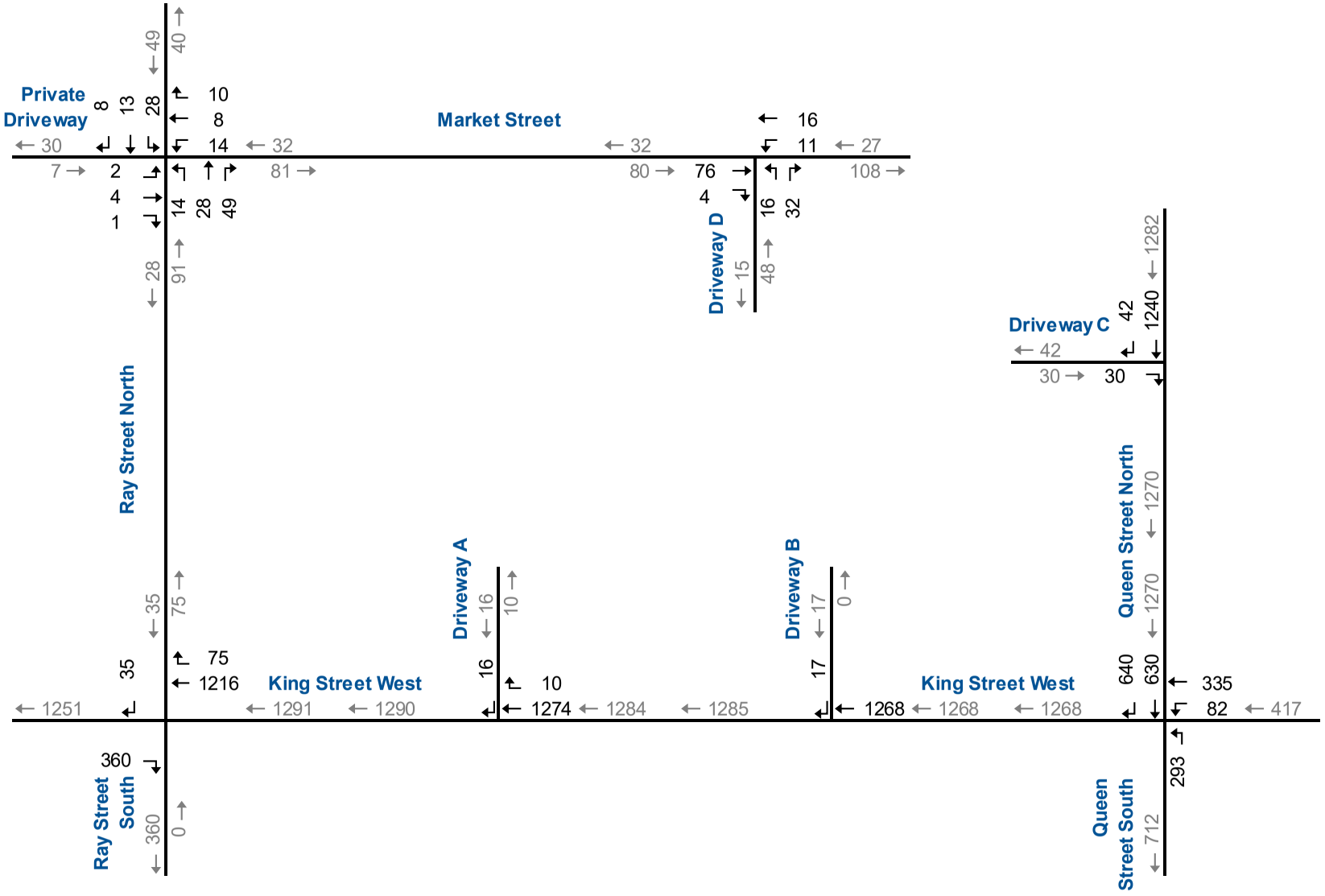
2027 Total AM Peak Hour Traffic Volumes (Interim)



2027 Total PM Peak Hour Traffic Volumes (Interim)



2027 Total Sat. Peak Hour Traffic Volumes (interim)



2027 Total AM Peak Hour Traffic Volumes (Rapid Transit)

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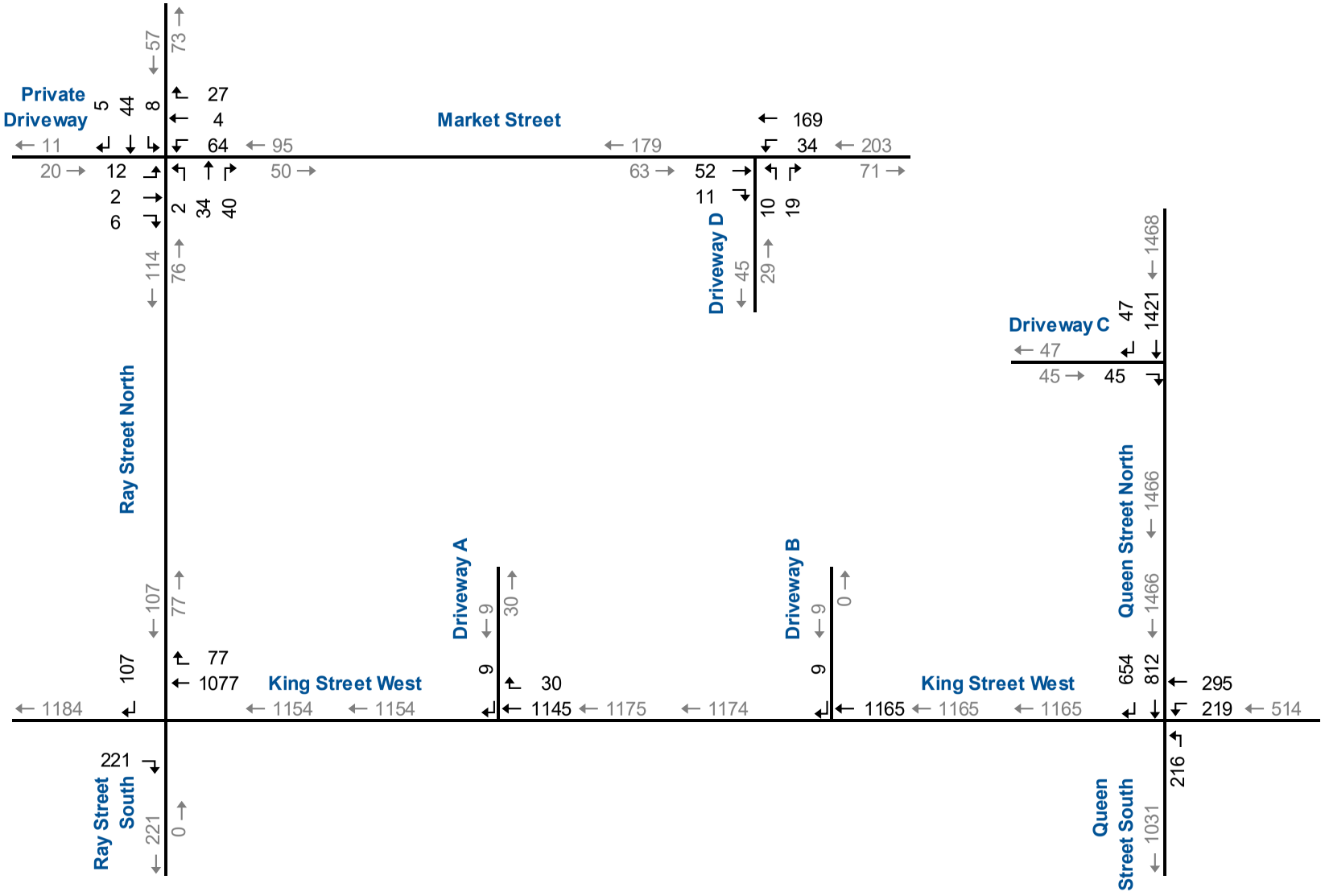
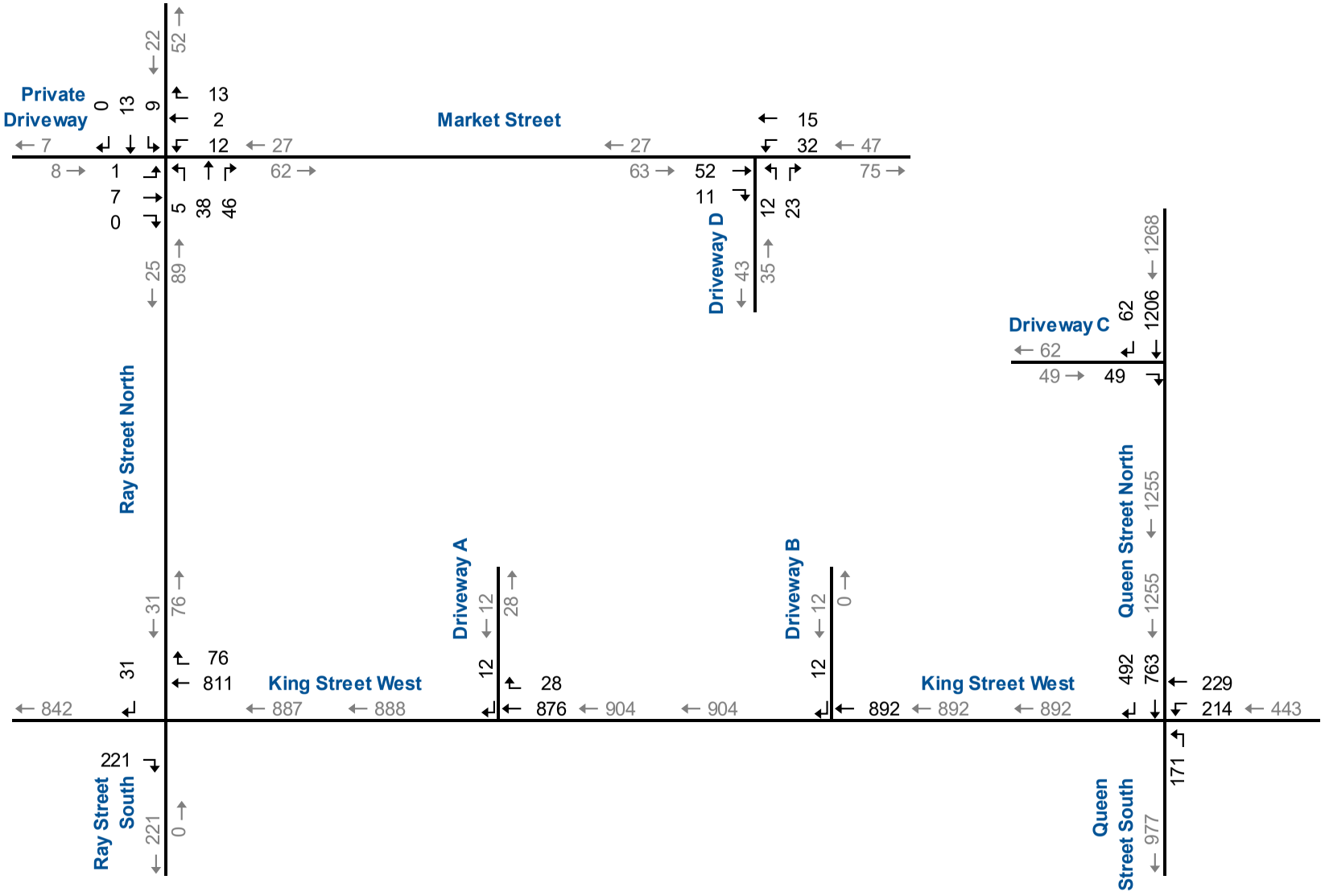
Figure 4.6A



2027 Total PM Peak Hour Traffic Volumes (Rapid Transit)



2027 Total Sat. Peak Hour Traffic Volumes (Rapid Transit)

5 Operational Analysis

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic within the study area. To assess quality of flow, roadway capacity analysis was conducted with respect to base year conditions and projected background and total conditions. Capacity analysis provides an indication of how well the roadway facilities serve the traffic demands placed on them. Calculated levels of service classify roadway operating conditions.

5.1 Level of Service Criteria

Level of service (LOS) is the term used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that provides an index to the operational qualities of a roadway segment or an intersection with designations that range from LOS A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

For unsignalized intersections, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. The level of service is only determined for left turns from the main street and all movements from the minor street.

Unsignalized intersections use conservative analysis parameters, such as high critical gaps. A “critical gap” is defined as the minimum time, in seconds, between successive major stream vehicles, in which a minor-street vehicle can make a maneuver.

Actual field observations indicate that drivers on minor streets generally accept smaller gaps in traffic than those used in the analysis procedures and therefore experience less delay than reported by the analysis software. Consequently, the analysis results tend to overstate the actual delays experienced in the field. For this reason, the results of the unsignalized intersection analyses should be considered conservative.

5.2 Intersection Capacity Analysis

The evaluation criteria used to analyze signalized and unsignalized intersections are based on the 2000 Highway Capacity Manual (HCM)[11] utilizing Synchro 9.2.

Existing signal timings provided by the City of Hamilton has been used for the Base Year traffic conditions as well as the interim scenario. As mentioned in **Sub-Section 4.1.3**, changes made to the roadway network with implementation of the rapid transit are reasonably significant which means that changes are also required for the traffic signal coding. There was very little information provided on future traffic signal changes that accompanied the network modifications, so changes were made on professional judgement and informed by details of intersection layouts that were provided by the City of Hamilton.

Table 5.1 - 5.3 summarizes the capacity analyses for the study area intersections for base year and all horizon years for the AM, PM and, Saturday peak hours, respectively. **Appendix F** includes the capacity analyses results.

5.2.1 Ray Street at Market Street

Individual movements at the unsignalized intersection of Ray Street at Market Street operate at LOS A under the Base year traffic conditions. Similar levels of operation are expected under future Background and Total traffic conditions (both scenarios) with only negligible increase in delay resulting from site-generated traffic volumes.

5.2.2 Ray Street North at King Street West

Individual movements at the unsignalized intersection of Ray Street North at King Street West operate at LOS C or better under the Base year traffic conditions. Under the interim scenario, similar levels of operation are expected under future Background and Total traffic conditions with only negligible increase in delay resulting from site-generated traffic volumes.

Under the rapid transit scenario, the southbound right turn movement is projected to degrade to LOS E under future Background and Total traffic conditions during the weekday AM/PM peak hours. A volume to capacity (v/c) ratio no greater than 0.60 is projected indicating the southbound right turn movement is operating at 60 percent (or less) of its available capacity.

[11] Transportation Research Board, Highway Capacity Manual, Washington, D.C. 2003.

5.2.3 Queen Street at King Street West

Individual movements at the signalized intersection of Queen Street at King Street West operate at LOS C or better under the Base year traffic conditions.

Under the interim scenario, the following movements are projected to see a degrade in operations:

- During the AM and PM peak hours, the southbound approach is projected to operate at LOS F under the Background/Total traffic conditions;
- During the Saturday peak hour, the northbound left turn movement is projected to operate at LOS E under the Total traffic conditions.

Under the rapid transit scenario, the following movements are projected to see a degrade in operations:

- During the AM and PM peak hours, the southbound right turn movement is projected to operate at LOS E/F under the Background/Total traffic conditions.
- During the AM and PM peak hours, the northbound left turn movement is projected to operate at LOS E/F under the Background/Total traffic conditions.

5.2.4 King Street West at Driveway A (Right In/Out)

Individual movements at the proposed unsignalized intersection of Driveway A at King Street West during the peak hour is projected to operate at LOS C or better under the interim scenario.

Under the rapid transit scenario, the stop controlled southbound right turn movement is projected to operate at LOS E during the AM peak hour with a v/c ratio of 0.13. This indicates the southbound right turn movement is operating at 13 percent (or less) of its available capacity.

5.2.5 King Street West at Driveway B (Right Out)

Individual movements at the proposed unsignalized intersection of Driveway B at King Street West during the peak hours is projected to operate at LOS B or better under the interim scenario.

Under the rapid transit scenario, the stop controlled southbound right turn movement is projected to operate at LOS E during the AM peak hour with a v/c ratio of 0.14. This indicates the southbound right turn movement is operating at 14 percent (or less) of its available capacity.

5.2.6 Queen Street North at Driveway C (Right In/Out)

Individual movements at the proposed unsignalized intersection of Driveway C at Queen Street North during the peak hours is projected to operate at LOS B or better (both scenarios). The stop controlled eastbound right turn movement is projected to operate with a v/c ratio no greater than 0.12. This indicates the southbound right turn movement is operating at 12 percent (or less) of its available capacity.

5.2.7 Market Street at Driveway D (Full Movements)

Individual movements at the proposed unsignalized intersection of Driveway D at Market Street during the peak hours is projected to operate at LOS A (both scenarios). The stop controlled northbound approach is projected to operate with a v/c ratio no greater than 0.06. This indicates the northbound approach is operating at 6 percent (or less) of its available capacity.

TABLE 5.1A: INTERSECTION OPERATIONS (AM PEAK HOUR)

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																
					Eastbound				Westbound				Northbound				Southbound				
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
AM Peak Hour	1. Ray Street North at Market Street	TWSC	Base Year	LOS	<	A	>	A	<	A	>	A	<	A	>	A	<	A	>	A	A
				Delay	<	10	>	10	<	10	>	10	<	2	>	2	<	4	>	4	4
				V/C	<	0.01	>		<	0.02	>		<	0.01	>		<	0.01	>		
				Q	<	0	>		<	1	>		<	0	>		<	0	>		
			2027 Background	LOS	<	A	>	A	<	A	>	A	<	A	>	A	<	A	>	A	A
				Delay	<	10	>	10	<	10	>	10	<	2	>	2	<	4	>	4	4
				V/C	<	0.01	>		<	0.02	>		<	0.01	>		<	0.02	>		
				Q	<	0	>		<	1	>		<	0	>		<	0	>		
			2027 Total	LOS	<	B	>	B	<	A	>	A	<	A	>	A	<	A	>	A	A
				Delay	<	10	>	10	<	10	>	10	<	1	>	1	<	4	>	4	4
				V/C	<	0.01	>		<	0.04	>		<	0.01	>		<	0.02	>		
				Q	<	0	>		<	1	>		<	0	>		<	1	>		
			2027 Background (Rapid Transit)	LOS	<	A	>	A	<	A	>	A	<	A	>	A	<	A	>	A	A
				Delay	<	10	>	10	<	10	>	10	<	2	>	2	<	4	>	4	4
				V/C	<	0.01	>		<	0.02	>		<	0.01	>		<	0.02	>		
				Q	<	0	>		<	1	>		<	0	>		<	0	>		
			2027 Total (Rapid Transit)	LOS	<	B	>	B	<	A	>	A	<	A	>	A	<	A	>	A	A
				Delay	<	10	>	10	<	10	>	10	<	1	>	1	<	4	>	4	4
				V/C	<	0.01	>		<	0.04	>		<	0.01	>		<	0.02	>		
				Q	<	0	>		<	1	>		<	0	>		<	1	>		
	2. Ray Street at King Street West	TWSC	Base Year	LOS					<	A	>	A	<	B		A		A	>	A	A
				Delay					<	0	>	0	<	13		10		10	>	0	0
				V/C					<	0.44	>		<	0.10				0.03	>		
				Q					<	0	>		<	3				1	>		
			2027 Background	LOS					<	A	>	A	<	C		B		B	>	B	A
				Delay					<	0	>	0	<	19		10		10	>	10	1
				V/C					<	0.55	>		<	0.20				0.04	>		
				Q					<	0	>		<	6				1	>		
			2027 Total	LOS					<	A	>	A	<	C		C		B	>	B	A
				Delay					<	0	>	0	<	20		20		10	>	10	1
				V/C					<	0.56	>		<	0.21				0.05	>		
				Q					<	0	>		<	6				1	>		
			2027 Background (Rapid Transit)	LOS			A	A		A	>	A							D	D	A
				Delay			0	0		0	>	0							32	32	1
				V/C			0.23			0.78	>								0.18		
				Q			0			0	>								5		
			2027 Total (Rapid Transit)	LOS			A	A		A	>	A							E	E	A
				Delay			0	0		0	>	0							45	45	1
				V/C			0.23			0.83	>								0.30		
				Q			0			0	>								9		
	3. Queen Street at King Street West	TCS	Base Year	LOS					<	C		C						B	B	B	C
				Delay					<	26		26						16	18	17	24
				V/C					<	0.80								0.36	0.36		0.57
				Q					<	106								41	42		
			2027 Background	LOS					<	C		C	C			C		D	F	F	D
				Delay					<	24		24	34			34		54	109	83	39
				V/C					<	0.83			0.72					0.89	1.10		0.91
				Q					<	119			43					123	139		
			2027 Total	LOS					<	C		C	D			D		E	F	F	D
				Delay					<	24		24	55			55		74	129	102	46
				V/C					<	0.83			0.89					0.99	1.15		0.95
				Q					<	121			65					143	148		
			2027 Background (Rapid Transit)	LOS					<	C		C	E			E		D	F	F	F
				Delay					<	20		20	64			64		36	225	133	99
				V/C					<	0.54			0.96					0.75	1.39		0.87
				Q					<	83			80					76	178		
			2027 Total (Rapid Transit)	LOS					<	B		B	F			F		D	F	F	F
				Delay					<	20		20	97			97		38	272	156	119
				V/C					<	0.56			1.08					0.80	1.50		0.93
				Q					<	87			94					84	193		

MOE - Measure of Effectiveness
LOS - Level of Service
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio

TABLE 5.1B: INTERSECTION OPERATIONS (AM PEAK HOUR CONT.)

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																
					Eastbound				Westbound				Northbound				Southbound				Overall
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	4. King Street West at Driveway A	TWSC	2027 Total	LOS						A	>	**A**							B	**B**	**A**
				Delay						0	>	**0**							10	**10**	**0**
				V/C						0.49	>								0.02		
				Q						0	>								1		
			2027 Total (Rapid Transit)	LOS						A	>	**A**							E	**E**	**A**
				Delay						0		**0**							37	**37**	**0**
				V/C						0.82									0.13		
				Q						0									4		
	5. King Street West at Driveway B	TWSC	2027 Total	LOS						A		**A**							B	**B**	**A**
				Delay						0		**0**							10	**10**	**0**
				V/C						0.43									0.02		
				Q						0									1		
			2027 Total (Rapid Transit)	LOS						A		**A**							E	**E**	**A**
				Delay						0		**0**							36	**36**	**1**
				V/C						0.81									0.14		
				Q						0									4		
	6. Queen Street North at Driveway C	TWSC	2027 Total	LOS						B		**B**						A	A	**A**	**A**
				Delay						12		**12**						0	0	**0**	**0**
				V/C						0.06								0.34	0.20		
				Q						2								0	0		
			2027 Total (Rapid Transit)	LOS						B		**B**						A	A	**A**	**A**
				Delay						12		**12**						0	0	**0**	**0**
				V/C						0.06								0.32	0.19		
				Q						2								0			
	7. Market Street at Driveway D	TWSC	2027 Total	LOS		A	>	**A**	<	A		**A**	<	A	>	**A**					**A**
				Delay		0	>	**0**	<	3		**3**	<	9	>	**9**					**3**
				V/C		0.05	>		<	0.01			<	0.06	>						
				Q		0	>		<	0			<	1	>						
			2027 Total (Rapid Transit)	LOS		A	>	**A**	<	A		**A**	<	A	>	**A**					**A**
				Delay		0	>	**0**	<	3		**3**	<	9	>	**9**					**3**
				V/C		0.05	>		<	0.01			<	0.06	>						
				Q		0	>		<	0			<	1	>						

MOE - Measure of Effectiveness
LOS - Level of Service
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio

TABLE 5.2A: INTERSECTION OPERATIONS (PM PEAK HOUR)

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																
					Eastbound				Westbound				Northbound				Southbound				
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
PM Peak Hour	1. Ray Street North at Market Street	TWSC	Base Year	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	9	>	**9**	<	9	>	**9**	<	1	>	**1**	<	0	>	**0**	**4**
				V/C	<	0.02	>		<	0.09	>		<	0.00	>		<	0.00	>		
				Q	<	1	>		<	2	>		<	0	>		<	0	>		
			2027 Background	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	9	>	**9**	<	10	>	**10**	<	0	>	**0**	<	0	>	**0**	**5**
				V/C	<	0.03	>		<	0.10	>		<	0.00	>		<	0.00	>		
				Q	<	1	>		<	3	>		<	0	>		<	0	>		
			2027 Total	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	10	>	**10**	<	10	>	**10**	<	0	>	**0**	<	1	>	**1**	**5**
				V/C	<	0.03	>		<	0.12	>		<	0.00	>		<	0.01	>		
				Q	<	1	>		<	3	>		<	0	>		<	0	>		
			2027 Background (Rapid Transit)	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	9	>	**9**	<	10	>	**10**	<	0	>	**0**	<	0	>	**0**	**5**
				V/C	<	0.03	>		<	0.11	>		<	0.00	>		<	0.00	>		
				Q	<	1	>		<	3	>		<	0	>		<	0	>		
			2027 Total (Rapid Transit)	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	10	>	**10**	<	10	>	**10**	<	0	>	**0**	<	1	>	**1**	**5**
				V/C	<	0.03	>		<	0.12	>		<	0.00	>		<	0.01	>		
				Q	<	1	>		<	3	>		<	0	>		<	0	>		
	2. Ray Street at King Street West	TWSC	Base Year	LOS					<	A	>	**A**	<	B		**B**		B	>	**B**	**A**
				Delay					<	1	>	**0**	<	12		**12**		10	>	**10**	**1**
				V/C					<	0.45	>		<	0.09				0.12	>		
				Q					<	0	>		<	2				3	>		
			2027 Background	LOS					<	A		**A**	<	B		**B**		B	>	**B**	**A**
				Delay					<	1		**0**	<	14		**14**		11	>	**11**	**1**
				V/C					<	0.55			<	0.12				0.16	>		
				Q					<	0			<	3				4	>		
			2027 Total	LOS					<	A	>	**A**	<	B		**B**		B	>	**B**	**A**
				Delay					<	1	>	**0**	<	15		**15**		11	>	**11**	**1**
				V/C					<	0.56	>		<	0.13				0.17	>		
				Q					<	0	>		<	3				5	>		
			2027 Background (Rapid Transit)	LOS			A	**A**		A	>	**A**							E	**E**	**A**
				Delay			0	**0**		0	>	**0**							37	**37**	**3**
				V/C			0.14			0.69	>								0.51		
				Q			0			0	>								21		
			2027 Total (Rapid Transit)	LOS			A	**A**		A	>	**A**							E	**E**	**A**
				Delay			0	**0**		0	>	**0**							48	**48**	**4**
				V/C			0.14			0.74	>								0.60		
				Q			0			0	>								27		
	3. Queen Street at King Street West	TCS	Base Year	LOS					<	C		**C**						C	C	**C**	**C**
				Delay					<	21		**21**						22	25	**23**	**22**
				V/C					<	0.73								0.56	0.57		**0.65**
				Q					<	98								70	72		
			2027 Background	LOS					<	C		**C**	C			**C**		F	F	**F**	**F**
				Delay					<	25		**25**	24			**24**		207	187	**198**	**80**
				V/C					<	0.86			0.44					1.36	1.30		**0.96**
				Q					<	126			24					223	177		
			2027 Total	LOS					<	C		**C**	C			**C**		F	F	**F**	**F**
				Delay					<	25		**25**	27			**27**		243	235	**239**	**96**
				V/C					<	0.87			0.55					1.44	1.41		**1.01**
				Q					<	128			29					240	195		
			2027 Background (Rapid Transit)	LOS					<	C		**C**	D			**D**		C	E	**D**	**D**
				Delay					<	30		**30**	50			**50**		27	79	**50**	**45**
				V/C					<	0.75			0.85					0.70	1.03		**0.89**
				Q					<	120			49					89	161		
			2027 Total (Rapid Transit)	LOS					<	C		**C**	F			**F**		C	F	**E**	**E**
				Delay					<	33		**33**	95			**95**		28	118	**68**	**63**
				V/C					<	0.80			1.04					0.73	1.15		**0.98**
				Q					<	144			66					94	182		

MOE - Measure of Effectiveness
LOS - Level of Service
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio

TABLE 5.2B: INTERSECTION OPERATIONS (PM PEAK HOUR CONT.)

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																
					Eastbound				Westbound				Northbound				Southbound				
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
PM Peak Hour	4. King Street West at Driveway A	TWSC	2027 Total	LOS						A	>	**A**							B	**B**	**A**
				Delay						0	>	**0**							10	**10**	**0**
				V/C						0.49	>								0.01		
				Q						0	>								0		
			2027 Total (Rapid Transit)	LOS						A	>	**A**							C	**C**	**A**
				Delay						0	>	**0**							24	**24**	**0**
				V/C						0.75	>								0.05		
				Q						0	>								1		
	5. King Street West at Driveway B	TWSC	2027 Total	LOS						A		**A**							B	**B**	**A**
				Delay						0		**0**							10	**10**	**0**
				V/C						0.44									0.01		
				Q						0									0		
			2027 Total (Rapid Transit)	LOS						A		**A**							C	**C**	**A**
				Delay						0		**0**							24	**24**	**0**
				V/C						0.74									0.05		
				Q						0									1		
	6. Queen Street North at Driveway C	TWSC	2027 Total	LOS						B		**B**						A	A	**A**	**A**
				Delay						15		**15**						0	0	**0**	**1**
				V/C						0.12								0.47	0.27		
				Q						3								0	0		
			2027 Total (Rapid Transit)	LOS						B		**B**						A	A	**A**	**A**
				Delay						13		**13**						0	0	**0**	**0**
				V/C						0.10								0.36	0.21		
				Q						3								0			
	7. Market Street at Driveway D	TWSC	2027 Total	LOS		A	>	**A**	<	A		**A**	<	A	>	**A**					**A**
				Delay		0	>	**0**	<	1		**1**	<	9	>	**9**					**2**
				V/C		0.04	>		<	0.02			<	0.04	>						
				Q		0	>		<	1			<	1	>						
			2027 Total (Rapid Transit)	LOS		A	>	**A**	<	A		**A**	<	A	>	**A**					**A**
				Delay		0	>	**0**	<	1		**1**	<	9	>	**9**					**2**
				V/C		0.04	>		<	0.02			<	0.04	>						
				Q		0	>		<	1			<	1	>						

MOE - Measure of Effectiveness
LOS - Level of Service
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio

TABLE 5.3A: INTERSECTION OPERATIONS (SAT. PEAK HOUR)

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																
					Eastbound				Westbound				Northbound				Southbound				
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
SAT Peak Hour	1. Ray Street North at Market Street	TWSC	Base Year	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	9	>	**9**	<	9	>	**9**	<	1	>	**1**	<	1	>	**1**	**3**
				V/C	<	0.01	>		<	0.01	>		<	0.00	>		<	0.00	>		
				Q	<	0	>		<	0	>		<	0	>		<	0	>		
			2027 Background	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	10	>	**10**	<	9	>	**9**	<	1	>	**1**	<	1	>	**1**	**3**
				V/C	<	0.01	>		<	0.02	>		<	0.00	>		<	0.00	>		
				Q	<	0	>		<	0	>		<	0	>		<	0	>		
			2027 Total	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	10	>	**10**	<	9	>	**9**	<	0	>	**0**	<	3	>	**3**	**3**
				V/C	<	0.01	>		<	0.03	>		<	0.00	>		<	0.01	>		
				Q	<	0	>		<	1	>		<	0	>		<	0	>		
			2027 Background (Rapid Transit)	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	10	>	**10**	<	9	>	**9**	<	1	>	**1**	<	1	>	**1**	**3**
				V/C	<	0.01	>		<	0.02	>		<	0.00	>		<	0.00	>		
				Q	<	0	>		<	0	>		<	0	>		<	0	>		
			2027 Total (Rapid Transit)	LOS	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	<	A	>	**A**	**A**
				Delay	<	10	>	**10**	<	9	>	**9**	<	0	>	**0**	<	3	>	**3**	**3**
				V/C	<	0.01	>		<	0.03	>		<	0.00	>		<	0.01	>		
				Q	<	0	>		<	1	>		<	0	>		<	0	>		
	2. Ray Street at King Street West	TWSC	Base Year	LOS					<	A	>	**A**	<	B		**B**		B	>	**B**	**A**
				Delay					<	0	>	**0**	<	13		**13**		10	>	**10**	**1**
				V/C					<	0.40	>		<	0.10				0.03	>		
				Q					<	0	>		<	3				1	>		
			2027 Background	LOS					<	A		**A**	<	C		**C**		B	>	**B**	**A**
				Delay					<	0		**0**	<	15		**15**		11	>	**11**	**1**
				V/C					<	0.49			<	0.15				0.04	>		
				Q					<	0			<	4				1	>		
			2027 Total	LOS					<	A	>	**A**	<	C		**C**		B	>	**B**	**A**
				Delay					<	0	>	**0**	<	16		**16**		11	>	**11**	**1**
				V/C					<	0.50	>		<	0.16				0.06	>		
				Q					<	0	>		<	4				1	>		
			2027 Background (Rapid Transit)	LOS			A	**A**		A	>	**A**							C	**C**	**A**
				Delay			0	**0**		0	>	**0**							17	**17**	**0**
				V/C			0.14			0.51	>								0.08		
				Q			0			0	>								2		
			2027 Total (Rapid Transit)	LOS			A	**A**		A	>	**A**							C	**C**	**A**
				Delay			0	**0**		0	>	**0**							19	**19**	**1**
				V/C			0.14			0.57	>								0.11		
				Q			0			0	>								3		
	3. Queen Street at King Street West	TCS	Base Year	LOS					<	C		**C**						B	B	**B**	**C**
				Delay					<	25		**25**						16	16	**16**	**22**
				V/C					<	0.75								0.36	0.35		**0.54**
				Q					<	100								48	46		
			2027 Background	LOS					<	C		**C**	C			**C**		C	C	**C**	**C**
				Delay					<	26		**26**	32			**32**		33	25	**30**	**27**
				V/C					<	0.83			0.64					0.81	0.57		**0.81**
				Q					<	120			25					155	76		
			2027 Total	LOS					<	C		**C**	E			**E**		D	C	**C**	**C**
				Delay					<	27		**27**	64			**64**		38	26	**33**	**30**
				V/C					<	0.85			0.90					0.87	0.62		**0.89**
				Q					<	123			50					174	85		
			2027 Background (Rapid Transit)	LOS					<	C		**C**	C			**C**		C	C	**C**	**C**
				Delay					<	26		**26**	24			**24**		26	25	**25**	**25**
				V/C					<	0.64			0.06					0.65	0.51		**0.64**
				Q					<	97			26					81	42		
			2027 Total (Rapid Transit)	LOS					<	C		**C**	D			**D**		C	C	**C**	**C**
				Delay					<	27		**27**	38			**38**		27	30	**28**	**29**
				V/C					<	0.69			0.76					0.69	0.65		**0.76**
				Q					<	107			41					87	73		

MOE - Measure of Effectiveness
LOS - Level of Service
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio

TABLE 5.3B: INTERSECTION OPERATIONS (SAT. PEAK HOUR CONT.)

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																
					Eastbound				Westbound				Northbound				Southbound				
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Overall
SAT Peak Hour	4. King Street West at Driveway A	TWSC	2027 Total	LOS						A	>	**A**							A	**A**	**A**
				Delay						0	>	**0**							10	**10**	**0**
				V/C						0.44	>								0.02		
				Q						0	>								0		
			2027 Total (Rapid Transit)	LOS						A	>	**A**							C	**C**	**A**
				Delay						0	>	**0**							17	**17**	**0**
				V/C						0.58	>								0.04		
				Q						0	>								1		
	5. King Street West at Driveway B	TWSC	2027 Total	LOS						A		**A**							A	**A**	**A**
				Delay						0		**0**							10	**10**	**0**
				V/C						0.39									0.02		
				Q						0									0		
			2027 Total (Rapid Transit)	LOS						A		**A**							C	**C**	**A**
				Delay						0		**0**							17	**17**	**0**
				V/C						0.57									0.04		
				Q						0									1		
	6. Queen Street North at Driveway C	TWSC	2027 Total	LOS						B		**B**						A	A	**A**	**A**
				Delay						13		**13**						0	0	**0**	**1**
				V/C						0.11								0.40	0.24		
				Q						3								0	0		
			2027 Total (Rapid Transit)	LOS						B		**B**						A	A	**A**	**A**
				Delay						12		**12**						0	0	**0**	**1**
				V/C						0.10								0.31	0.19		
				Q						3								0	0		
	7. Market Street at Driveway D	TWSC	2027 Total	LOS		A	>	**A**	<	A		**A**	<	A	>	**A**					**A**
				Delay		0	>	**0**	<	5		**5**	<	9	>	**9**					**4**
				V/C		0.04	>		<	0.02			<	0.04	>						
				Q		0	>		<	1			<	1	>						
			2027 Total (Rapid Transit)	LOS		A	>	**A**	<	A		**A**	<	A	>	**A**					**A**
				Delay		0	>	**0**	<	5		**5**	<	9	>	**9**					**4**
				V/C		0.04	>		<	0.02			<	0.04	>						
				Q		0	>		<	1			<	1	>						

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LOS - Level of Service
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio

5.3 Queue Assessment

SimTraffic was utilized rather than Synchro in this assessment as microscopic models, such as Sim Traffic, individually track each vehicle in the traffic system through the model and collect comprehensive operational measures of effectiveness for every vehicle during each 0.1 second of the simulation. Unlike Synchro, SimTraffic measures the full impact of queuing and blocking. Synchro is best used to determine level of service and delay at the macro level but is not ideal for assessments simulating real-world conditions. The analysis consisted of ten (10) iterations of sixty (60) minute simulations to forecast the delay per vehicle in seconds. **Appendix G** provides the SimTraffic results.

5.3.1 Signalized Intersection

Vehicle queuing is an important measure of effectiveness that should be evaluated as part of all analyses of signalized intersections. Estimates of vehicle queues are needed to determine whether spillover occurs at upstream facilities (i.e. unsignalized intersections, signalized intersections, etc.). Approximately 75 metres of queue storage from Market Street to the southbound stop bar at King Street West and Queen Street is available.

Reviewing the SimTraffic results indicates that during the respective peak hours, the 95th percentile queue length for the southbound approach at the intersection of King Street West and Queen Street is 51 metres under the interim scenario and 73 metres under the rapid transit scenario. Market Street is not anticipated to encounter vehicle blockages.

5.3.2 Unsignalized Intersections

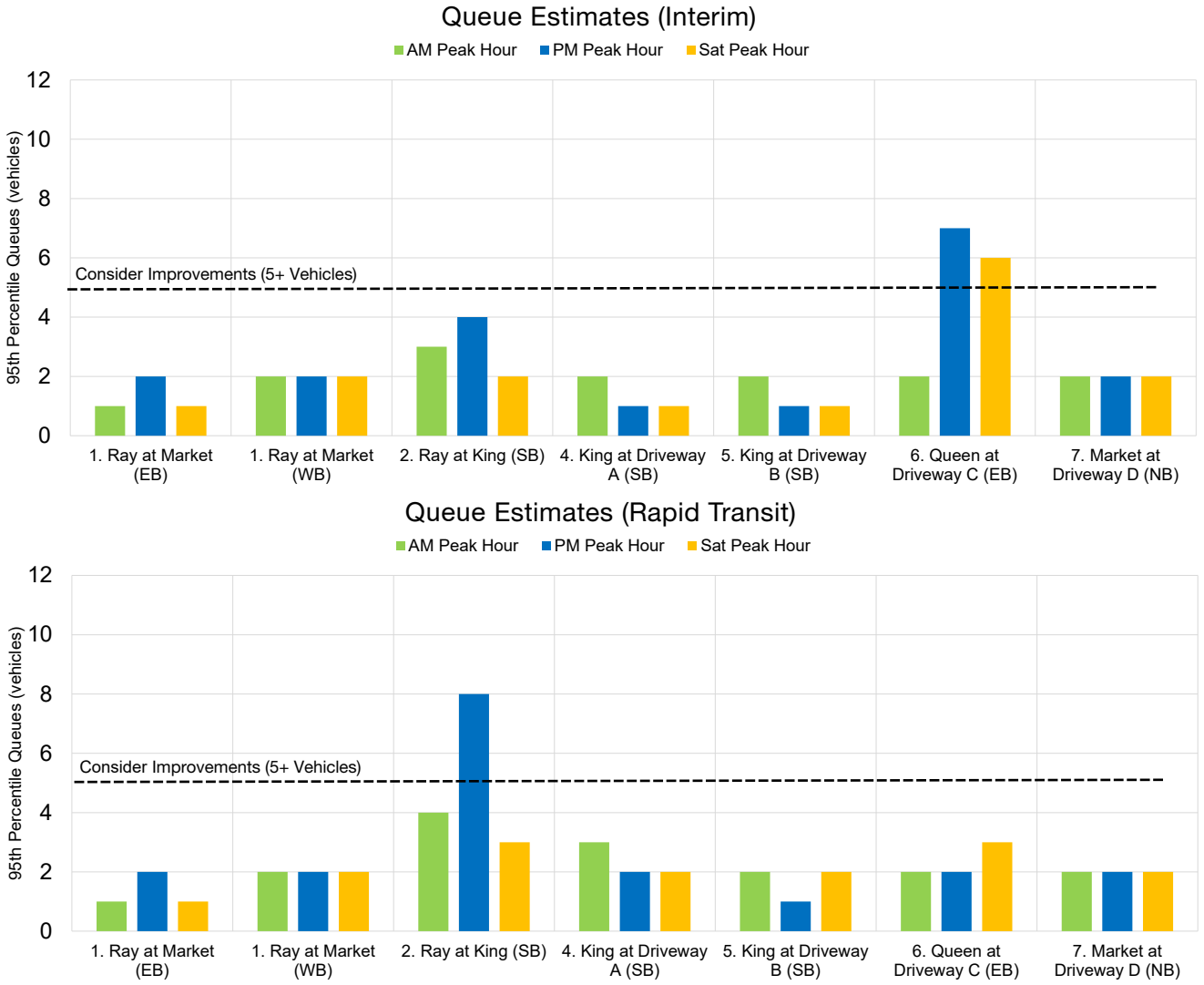
A queue assessment of the unsignalized intersections within the study area was conducted to determine the queue lengths for the stop-controlled movements. The queue estimates are an additional key metric to determine if improvements are necessary. Based on Paradigm's experience, stacking of five vehicles of less does not need improvements, between five and ten vehicles should consider improvements, and above ten vehicles generally require improvements.

Chart 5.2 provides a summary of the queue analysis for the unsignalized intersections within the study area under Total traffic conditions. Based on the queue assessment, the following is noted:

- At the intersection of Queen Street North and Driveway C, the interim scenario projects a queue length of 7 vehicles for the westbound approach during the weekday PM peak hour. These queue issues are expected to reduce under the rapid transit scenario given the changes to traffic patterns. No further mitigation is recommended given the driveway is restricted to right in/out and the projected queue can be contained on site with no impact to the adjacent roadway network.

- At the intersection of Ray Street North and King Street West, the interim scenario projects a queue length of 3 vehicles during the weekday PM peak hour for the southbound right turn movement. Under the rapid transit scenario, the southbound right turn movement will see a queue length of 8 vehicles. Mitigation measures should be considered and is further discussed in **Chapter 6**.

CHART 5.2: QUEUE ASSESSMENT (UNSIGNALIZED INTERSECTIONS)



5.4 Queen Street North (Two-Way Conversion)

It is understood the City is reviewing the potential to convert Queen Street North from King Street West to York Boulevard from one-way to two-way operations. Although not on the current conversion schedule, this portion of Queen Street has been documented as a possibility. The two-way conversion will enable drivers to use Queen Street northbound from King Street West to York Boulevard, providing an alternate route to travel north.

Additionally, if conversion of this section of Queen Street North occurs, improved access circulation and route selection for the overall area could be realized given the degree of accessibility that can be afforded by a two-way system. This may provide for improved operations at a number of the unsignalized intersections by redistributing northbound traffic from the local roadway network to the arterial network. Improved pedestrian experience, safety, and livability could also be realized through the two-way conversion by-way of lowered vehicle speeds and allowing for bike/pedestrian crossing opportunities.

6 Mitigation

This chapter summarizes the results for the investigate to identify if improvement measures are required to accommodate the impacts of the proposed development.

6.1 Assessment of Impacts

Based on the analysis, congestion is forecast to occur at the intersections of King Street West with Queen Street and Ray Street North. A summary of the findings is further discussed.

6.1.1 King Street West at Queen Street

As discussed earlier within the report, Queen Street, south of King Street West will be converted to two-way traffic. Through this conversion, and based on the operational assessment completed, increased delay is projected for a number of movements at the intersection. Additionally, a secondary scenario that assess the long-term implications of introducing rapid transit along King Street West has been undertaken. As with the two-way conversion of Queen Street impacting traffic patterns, the implementation of rapid transit along King Street West will have a similar and more noticeable effect, mainly through a reduction of capacity on King Street West.

Both scenarios will result in increased delay to the King Street West and Queen Street intersection. With that said, a feasible improvement option is the optimization of the cycle length and splits for the traffic control signal.

A sensitivity analysis to assess optimized timings for the intersection has been undertaken for the 2027 Total traffic conditions. **Table 6.1** summarizes the results of the sensitivity analysis. **Appendix H** contains the detailed Synchro reports. Overall, the intersection of King Street West and Queen Street is expected to operate with improved operations.

TABLE 6.1: SENSITIVITY ANALYSIS

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																
					Eastbound				Westbound				Northbound				Southbound				Overall
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	3. Queen Street at King Street West	TCS	2027 Total	LOS					<	C		**C**	D			**D**		C	C	**C**	**C**
				Delay					<	28		**28**	40			**40**		23	31	**27**	**28**
				V/C					<	0.88			0.78					0.61	0.77		
				Q					<	128			76					93	119		
			2027 Total (Rapid Transit)	LOS					<	D		**D**	D			**D**		B	C	**C**	**C**
				Delay					<	48		**48**	35			**35**		11	33	**22**	**29**
				V/C					<	0.87			0.84					0.37	0.90		
				Q					<	133			101					44	174		
PM Peak Hour	3. Queen Street at King Street West	TCS	2027 Total	LOS					<	D		**D**	E			**E**		D	D	**D**	**D**
				Delay					<	54		**54**	60			**60**		51	54	**53**	**54**
				V/C					<	1.02			0.39					0.95	0.95		
				Q					<	172			41					203	169		
			2027 Total (Rapid Transit)	LOS					<	D		**D**	E			**E**		B	D	**C**	**D**
				Delay					<	50		**50**	65			**65**		15	42	**27**	**36**
				V/C					<	0.93			0.95					0.53	0.93		
				Q					<	162			88					70	171		
Sat. Peak Hour	3. Queen Street at King Street West	TCS	2027 Total	LOS					<	C		**C**	D			**D**		D	C	**C**	**C**
				Delay					<	30		**30**	48			**48**		35	25	**31**	**31**
				V/C					<	0.89			0.81					0.85	0.61		
				Q					<	129			46					170	84		
			2027 Total (Rapid Transit)	LOS					<	C		**C**	C			**C**		C	C	**C**	**C**
				Delay					<	31		**31**	25			**25**		28	32	**30**	**29**
				V/C					<	0.73			0.63					0.71	0.69		
				Q					<	112			30					89	93		

MOE - Measure of Effectiveness
LOS - Level of Service
> - Shared Right-Turn Lane
< - Shared Left-Turn Lane
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
Delay - Average Delay per Vehicle in Seconds
V/C - Volume to Capacity Ratio

6.1.1 King Street West at Ray Street North

As discussed in **Sub-Section 5.2.2**, under the rapid transit scenario, the southbound right turn movement at the intersection of King Street West and Ray Street North is projected to degrade to LOS E under both the Background and Total traffic conditions. A volume to capacity (v/c) ratio no greater than 0.60 is projected indicating the southbound right turn movement still has sufficient capacity.

In addition to the operational analysis completed, a queue assessment completed utilizing SimTraffic projects a queue length of 8 vehicles during the weekday PM peak hour. Given the increase delay coupled with increase queue lengths, mitigation measures for these conditions should be considered.

Review of the existing traffic volumes along Ray Street North between King Street West and Market Street suggests traffic volumes are higher than expected during the weekday PM peak hour. As Ray Street North provides access to a predominately residential neighbourhood, the directional distribution of trips should have a higher number of inbound trips than outbound. However, the existing volumes suggest the opposite, with a higher number of outbound trips occurring.

One possible explanation for this is southbound vehicles along Queen Street North are using the local roadways to the west to by-pass the King Street West intersection. The most feasible option to reduce the potential for traffic infiltrating the local roadways is through traffic calming measures. As these measures have the potential to reduce traffic volumes along the area roadway, improved capacity and operations are expected to occur for the King Street West and Ray Street North intersection. Further, as this is an existing issue that is projected to be exacerbated by the implementation of rapid transit along the King Street West, the planning and funding of specific measures should be considered by the City of Hamilton.

6.2 Neighbourhood Impacts

There are several possible areas of concern related to traffic; namely, the roadway capacity and resulting level of service, traffic safety and the potential nuisance for adjacent residents related to the traffic.

The local area intersection within the neighbourhood that will see the largest increase in traffic is Ray Street at Market Street. The traffic assessment noted above indicates that this intersection currently operates at acceptable level of service conditions during the peak hours. With the expected increase in traffic due to development, there is a negligible increase in delay during the peak hours.

In terms of traffic north of the study area, the additional traffic resulting from the proposed development is expected to be up to 25 vehicles during the respective peak hours.

Throughout the planning stages of this project, the Applicant has had numerous meetings with representatives of the City of Hamilton to discuss the transportation related components of the project. In addition, a community meeting has been held to understand concerns the surrounding neighborhood has with the proposed development. Some of the common themes that have resulted from these meetings are related to increased traffic volumes along the area roadways. In particular, residents feel that certain sections of roadways experience unsafe vehicle speeds and cut-through traffic.

Based on this feedback, the Applicant is proposing to implement improvements in the area of these concerns and address future traffic associated with the proposed development. The initiatives planned include the following:

- The proposed development is proposing active mitigation by implementing Transportation Demand Management measures to curb the developments dependency towards vehicular traffic with a focus towards sustainable transportation modes. These measures strengthen the developments efforts to reduce its dependence on vehicles and reduce its impact to the adjacent transportation network.
- Traffic calming improvements along Ray Street North to discourage development traffic infiltrating the local roadway network. Specifically, the Applicant in consultation with City of Hamilton staff will consider providing two speed humps along Ray Street North.

The planning of these improvements is ongoing. Further evaluation will be required to determine costs and schedule for implementation. These measures are geared towards traffic calming along Ray Street North as well as improving vehicle and pedestrian safety along this corridor.

7 Transportation Demand Management

The goal of a Transportation Demand Management (TDM) plan is to reduce the development's overall traffic and parking impacts through the implementation of strategies that are aimed at affecting the demand side of the transportation equation, rather than the supply side. By there very nature, TDM programs attempt to change people's behavior, and to be successful, they must rely on incentives or disincentives to makeshifts in behavior attractive to the commuter.

TDM strategies include financial incentives, time incentives, the provision of new or enhanced commuter services, dissemination of information, and marketing alternative services. TDM strategies include all the incentives and disincentives that increase the likelihood for people to change their existing travel behavior.

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

7.1 Through Design

Supporting land-use/infrastructure that encourage people to choose travel modes other than driving alone are a number of factors that influence peoples' travel mode choices. These strategies are already accounted for through the developments overall design and include the following.

7.1.1 Density

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

7.1.2 Pedestrian Sidewalks

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

Walking is encouraged by the provision of a pedestrian-friendly site layout that features an extensive network of sidewalks and entrances at key points both within the site and connecting to the existing pedestrian network. The majority of the site is provided with direct public access for pedestrians via three street level entrances from King Street West, Queen Street North and Market Street.

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

7.1.3 Bicycle Lanes

Increasing bicycling to, from and within Hamilton is a key strategy to reducing vehicle trips. The number of people bicycling is directly related to the quality of the bicycling network and presence of bicycling facilities. Presently Napier Street a portion of Market Street, Locke Street and Caroline Street is signed as an on-street bike route. The site has the potential to be served by bicycle modes given the present network.

7.1.4 Bicycle Parking

The City of Hamilton By-law for Transit Oriented Corridor (TOC) zones includes rates for bicycle parking for multiple dwellings require 5 short term bicycle parking spaces and a bicycle parking rate of 0.20 long term spaces per unit. No requirement is provided for hotel uses.

The development is providing a total of 5 short term bicycle parking and 166 long terms spaces exceeding the By-law requirements.

7.1.5 Rapid Transit

Transit oriented development does much more than just shift automobile trips to transit. People who live or work in communities with high quality public transit tend to own fewer automobiles and drive fewer annual miles than they otherwise would. With the development located adjacent to a future rapid transit corridor that will provide connections to the GO Transit Stations, it is expected that the subject development will attract residents that will utilize high order transit for primary commuting options rather than automobiles.

At the development level, direct links connecting residents and visitor to nearby transit stops are planned to be provided as part of the overall design scheme making the development area more navigable towards transit.

7.2 Proposed Strategies

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

7.2.1 Welcome Packet

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

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

7.2.2 Unbundled Parking

Implementing a paid-parking operation is one of the most effective TDM strategies for encouraging alternative travel habits. To further encourage residents to utilize sustainable travel modes, the development will lease parking spaces separately from the cost to rent a unit. This is more equitable and efficient since occupants are not forced to pay for parking they do not need and allows consumers to adjust their parking supply to reflect their needs.

This is an important factor as residents are notified at the onset of the project that parking is proposed to be provided as an additional cost in lieu of the price to rent a unit.

7.2.3 Bike Share Station

Bike sharing is a program where there could be a promotional opportunity to encourage cycling and make access to bicycles simpler for those working as well as visiting the site.

Should the SOBI wish to locate a station on the property at their own expense, the development would work with SOBI to accommodate a mutual aggregable location.

7.2.4 Car Share

Car sharing programs are services that provide members with access to a fleet of vehicles, usually on an hourly basis. It is an increasingly effective way of encouraging people to reconsider purchasing a car, or in some cases acquiring a second car. Success of car sharing programs relies upon having cars in conveniently located areas with parking spaces allocated directly to the service. This development will allocate two (2) surface parking spaces for the use of a carshare vehicle.

7.3 Optional Strategies

In addition to the strategies above, the applicant may wish to implement more strategies. The following strategies are strictly optional, and the applicant should weigh each carefully before implementing to both ensure it is cost-effective and does not adversely impact the overall community (such as parking spillover).

7.3.1 Presto Pass

To create a climate in which sustainable transportation is considered "the norm", a ten-dollar presto pass could be considered for each unit of the residential component during the initial opening. This would help create and establish a culture of transit use amongst the development.

7.3.2 Live Transit Information

Live transit information, such as next scheduled departure for transit vehicles can be permanently displayed in a central location such as the lobby of the hotel and residential building. Displaying this information allows passengers to time their trips appropriately and stay in a climate-controlled area during times of severe weather.

7.3.3 Bike Share Pass

To encourage residents on site to use the program, reduced rates or complementary one-month memberships could be provided to residents which could lead to their permanent participation in the program.

7.3.4 On-Site Bicycle Repair Facilities

Providing basic tools for keeping bicycles in good working order can encourage residents to try biking and keep them riding. Bicycle repair facilities, such as hand tools and an air compressor for tires, are a small investment that can keep bicycles in circulation and maximize bicycle trips.

Do-it-yourself bicycle repair stands are proposed to be provided, including tire gauges, air pumps, wrenches, and other tools for minor repairs. A repair facility could be located within the underground parking garage for use by residents and a secondary facility be located adjacent the commercial block for use by employees.

7.4 Evaluation of TDM

Table 7.1 summarizes the City of Hamilton's Evaluation form for TDM measures. The form indicates the site has ten (10) measures provided to the "High Level of Provision" and up to seven (7) measures provided to the "Modest Level of Provision." This suggests the site is above average for supporting high provisions and average for supporting moderate provision of TDM.

TABLE 7.1: TDM CHECKLIST

Category	TDM Initiative	Not Applicable	Modest* level of provision	High* level of provision
Cycling	Visible, well-lit, short-term bicycle parking for visitors (above minimum provisions or recommendations)			X
	Secure, indoor bicycle parking storage spaces for tenants/residents			X
	Ensure development connects to bicycle network		X	X
Walking	Safe, attractive and direct walkways for pedestrians linking building entrances with public sidewalks and with key destinations such as schools			X
	Enhanced pedestrian amenities on-site (benches, landscaping, lighting)		X	
Transit	Enhance walking routes between main building entrance(s) and transit stops/stations			X
	Provide weather-protected waiting areas		X	
	Bicycle parking located at or near transit stops		X	
	Provision of transit information on-site and adjacent to stops/stations	X		
	Implement transit priority measures (queue jump lanes, traffic signal priority, bus only lanes)	X		
Parking	Provide no more than the minimum number of required spaces for residents and visitors			X
	Reduced minimum parking requirements based on proximity to transit			X
	Cash-in-lieu of parking to fund public parking or fund sustainable transportation	X		
	Shared parking with nearby developments or on-street spaces	X		
	Reduced minimum parking requirements based on provision of dedicated carshare vehicle parking spaces		X	
	Unbundle parking costs from unit costs			X
Carshare/ Bikeshare	On-site carshare vehicles(s)			X
	On-site bikeshare facility		X	
Wayfinding and Travel Planning	Travel planning resources for residents (individualized marketing, active transportation maps, community resources)			X
	Wayfinding signage to major destinations such as schools, public amenities, and commercial areas	X		
Education/ Promotion, Incentives	Contribute to building a strong TDM brand		X	
	Include transit and active transportation maps, annual transit passes, carshare memberships, and/or bikeshare memberships with new home/condo purchase	X		

***Definitions for "Modest" and "High" are relative to a typical development of the same type and will be further bench marked through annual review. **Staff comments to be provided on the following page.**

Project Name: 354 King Street West

Checklist evaluation:

# measures N/A:	6	26% < 50% modest provision **= below average ***
# measures modest provision:	7	30% > 50% modest provision **= average***
# measures high provision:	10	43% > 10% high provision **= above average***

8 Conclusions

8.1 Conclusions

This study evaluated the transportation impacts associated within the construction of 154 hotel suites and 325 residential units on the northwest corner of King Street West and Queen Street North. The proposed development is projected to generate between 178 – 239 new vehicle trips during the peak hours. Vehicle access is proposed by four driveway connections to King Street West, Queen Street North, and Market Street. A preliminary review of the proposed driveway locations has also been undertaken:

- The full movement driveway connection (Driveway D) to Market Street is spaced between 60 m – 90 m from adjacent unsignalized intersections and is adequately positioned.
- The restricted driveway connections (Driveway A, B and C) will be spaced between 45 m to 90 m from the signalized intersection of King Street West and Queen Street and between 25 m to 95 m from adjacent unsignalized intersections. Given the limited frontage along King Street West and Queen Street North, and these driveways being restricted to right in/out, these driveways are forecast to operate efficiently and safely without any issues related to sightlines, corner clearance, access conflicts, heavy truck movements and transit operational conflicts.

Transportation Impacts

Detailed traffic analysis was conducted for each of the study area intersections under Base Year (2020) traffic conditions and 2027 Background and Total traffic conditions. As requested by the City of Hamilton, two scenarios for the 2027 horizon have been undertaken. An interim scenario that assumes Queen Street south of King Street West is converted to two-way operation and a secondary scenario that assumes rapid transit is implemented along King Street West. Based on traffic data and analyses completed, the following is noted:

- **King Street West at Queen Street** – Individual movements at the signalized intersection of Queen Street at King Street West operate at LOS C or better under the Base year traffic conditions. Under the 2027 interim and rapid transit scenario, increased delay is projected for a number of movements (with or without the development). A feasible improvement option would be optimizing signal timings to better reflect the changes in traffic patterns.

  In addition to the operation assessment, a queue assessment has been completed along Queen Street North. The 95th percentile queue length as reported by SimTraffic for the southbound approach is 51 metres under the interim scenario and 73 metres under the rapid

transit scenario. The upstream unsignalized intersection of Queen Street and Market Street is located 75 metres and not anticipated to encounter vehicle blockages.

- **King Street West at Ray Street** – Individual movements at the unsignalized intersection of Ray Street at King Street West operate at LOS C or better under the Base year traffic conditions with similar operation expected under the 2027 interim scenario. However, under the 2027 rapid transit scenario, the intersection is expected to see increased delay and queue lengths for the southbound right turn movement during the weekday PM peak hour.

  Reviewing existing traffic volumes for this intersection notes the southbound right turn volume during the weekday PM peak hour is unusually high. As Ray Street North provides access to a predominately residential neighbourhood, the directional distribution of trips should have a higher number of inbound trips (i.e. vehicles returning home from work). However, the existing volumes suggest the opposite, with a higher number of outbound trips occurring. The high volume of southbound right turns is most likely a result of traffic travelling southbound on Queen Street North, cutting through the local roadways and continuing westward along King Street West to avoid delay at the signalized intersection of King Street West and Queen Street. The cut-through vehicles are most likely contributing to reduced capacity under the rapid transit scenario.

  A feasible improvement option to address cut-through traffic could be through a number of traffic calming measures. As these measures have the potential to reduce traffic volumes along the area roadway, improved capacity and operations are expected to occur for the King Street West and Ray Street North intersection. As this is an existing issue, further review by the City of Hamilton is recommended.

- **Neighbourhood Impacts -** The local area intersection that will see the largest increase in traffic is Ray Street North at Market Street. With the expected increase in traffic due to development, there is a negligible increase in delay during the peak hours. In terms of traffic north of the study area, the additional traffic resulting from the proposed development is expected to be up to 25 vehicles during the respective peak hours. It is recognized that the development will increase traffic on the study area roadways and this traffic may be noticed by at least some of the adjacent residents who will perceive it to be a nuisance, however the increased traffic volumes are not expected to be sufficient that motorists will notice any major deterioration in level of service. However, based on feedback received from the area residents, the Applicant is proposing to implement the following initiatives:

  - implementing a number of Transportation Demand Management measures to curb the developments dependency towards vehicular traffic.

- Traffic calming improvements along Ray Street, north of Market Street to discourage development traffic infiltrating the local roadway network.

Transportation Demand Management

The site plan proposes several TDM measures as identified by the City of Hamilton's TDM Guide for Development. These measures include:

- Sidewalk connections linking the dwelling units to the existing municipal sidewalks;
- Located adjacent to Light Rail Transit;
- 166 Long-term bicycle parking spaces;
- 5 Short-term bicycle parking spaces;
- Welcome packet provided to residents outlining schedules for local and regional transit services, bicycle and trail networks and the location of retail and recreational establishments;
- Unbundled parking for the residential units;
- Should the SOBI wish to locate a station on the property at their own expense, the development would work with SOBI to accommodate a mutual aggregable location; and
- Allocate two (2) surface parking spaces for the use of a carshare vehicle.

8.2 Recommendations

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

- City of Hamilton optimize signals at King Street West and Queen Street, if necessary, after occupancy to better support the future traffic volumes and travel patterns.
- City of Hamilton review traffic within the Strathcona neighbourhood to identify if cut-through traffic is occurring.
- The TDM strategies proposed and through design as outlined in Chapter 7 be implemented by the development to encourage sustainable travel modes.
- The Applicant provide traffic calming measures along Ray Street, north of Market Street to discourage development traffic infiltrating the local roadway network.

Appendix A

Terms of Reference

Adam Makarewicz

From: Macdonald, Greg <Greg.Macdonald@hamilton.ca>
Sent: 16-Jul-19 9:39 AM
To: Adam Makarewicz
Cc: Lucas, Sandra; Groen, Harold; Andrew Brown
Subject: RE: (190322) 354 King Street West - TIA Scope of Work (Ward 1) OPA

Hello Adam,

Thank-you for running by the LRT Office the below noted terms of reference that you and Sandra had developed for a TIS to be completed as part of a future complete application for an Official Plan Amendment and Zoning By-law Amendment to allow for further increases in height/density as part of the development at 354 King Street West (which is currently under review via DA-18-096 – although a future site plan amendment would be needed). Just a couple of points of clarification. While we will provide the TIS to Metrolinx for their review and possible comments, the actual requirement for the TIS is not from the LRT Office or Metrolinx (i.e. neither our office nor Metrolinx would be formally approving or clearing the condition for the study however we would provide our feedback on the TIS to Transportation Planning and Development Planning). While Metrolinx had commented initially on the original Site Plan (DA-18-096) on the need for a TIS, since that time it was communicated to Development Planning that should a TIS be required by the City of Hamilton as part of a planning process that the requirement for it would not come from either the cities LRT Office or Metrolinx, but rather from Transportation Planning. That is why a TIS wasn't required as part of the original Site Plan (for the 6 and 10-storey buildings). It is my understanding that a TIS is required (albeit a scoped TIS) from Transportation Planning for the upcoming submission of a UHOPA/ZBA to further increase density.

However, getting into the specifics of your questions, firstly in regards to the lane configuration post LRT implementation (note that these could in theory be subject to further change):

i. - Yes, you are correct.
ii. – Yes, you are correct (no left turns in or out of site to/from King)
iii. – This is somewhat changed due to the upcoming 2-way conversion of Queen Street from Aberdeen to Main. Once the conversion happens, under future LRT conditions there would only be 2 through southbound lanes from Queen Street North and then a 3rd southbound right turn lane onto King Street (whether it is a slip lane or not could depend on the truck route study ongoing). This would likely be the same configuration under a non-LRT scenario here.
iv. – Yes, you are correct. HOWEVER, that traffic lane on King Street East would only start at Margaret Street so would only be carrying any traffic picked up by Margaret Street (only traffic coming from Main), Locke Street (only southbound traffic from Locke turning east onto King) and Pearl Street (only traffic coming from Main) and therefore this east bound lane on King would function as more of a local road in this area.
v. Yes, you are correct. Note that it is now proposed at King and Caroline a change to allow for all through and right-turn movements at that intersection (previous plans did not allow north/south crossings of the guideway).

For the most recent LRT traffic studies you can go to the below noted link. Scroll down and Appendix E-2 is the "Wider Area Impacts Report", which is essentially the LRT Traffic Study. Next is Appendix E-3, the VISSIM Modelling Report (i.e. the LRT traffic model). They are publically available at that link.

https://www.hamilton.ca/city-initiatives/priority-projects/2017-environmental-project-report-addendum

If you have any further questions do not hesitate to contact me.

Sincerely,

Greg Macdonald

Greg Macdonald, MCIP, RPP
Senior Project Manager, Planning
Light Rail Transit Office | City of Hamilton
T: 905.546.2424 x. 6223

From: Adam Makarewicz [mailto:amakarewicz@ptsl.com]
Sent: July-11-19 11:53 AM
To: Macdonald, Greg
Cc: Andrew Brown
Subject: RE: (190322) 354 King Street West - TIA Scope of Work (Ward 1) OPA

Hi Greg,

We have been retained to conduct a TIS for a proposed hotel/residential development at 354 King Street West in Hamilton. The site is located on the north side of King Street West between Queen Street North and Ray Street North. A total of 126 hotel suites and 78 residential units are proposed. Vehicle access is proposed via two driveways to King Street West as well as an access to Market Street and Queen Street North. A site plan is enclosed for your reference.

The City's Transportation Planning department has advised that we should reach out to the LRT Office to confirm the requirements of the TIS given the site is located adjacent to the Main/King/Queenston B-Line LRT corridor. Our work plan is noted further below in the email with additional comments provided by Transportation Planning. Can you advise if there are any additional requirements from the LRT office.

Additionally, can you also confirm the future lane configuration post LRT implementation is consistent with the following:

i. King Street West from Ray Street North to Queen Street North will have one (1) westbound traffic lane on the north side
ii. No left turns will be permitted into or out of this site from King St;
iii. Queen Street North between Market Street and King Street West will have three (3) southbound through lanes plus a potential southbound right turn lane to facilitate truck movements to King Street West;
iv. Due to the alignment of the LRT, eastbound traffic on King Street West will be required to turn right and travel southbound on Ray Street North;
v. King Street West, east of Hess Street will have one (1) westbound lane on the north side and one (1) eastbound lane on the south side of the street;

Regards,

Adam J. Makarewicz, Dipl.T., C.E.T. MITE
Senior Project Manager

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge ON N1R 8J8
p: 905.381.2229 x303
e: amakarewicz@ptsl.com
w: www.ptsl.com

From: Transportation Planning <Transportation.Planning@hamilton.ca>
Sent: 26-Jun-19 1:27 PM
To: Ashley Paton (apaton@gspgroup.ca) <apaton@gspgroup.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>; Andrew Brown <abrown@ptsl.com>; Jazvac, Kathy <Kathy.Jazvac@hamilton.ca>
Subject: RE: (190322) 354 King Street West - TIA Scope of Work (Ward 1) OPA

Good afternoon Ashley,

As per our conversation with Kathy on June 24th, Transportation Planning did not require a TIS for this site under DA-18-096 however, it is our understanding you are now applying for an OPA based on density and/or height.
This requires a TIS be competed to the satisfaction of the Manager of Transportation Planning and is to specifically analyze the anticipated trip distribution and routes to/from the subject site under the road and lane configuration post LRT implementation and Queen Street two-way conversion.

Comments from the DA application noted a TIS was required by Metrolinx. We suggest you contact the LRT office to confirm their requirements, if any. Although it is not clear what the expectations are from Metrolinx for a TIS, Transportation Planning requires trip distribution analysis. This analysis can be incorporated into the Metrolinx TIS and must be clearly documented and noted as such. Alternately, a separate report can be submitted to the City. This analysis, whether separate or imbedded in the Metrolinx TIS is to be submitted to the satisfaction of the Manager, Transportation Planning. We reserve the right to alter the scope, as more information is obtained, and after review of the submitted TIS.

1. This Transportation Impact Study is to specifically analyze the trip distribution and routes to/from the subject site under:
    a. The road and lane configuration post LRT implementation:
        i. King Street West from Ray Street North to Queen Street North will have one (1) westbound traffic lane on the north side
        ii. No left turns will be permitted into or out of this site from King St;
        iii. Queen Street North between Market Street and King Street West will have three (3) southbound through lanes plus a potential southbound right turn lane to facilitate truck movements to King Street West;
        iv. Due to the alignment of the LRT, eastbound traffic on King Street West will be required to turn right and travel southbound on Ray Street North;
        v. King Street West, east of Hess Street will have one (1) westbound lane on the north side and one (1) eastbound lane on the south side of the street;
        vi. All to be confirmed with the LRT office prior to commencement of the analysis.

2. Queen Street will be converted to two-way: please confirm details of limits and timing with Robert.Decleir@hamilton.ca
3. Ensure the most up to date site plan and access configuration is analysed: please confirm with the Applicant and/or Ashley Paton.
4. Amongst other detail we would like you to determine how vehicles will
    a. access 403 eastbound? 403 westbound?
    b. Can Market Street accommodate the trips?
    c. Any other routes that are necessary for movements to north, south, east and westbound destinations.
5. Please provide clear recommendations.
6. All Synchro files, in digital format, are to be forwarded with the report.
7. Please submit a TIS cover sheet (attached) with information filled-in.
8. The City may have useable traffic volume counts available for purchase. The traffic consultant is to contact trafficops@hamilton.ca with a cc to tplanning@hamilton.ca. Please reference the address and file number of the development.
9. Regardless of age of the traffic volume data, a minimum one-hour field observations during the peak hour must be undertaken at each affected intersection to verify that traffic volumes through each intersection reflect actual demand and to confirm the necessary adjustment factors for level of service calculations.
10. Any analysis within the TIS must use the existing signal timings. Optimized signal timings are permissible only when existing timing analysis is also provided in the review. For information on existing traffic signal timings contact trafficops@hamilton.ca with a cc to tplanning@hamilton.ca, with a subject line of 354 King Street West OPA (Ward 1) traffic signal timings.
11. The peak hours utilized must be suitable for the subject development i.e.; retail will include Saturday peak hours.
12. A growth rate of 2% per annum, compounded, plus available background growth information should be used unless the proponent can provide a justifiable alternative.
13. The existing base year plus the (5) five-year horizon from full build-out must be identified in the TIS.
14. As required by the City TIS guidelines, the Traffic Consultant is to approach and receive information from the planner on file, regarding the approved developments in the study area.
15. Ensure all trip generation assumptions and adjustments assumed in the calculation of vehicle trips are supported and well documented. For example, please include 2011 Transportation Tomorrow Survey data and query criteria used to estimate any travel modal split, trip distribution and assignment. Sensitivity analysis should be undertaken where trip generation parameters have the potential to vary considerably and most probable values cannot be readily identified. This information is required to enable the City to duplicate/verify the results.
16. Trip generation is to be obtained using the current edition of Institute of Transportation Engineers' (ITE) Trip Generation Manual data. The proponent should provide a copy of the relevant pages within the appendix.
17. Any reduction of trips should be demonstrated through the implementation of the TDM measures identified in the TDM options report.
18. Include existing, future and proposed multi-modal review.

A few comments added to the proposed TIA list below.

The applicant is required to submit a TDM Report for a MIXED-USE development. Please refer to the TDM for Development Guidelines section 3. D Mixed Use, see page 31 for specific details. Additional requirements for report writing can be found on page 5 (https://www.hamilton.ca/develop-property/policies-guidelines/transportation-demand-management-land-development-guidelines).

You are welcome to contact this office through tplanning@hamilton.ca if you require any further information or clarification.

Thank you.

Sandra Lucas
Senior Project Manager, Transportation Planning

On behalf of Transportation Planning

From: Andrew Brown <abrown@ptsl.com>
Sent: May 13, 2019 12:46 PM
To: Transportation Planning <Transportation.Planning@hamilton.ca>
Cc: Adam Makarewicz <amakarewicz@ptsl.com>
Subject: (190322) 354 King Street West - TIA Scope of Work

Greetings,

Paradigm has been retained to undertake a Transportation Impact Assessment and Transportation Demand Management Options Report for a proposed hotel/residential development at 354 King Street West in Hamilton. The site is located on the north side of King Street West between Queen Street North and Ray Street North. A total of 126 hotel suites and 78 residential units are proposed. Vehicle access is proposed via two driveways to King Street West as well as an access to Market Street and Queen Street North. A site plan is enclosed for your reference.

The Terms of Reference for the study will follow the City of Hamilton Traffic Impact Study Guidelines (2009). The following items supplement these guidelines:

1. The public roadway intersections to be analyzed will be:
    - King Street West at Queen Street North (signalized);
    - King Street West at Ray Street North/South (unsignalized);
    - Market Street at Ray Street North (unsignalized); and
    - Four site driveways (unsignalized).

2. To reflect the peak use of the site being a combination of residential and hotel guests, the weekday AM/PM peak hours as well as the Saturday peak hour will be analyzed.

3. New traffic counts will be conducted if existing count data on file with the City is older than two years.

4. Base Year (2019) and five years beyond occupancy (2026) will be included in the analysis. **Please make sure full build-out year is attainable and include all proposed units as per the OPA proposal.**

5. Review TTS data for the area and consider the percentage of trips made by alternative modes of travel.

6. Trip generation will be based on ITE rates. **Please do not reduce these rates for alternate transportation in your analysis. Reductions will be part of the TDM portion of the report and we would like them separated for review and acceptance of assumptions.**

7. Trip distribution will be based on the Transportation Tomorrow Survey (TTS), existing travel patterns and most logical routes to the arterial road network.

8. General background growth will be accounted for at 2.0% per annum, **compounded over the study years.**

9. Traffic growth from nearby developments will be accounted for. We will reference the City's Development Applications Mapping website and develop a list of developments within the vicinity of the subject site. We will circulate the list to the City for confirmation. **Please contact Kathy Jazvac and/or Shannon McKie.**

10. Assessment of a TDM Plan to reduce the project's overall traffic/parking impact through the implementation of measures that are aimed at affecting the demand side of the transportation equation. **As noted in no. 6 please do not reduce the ITE trip gen rates for alternate transportation in your analysis. Reductions will be part of the TDM portion of the report and we would like them separated for review and acceptance of assumptions.**

We respectfully request your review and approval of these proposed Terms of Reference by **Monday May 20th**. Should you have any question or require additional information, please do not hesitate to contact me.

Thank you and regards,

Andrew Brown, Dipl. T., MITE
Transportation Consultant

Paradigm Transportation Solutions Limited
5A-150 Pinebush Road, Cambridge, ON N1R 8J8
p: 905.381.2229 x307
e: abrown@ptsl.com
w: www.ptsl.com

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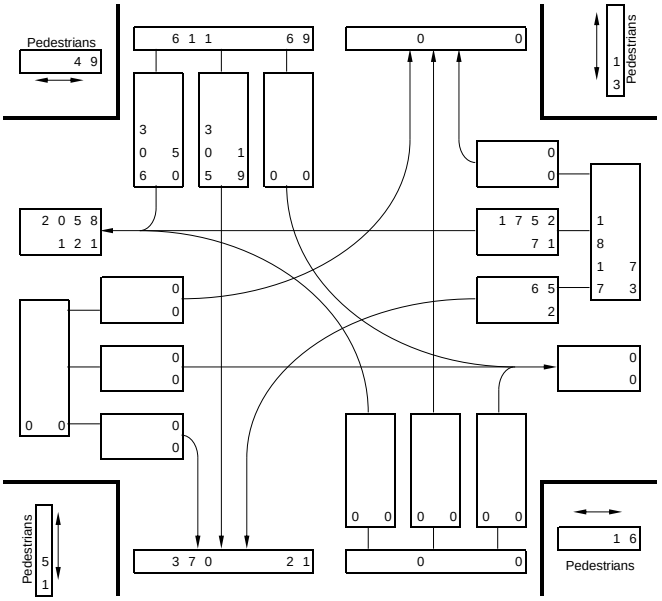
Appendix B

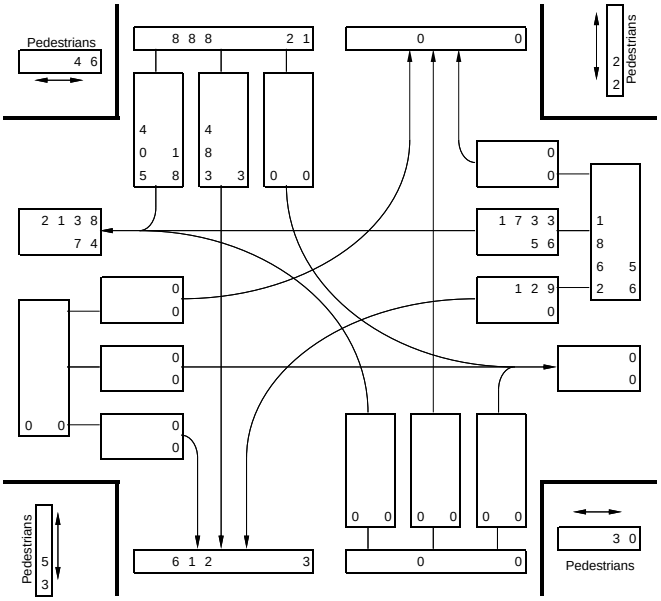
Traffic Data

City of Hamilton **TURNING MOVEMENT FLOW CHART** Loc. Code: 5518

Intersection: **King St W** **at** **Queen St** Total Vehicles: 16,297 Date: Tuesday
Direction: (East/West) (North/South) M.V.E./Year: 11.525 Dec 10, 2019
Road Condition: Dry Weather: Overcast AWDT Factor: 2.08 Period: 7 hours
Comments:

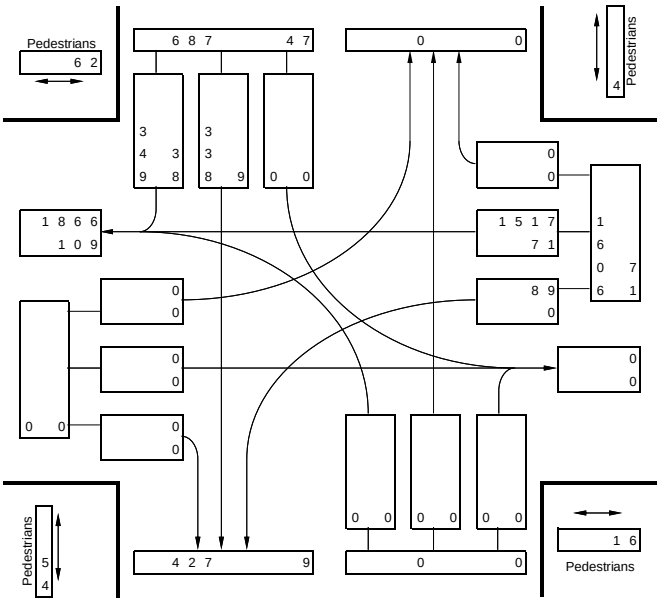


A.M. PEAK HOUR = 8:00 AM - 9:00 AM

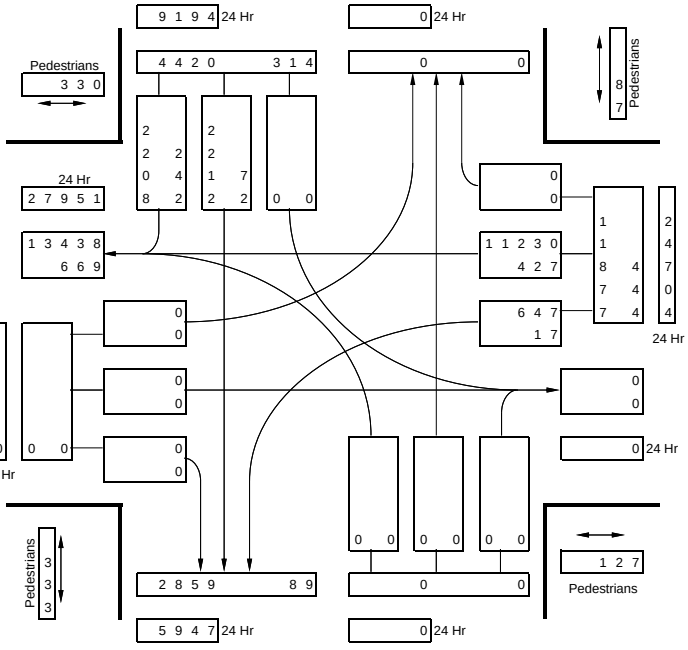


P.M. PEAK HOUR = 4:45 PM - 5:45 PM

N



NORMAL HOUR = 2:30 PM - 3:30 PM



7 Hr & 24 Hr TOTAL VOLUMES

City of Hamilton **TURNING MOVEMENT COUNT** Loc. Code: 5518

Intersection: **King St W** **at** **Queen St** Total Vehicles: 16,297 Date: Tuesday
Direction: (East/West) (North/South) M.V.E./Year: 11.525 Dec 10, 2019
Road Condition: Dry Weather: Overcast AWDT Factor: 2.08 Period: 7 hours
Comments:

TOTAL VEHICLES

15 mins. Ending	North Bd. on N/S			East Bd. on E/W			South Bd. on N/S			West Bd. on E/W			Total	Pedestrians N	E	S	W
(Pk.Hr.*)	L	S	R	L	S	R	L	S	R	L	S	R	Veh's	side	side	side	side
7:15	0	0	0	0	0	0	0	29	40	8	480	0	557	1	3	1	3
7:30	0	0	0	0	0	0	0	44	46	15	460	0	565	7	2	1	5
7:45	0	0	0	0	0	0	0	33	60	13	441	0	547	7	8	1	11
8:00	0	0	0	0	0	0	0	57	81	28	425	0	591	6	1	0	8
8:15 *	0	0	0	0	0	0	0	58	63	11	463	0	595	7	3	1	11
8:30 *	0	0	0	0	0	0	0	88	80	16	420	0	604	14	2	5	13
8:45 *	0	0	0	0	0	0	0	67	78	21	452	0	618	16	7	6	15
9:00 *	0	0	0	0	0	0	0	92	85	17	417	0	611	12	1	4	12
9:15	0	0	0	0	0	0	0	68	52	20	373	0	513	16	0	5	15
9:30	0	0	0	0	0	0	0	51	60	21	321	0	453	13	3	2	11
9:45	0	0	0	0	0	0	0	49	46	19	312	0	426	12	0	5	14
10:00	0	0	0	0	0	0	0	48	69	25	332	0	474	9	3	5	13
13:45	0	0	0	0	0	0	0	75	73	31	368	0	547	8	2	6	4
14:00	0	0	0	0	0	0	0	53	58	29	352	0	492	20	5	6	16
14:15	0	0	0	0	0	0	0	65	71	38	362	0	536	14	1	5	12
14:30	0	0	0	0	0	0	0	66	82	22	373	0	543	13	5	10	10
14:45 *	0	0	0	0	0	0	0	77	73	29	374	0	553	12	1	2	10
15:00 *	0	0	0	0	0	0	0	75	73	21	384	0	553	12	1	3	8
15:15 *	0	0	0	0	0	0	0	91	102	21	373	0	587	21	0	3	17
15:30 *	0	0	0	0	0	0	0	95	101	18	386	0	600	17	2	8	19
16:15	0	0	0	0	0	0	0	105	111	20	425	0	661	8	8	8	9
16:30	0	0	0	0	0	0	0	116	116	20	407	0	659	11	2	4	12
16:45	0	0	0	0	0	0	0	114	97	25	428	0	664	13	3	2	12
17:00 *	0	0	0	0	0	0	0	119	94	30	406	0	649	10	5	8	19
17:15 *	0	0	0	0	0	0	0	126	105	34	404	0	669	10	8	11	13
17:30 *	0	0	0	0	0	0	0	121	113	23	494	0	751	13	3	4	9
17:45 *	0	0	0	0	0	0	0	117	93	42	429	0	681	13	6	7	12
18:00	0	0	0	0	0	0	0	113	86	30	369	0	598	15	2	4	20
TOTAL	0	0	0	0	0	0	0	2,212	2,208	647	11,230	0		330	87	127	333
APPR.		0			0			4,420			11,877		16,297			877	

TRUCKS & BUSES

15 mins. Ending	North Bd. on N/S			East Bd. on E/W			South Bd. on N/S			West Bd. on E/W			
(Pk.Hr.*)	L	S	R	L	S	R	L	S	R	L	S	R	Total
7:15	0	0	0	0	0	0	0	2	4	0	9	0	15
7:30	0	0	0	0	0	0	0	3	4	1	9	0	17
7:45	0	0	0	0	0	0	0	4	16	0	16	0	36
8:00	0	0	0	0	0	0	0	3	15	0	13	0	31
8:15 *	0	0	0	0	0	0	0	1	8	0	14	0	23
8:30 *	0	0	0	0	0	0	0	9	15	1	22	0	47
8:45 *	0	0	0	0	0	0	0	8	14	1	19	0	42
9:00 *	0	0	0	0	0	0	0	1	13	0	16	0	30
9:15	0	0	0	0	0	0	0	2	2	1	16	0	21
9:30	0	0	0	0	0	0	0	4	13	3	18	0	38
9:45	0	0	0	0	0	0	0	0	11	2	18	0	31
10:00	0	0	0	0	0	0	0	4	10	0	11	0	25
13:45	0	0	0	0	0	0	0	4	6	3	17	0	30
14:00	0	0	0	0	0	0	0	2	5	2	15	0	24
14:15	0	0	0	0	0	0	0	1	12	1	17	0	31
14:30	0	0	0	0	0	0	0	1	9	1	13	0	24
14:45 *	0	0	0	0	0	0	0	1	11	0	19	0	31
15:00 *	0	0	0	0	0	0	0	5	8	0	16	0	29
15:15 *	0	0	0	0	0	0	0	2	13	0	21	0	36
15:30 *	0	0	0	0	0	0	0	1	6	0	15	0	22
16:15	0	0	0	0	0	0	0	1	10	1	19	0	31
16:30	0	0	0	0	0	0	0	2	7	0	17	0	26
16:45	0	0	0	0	0	0	0	7	11	0	13	0	31
17:00 *	0	0	0	0	0	0	0	2	7	0	19	0	28
17:15 *	0	0	0	0	0	0	0	0	5	0	9	0	14
17:30 *	0	0	0	0	0	0	0	1	3	0	13	0	17
17:45 *	0	0	0	0	0	0	0	0	3	0	15	0	18
18:00	0	0	0	0	0	0	0	1	1	0	8	0	10
TOTAL	0	0	0	0	0	0	0	72	242	17	427	0	
APPR.		0			0			314			444		758

TRUCKS

7:15	0	0	0	0	0	0	0	1	4	0	3	0	8
7:30	0	0	0	0	0	0	0	3	4	0	1	0	8
7:45	0	0	0	0	0	0	0	3	16	0	6	0	25
8:00	0	0	0	0	0	0	0	2	14	0	2	0	18
8:15 *	0	0	0	0	0	0	0	1	8	0	3	0	12
8:30 *	0	0	0	0	0	0	0	3	13	1	4	0	21
8:45 *	0	0	0	0	0	0	0	6	13	1	3	0	23
9:00 *	0	0	0	0	0	0	0	1	12	0	6	0	19
9:15	0	0	0	0	0	0	0	2	2	0	4	0	8
9:30	0	0	0	0	0	0	0	4	13	3	8	0	28
9:45	0	0	0	0	0	0	0	0	11	2	5	0	18
10:00	0	0	0	0	0	0	0	4	10	0	3	0	17
13:45	0	0	0	0	0	0	0	4	6	3	8	0	21
14:00	0	0	0	0	0	0	0	2	5	2	9	0	18
14:15	0	0	0	0	0	0	0	1	12	1	9	0	23
14:30	0	0	0	0	0	0	0	1	9	1	4	0	15
14:45 *	0	0	0	0	0	0	0	1	10	0	4	0	15
15:00 *	0	0	0	0	0	0	0	2	8	0	4	0	14
15:15 *	0	0	0	0	0	0	0	1	11	0	4	0	16
15:30 *	0	0	0	0	0	0	0	0	6	0	5	0	11
16:15	0	0	0	0	0	0	0	1	10	0	4	0	15
16:30	0	0	0	0	0	0	0	1	7	0	5	0	13
16:45	0	0	0	0	0	0	0	3	11	0	5	0	19
17:00 *	0	0	0	0	0	0	0	2	7	0	4	0	13
17:15 *	0	0	0	0	0	0	0	0	5	0	2	0	7
17:30 *	0	0	0	0	0	0	0	0	3	0	1	0	4
17:45 *	0	0	0	0	0	0	0	0	3	0	2	0	5
18:00	0	0	0	0	0	0	0	0	1	0	1	0	2
TOTAL	0	0	0	0	0	0	0	49	234	14	119	0	
APPR.		0			0			283			133		416

City of Hamilton **TURNING MOVEMENT COUNT** Loc. Code: 5518

Intersection: **King St W** **at** **Queen St** Total Vehicles: 18,552 Date: Tuesday
Direction: (East/West) (North/South) Dec 10, 2019
Road Condition: Dry Weather: Overcast Period: 8 hours
Comments:

TOTAL VEHICLES

15 mins. Ending	North Bd. on N/S			East Bd. on E/W			South Bd. on N/S			West Bd. on E/W			Total	Pedestrians			
	L	S	R	L	S	R	L	S	R	L	S	R	Veh's	N side	E side	S side	W side
7:15	0	0	0	0	0	0	0	29	40	8	480	0	557	1	3	1	3
7:30	0	0	0	0	0	0	0	44	46	15	460	0	565	7	2	1	5
7:45	0	0	0	0	0	0	0	33	60	13	441	0	547	7	8	1	11
8:00	0	0	0	0	0	0	0	57	81	28	425	0	591	6	1	0	8
8:15	0	0	0	0	0	0	0	58	63	11	463	0	595	7	3	1	11
8:30	0	0	0	0	0	0	0	88	80	16	420	0	604	14	2	5	13
8:45	0	0	0	0	0	0	0	67	78	21	452	0	618	16	7	6	15
9:00	0	0	0	0	0	0	0	92	85	17	417	0	611	12	1	4	12
9:15	0	0	0	0	0	0	0	68	52	20	373	0	513	16	0	5	15
9:30	0	0	0	0	0	0	0	51	60	21	321	0	453	13	3	2	11
9:45	0	0	0	0	0	0	0	49	46	19	312	0	426	12	0	5	14
10:00	0	0	0	0	0	0	0	48	69	25	332	0	474	9	3	5	13
13:45	0	0	0	0	0	0	0	75	73	31	368	0	547	8	2	6	4
14:00	0	0	0	0	0	0	0	53	58	29	352	0	492	20	5	6	16
14:15	0	0	0	0	0	0	0	65	71	38	362	0	536	14	1	5	12
14:30	0	0	0	0	0	0	0	66	82	22	373	0	543	13	5	10	10
14:45	0	0	0	0	0	0	0	77	73	29	374	0	553	12	1	2	10
15:00	0	0	0	0	0	0	0	75	73	21	384	0	553	12	1	3	8
15:15	0	0	0	0	0	0	0	91	102	21	373	0	587	21	0	3	17
15:30	0	0	0	0	0	0	0	95	101	18	386	0	600	17	2	8	19
16:15	0	0	0	0	0	0	0	105	111	20	425	0	661	8	8	8	9
16:30	0	0	0	0	0	0	0	116	116	20	407	0	659	11	2	4	12
16:45	0	0	0	0	0	0	0	114	97	25	428	0	664	13	3	2	12
17:00	0	0	0	0	0	0	0	119	94	30	406	0	649	10	5	8	19
17:15	0	0	0	0	0	0	0	126	105	34	404	0	669	10	8	11	13
17:30	0	0	0	0	0	0	0	121	113	23	494	0	751	13	3	4	9
17:45	0	0	0	0	0	0	0	117	93	42	429	0	681	13	6	7	12
18:00	0	0	0	0	0	0	0	113	86	30	369	0	598	15	2	4	20
18:15	0	0	0	0	0	0	0	122	80	36	375	0	613	7	2	7	15
18:30	0	0	0	0	0	0	0	94	75	29	358	0	556	2	4	3	5
18:45	0	0	0	0	0	0	0	86	63	27	353	0	529	7	4	2	9
19:00	0	0	0	0	0	0	0	82	70	40	365	0	557	7	2	4	6
TOTAL	0	0	0	0	0	0	0	2,596	2,496	779	12,681	0		353	99	143	368
APPR.		0			0			5,092			13,460		18,552			963	

TRUCKS & BUSES

15 mins. Ending	North Bd. on N/S			East Bd. on E/W			South Bd. on N/S			West Bd. on E/W			
	L	S	R	L	S	R	L	S	R	L	S	R	Total
7:15	0	0	0	0	0	0	0	2	4	0	9	0	15
7:30	0	0	0	0	0	0	0	3	4	1	9	0	17
7:45	0	0	0	0	0	0	0	4	16	0	16	0	36
8:00	0	0	0	0	0	0	0	3	15	0	13	0	31
8:15	0	0	0	0	0	0	0	1	8	0	14	0	23
8:30	0	0	0	0	0	0	0	9	15	1	22	0	47
8:45	0	0	0	0	0	0	0	8	14	1	19	0	42
9:00	0	0	0	0	0	0	0	1	13	0	16	0	30
9:15	0	0	0	0	0	0	0	2	2	1	16	0	21
9:30	0	0	0	0	0	0	0	4	13	3	18	0	38
9:45	0	0	0	0	0	0	0	0	11	2	18	0	31
10:00	0	0	0	0	0	0	0	4	10	0	11	0	25
13:45	0	0	0	0	0	0	0	4	6	3	17	0	30
14:00	0	0	0	0	0	0	0	2	5	2	15	0	24
14:15	0	0	0	0	0	0	0	1	12	1	17	0	31
14:30	0	0	0	0	0	0	0	1	9	1	13	0	24
14:45	0	0	0	0	0	0	0	1	11	0	19	0	31
15:00	0	0	0	0	0	0	0	5	8	0	16	0	29
15:15	0	0	0	0	0	0	0	2	13	0	21	0	36
15:30	0	0	0	0	0	0	0	1	6	0	15	0	22
16:15	0	0	0	0	0	0	0	1	10	1	19	0	31
16:30	0	0	0	0	0	0	0	2	7	0	17	0	26
16:45	0	0	0	0	0	0	0	7	11	0	13	0	31
17:00	0	0	0	0	0	0	0	2	7	0	19	0	28
17:15	0	0	0	0	0	0	0	0	5	0	9	0	14
17:30	0	0	0	0	0	0	0	1	3	0	13	0	17
17:45	0	0	0	0	0	0	0	0	3	0	15	0	18
18:00	0	0	0	0	0	0	0	1	1	0	8	0	10
18:15	0	0	0	0	0	0	0	3	3	0	9	0	15
18:30	0	0	0	0	0	0	0	2	1	0	13	0	16
18:45	0	0	0	0	0	0	0	1	0	0	9	0	10
19:00	0	0	0	0	0	0	0	1	3	1	5	0	10
TOTAL	0	0	0	0	0	0	0	79	249	18	463	0	
APPR.		0			0			328			481		809

TRUCKS

7:15	0	0	0	0	0	0	0	1	4	0	3	0	8
7:30	0	0	0	0	0	0	0	3	4	0	1	0	8
7:45	0	0	0	0	0	0	0	3	16	0	6	0	25
8:00	0	0	0	0	0	0	0	2	14	0	2	0	18
8:15	0	0	0	0	0	0	0	1	8	0	3	0	12
8:30	0	0	0	0	0	0	0	3	13	1	4	0	21
8:45	0	0	0	0	0	0	0	6	13	1	3	0	23
9:00	0	0	0	0	0	0	0	1	12	0	6	0	19
9:15	0	0	0	0	0	0	0	2	2	0	4	0	8
9:30	0	0	0	0	0	0	0	4	13	3	8	0	28
9:45	0	0	0	0	0	0	0	0	11	2	5	0	18
10:00	0	0	0	0	0	0	0	4	10	0	3	0	17
13:45	0	0	0	0	0	0	0	4	6	3	8	0	21
14:00	0	0	0	0	0	0	0	2	5	2	9	0	18
14:15	0	0	0	0	0	0	0	1	12	1	9	0	23
14:30	0	0	0	0	0	0	0	1	9	1	4	0	15
14:45	0	0	0	0	0	0	0	1	10	0	4	0	15
15:00	0	0	0	0	0	0	0	2	8	0	4	0	14
15:15	0	0	0	0	0	0	0	1	11	0	4	0	16
15:30	0	0	0	0	0	0	0	0	6	0	5	0	11
16:15	0	0	0	0	0	0	0	1	10	0	4	0	15
16:30	0	0	0	0	0	0	0	1	7	0	5	0	13
16:45	0	0	0	0	0	0	0	3	11	0	5	0	19
17:00	0	0	0	0	0	0	0	2	7	0	4	0	13
17:15	0	0	0	0	0	0	0	0	5	0	2	0	7
17:30	0	0	0	0	0	0	0	0	3	0	1	0	4
17:45	0	0	0	0	0	0	0	0	3	0	2	0	5
18:00	0	0	0	0	0	0	0	0	1	0	1	0	2
18:15	0	0	0	0	0	0	0	2	3	0	1	0	6
18:30	0	0	0	0	0	0	0	1	1	0	0	0	2
18:45	0	0	0	0	0	0	0	1	0	0	3	0	4
19:00	0	0	0	0	0	0	0	0	1	0	2	0	3
TOTAL	0	0	0	0	0	0	0	53	239	14	125	0	
APPR.		0			0			292			139		431

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Queen Street - Saturday
Site Code:
Start Date: 05/25/2019

Turning Movement Data

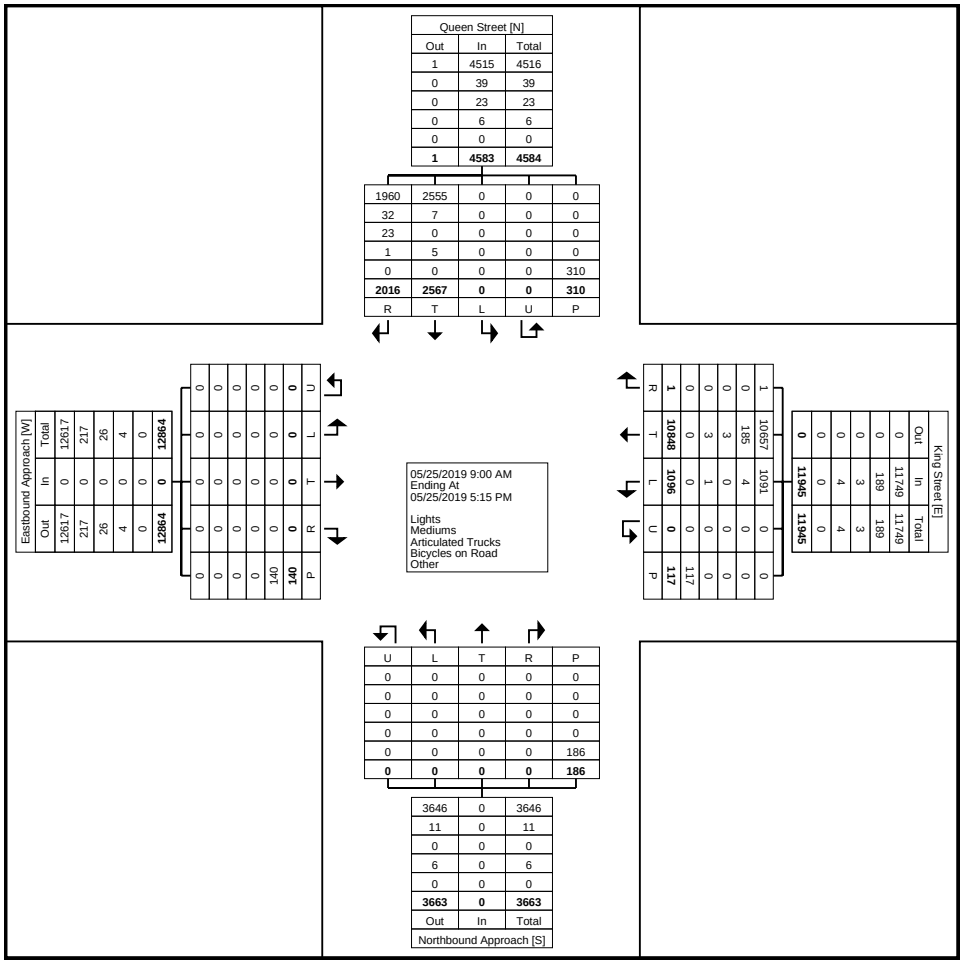
Start Time	Eastbound Approach Eastbound						King Street Westbound						Northbound Approach Northbound						Queen Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
9:00 AM	0	0	0	0	0	0	21	235	0	0	2	256	0	0	0	0	0	0	0	26	33	0	0	59	315
9:15 AM	0	0	0	0	2	0	12	209	0	0	1	221	0	0	0	0	1	0	0	40	34	0	3	74	295
9:30 AM	0	0	0	0	1	0	21	286	0	0	1	307	0	0	0	0	1	0	0	44	46	0	3	90	397
9:45 AM	0	0	0	0	2	0	24	285	0	0	0	309	0	0	0	0	2	0	0	32	48	0	8	80	389
Hourly Total	0	0	0	0	5	0	78	1015	0	0	4	1093	0	0	0	0	4	0	0	142	161	0	14	303	1396
10:00 AM	0	0	0	0	4	0	19	296	0	0	1	315	0	0	0	0	5	0	0	54	54	0	5	108	423
10:15 AM	0	0	0	0	7	0	27	303	0	0	2	330	0	0	0	0	7	0	0	39	59	0	2	98	428
10:30 AM	0	0	0	0	3	0	20	296	0	0	3	316	0	0	0	0	6	0	0	45	60	0	7	105	421
10:45 AM	0	0	0	0	1	0	31	307	0	0	2	338	0	0	0	0	1	0	0	65	51	0	4	116	454
Hourly Total	0	0	0	0	15	0	97	1202	0	0	8	1299	0	0	0	0	19	0	0	203	224	0	18	427	1726
11:00 AM	0	0	0	0	7	0	22	331	0	0	3	353	0	0	0	0	10	0	0	62	67	0	8	129	482
11:15 AM	0	0	0	0	8	0	30	310	1	0	6	341	0	0	0	0	8	0	0	73	71	0	7	144	485
11:30 AM	0	0	0	0	6	0	32	307	0	0	1	339	0	0	0	0	6	0	0	86	57	0	13	143	482
11:45 AM	0	0	0	0	5	0	31	359	0	0	2	390	0	0	0	0	4	0	0	74	60	0	4	134	524
Hourly Total	0	0	0	0	26	0	115	1307	1	0	12	1423	0	0	0	0	28	0	0	295	255	0	32	550	1973
12:00 PM	0	0	0	0	10	0	42	353	0	0	3	395	0	0	0	0	7	0	0	92	84	0	15	176	571
12:15 PM	0	0	0	0	4	0	37	345	0	0	6	382	0	0	0	0	6	0	0	85	71	0	10	156	538
12:30 PM	0	0	0	0	2	0	30	269	0	0	6	299	0	0	0	0	16	0	0	92	80	0	4	172	471
12:45 PM	0	0	0	0	8	0	40	335	0	0	1	375	0	0	0	0	8	0	0	96	69	0	10	165	540
Hourly Total	0	0	0	0	24	0	149	1302	0	0	16	1451	0	0	0	0	37	0	0	365	304	0	39	669	2120
1:00 PM	0	0	0	0	0	0	35	366	0	0	7	401	0	0	0	0	1	0	0	87	77	0	17	164	565
1:15 PM	0	0	0	0	4	0	37	375	0	0	3	412	0	0	0	0	11	0	0	90	72	0	11	162	574
1:30 PM	0	0	0	0	7	0	34	409	0	0	6	443	0	0	0	0	10	0	0	80	57	0	21	137	580
1:45 PM	0	0	0	0	1	0	45	417	0	0	4	462	0	0	0	0	5	0	0	105	71	0	11	176	638
Hourly Total	0	0	0	0	12	0	151	1567	0	0	20	1718	0	0	0	0	27	0	0	362	277	0	60	639	2357
2:00 PM	0	0	0	0	8	0	38	413	0	0	4	451	0	0	0	0	4	0	0	101	70	0	7	171	622
2:15 PM	0	0	0	0	5	0	51	365	0	0	4	416	0	0	0	0	15	0	0	107	55	0	9	162	578
2:30 PM	0	0	0	0	5	0	46	350	0	0	3	396	0	0	0	0	7	0	0	96	67	0	14	163	559
2:45 PM	0	0	0	0	6	0	56	351	0	0	2	407	0	0	0	0	5	0	0	108	76	0	11	184	591
Hourly Total	0	0	0	0	24	0	191	1479	0	0	13	1670	0	0	0	0	31	0	0	412	268	0	41	680	2350
3:00 PM	0	0	0	0	4	0	31	393	0	0	16	424	0	0	0	0	8	0	0	116	68	0	24	184	608
3:15 PM	0	0	0	0	6	0	42	386	0	0	2	428	0	0	0	0	6	0	0	124	90	0	9	214	642
3:30 PM	0	0	0	0	1	0	41	377	0	0	3	418	0	0	0	0	5	0	0	115	55	0	2	170	588
3:45 PM	0	0	0	0	3	0	55	393	0	0	0	448	0	0	0	0	5	0	0	103	66	0	10	169	617
Hourly Total	0	0	0	0	14	0	169	1549	0	0	21	1718	0	0	0	0	24	0	0	458	279	0	45	737	2455
4:00 PM	0	0	0	0	4	0	37	354	0	0	7	391	0	0	0	0	1	0	0	87	73	0	18	160	551
4:15 PM	0	0	0	0	6	0	31	380	0	0	8	411	0	0	0	0	4	0	0	68	66	0	11	134	545

4:30 PM	0	0	0	0	2	0	38	357	0	0	3	395	0	0	0	0	3	0	0	97	54	0	15	151	546
4:45 PM	0	0	0	0	8	0	40	335	0	0	5	375	0	0	0	0	8	0	0	78	55	0	17	133	508
Hourly Total	0	0	0	0	20	0	146	1426	0	0	23	1572	0	0	0	0	16	0	0	330	248	0	61	578	2150
5:00 PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	0	0	0	0	140	0	1096	10848	1	0	117	11945	0	0	0	0	186	0	0	2567	2016	0	310	4583	16528
Approach %	0.0	0.0	0.0	0.0	-	-	9.2	90.8	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	56.0	44.0	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	6.6	65.6	0.0	0.0	-	72.3	0.0	0.0	0.0	0.0	-	0.0	0.0	15.5	12.2	0.0	-	27.7	-
Lights	0	0	0	0	-	0	1091	10657	1	0	-	11749	0	0	0	0	-	0	0	2555	1960	0	-	4515	16264
% Lights	-	-	-	-	-	-	99.5	98.2	100.0	-	-	98.4	-	-	-	-	-	-	-	99.5	97.2	-	-	98.5	98.4
Mediums	0	0	0	0	-	0	4	185	0	0	-	189	0	0	0	0	-	0	0	7	32	0	-	39	228
% Mediums	-	-	-	-	-	-	0.4	1.7	0.0	-	-	1.6	-	-	-	-	-	-	-	0.3	1.6	-	-	0.9	1.4
Articulated Trucks	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	0	0	23	0	-	23	26
% Articulated Trucks	-	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	-	-	-	-	-	-	-	0.0	1.1	-	-	0.5	0.2
Bicycles on Road	0	0	0	0	-	0	1	3	0	0	-	4	0	0	0	0	-	0	0	5	1	0	-	6	10
% Bicycles on Road	-	-	-	-	-	-	0.1	0.0	0.0	-	-	0.0	-	-	-	-	-	-	-	0.2	0.0	-	-	0.1	0.1
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	8	-	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	-	0.7	-	-	-	-	-	2.6	-	-	-	-	-	4.3	-	-	-	-	-	1.0	-	-
Pedestrians	-	-	-	-	139	-	-	-	-	-	114	-	-	-	-	-	178	-	-	-	-	-	307	-	-
% Pedestrians	-	-	-	-	99.3	-	-	-	-	-	97.4	-	-	-	-	-	95.7	-	-	-	-	-	99.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Queen Street - Saturday
Site Code:
Start Date: 05/25/2019



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Queen Street - Saturday
Site Code:
Start Date: 05/25/2019

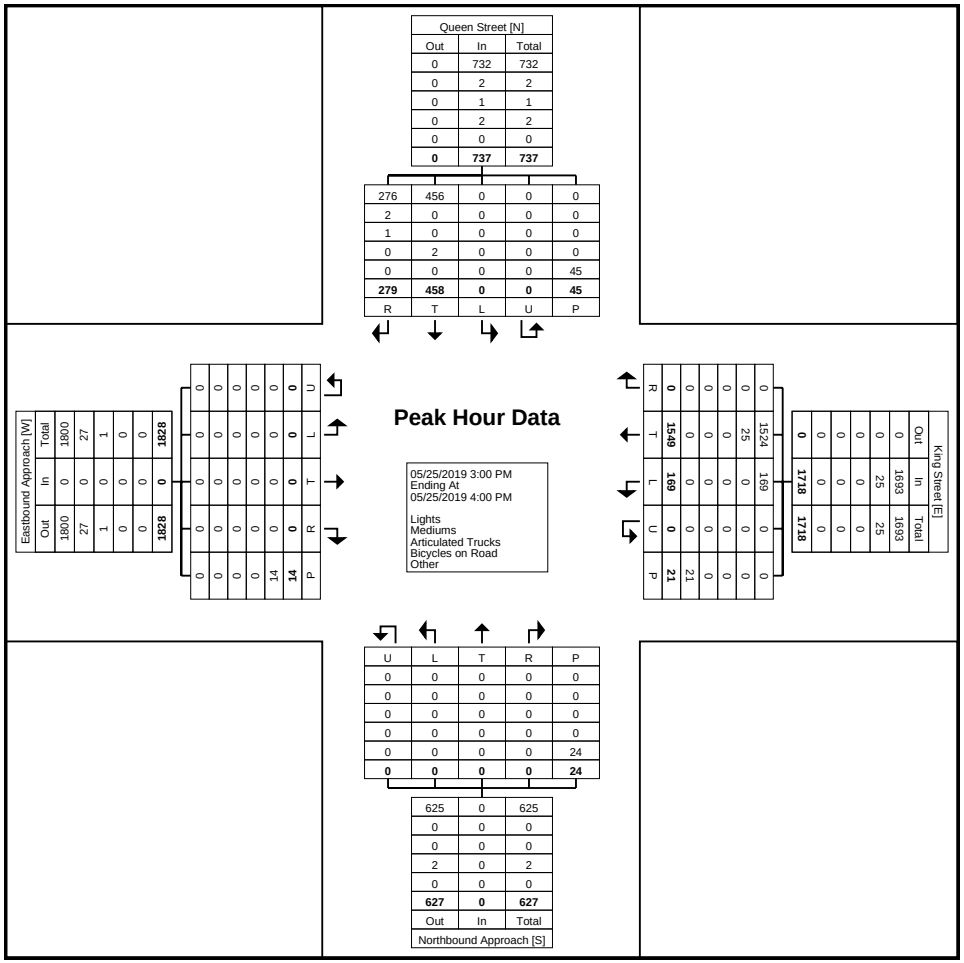
Turning Movement Peak Hour Data (3:00 PM)

Start Time	Eastbound Approach Eastbound						King Street Westbound						Northbound Approach Northbound						Queen Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
3:00 PM	0	0	0	0	4	0	31	393	0	0	16	424	0	0	0	0	8	0	0	116	68	0	24	184	608
3:15 PM	0	0	0	0	6	0	42	386	0	0	2	428	0	0	0	0	6	0	0	124	90	0	9	214	642
3:30 PM	0	0	0	0	1	0	41	377	0	0	3	418	0	0	0	0	5	0	0	115	55	0	2	170	588
3:45 PM	0	0	0	0	3	0	55	393	0	0	0	448	0	0	0	0	5	0	0	103	66	0	10	169	617
Total	0	0	0	0	14	0	169	1549	0	0	21	1718	0	0	0	0	24	0	0	458	279	0	45	737	2455
Approach %	0.0	0.0	0.0	0.0	-	-	9.8	90.2	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	62.1	37.9	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	6.9	63.1	0.0	0.0	-	70.0	0.0	0.0	0.0	0.0	-	0.0	0.0	18.7	11.4	0.0	-	30.0	-
PHF	0.000	0.000	0.000	0.000	-	0.000	0.768	0.985	0.000	0.000	-	0.959	0.000	0.000	0.000	0.000	-	0.000	0.000	0.923	0.775	0.000	-	0.861	0.956
Lights	0	0	0	0	-	0	169	1524	0	0	-	1693	0	0	0	0	-	0	0	456	276	0	-	732	2425
% Lights	-	-	-	-	-	-	100.0	98.4	-	-	-	98.5	-	-	-	-	-	-	-	99.6	98.9	-	-	99.3	98.8
Mediums	0	0	0	0	-	0	0	25	0	0	-	25	0	0	0	0	-	0	0	0	2	0	-	2	27
% Mediums	-	-	-	-	-	-	0.0	1.6	-	-	-	1.5	-	-	-	-	-	-	-	0.0	0.7	-	-	0.3	1.1
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	0	-	1	1
% Articulated Trucks	-	-	-	-	-	-	0.0	0.0	-	-	-	0.0	-	-	-	-	-	-	-	0.0	0.4	-	-	0.1	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	2
% Bicycles on Road	-	-	-	-	-	-	0.0	0.0	-	-	-	0.0	-	-	-	-	-	-	-	0.4	0.0	-	-	0.3	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	4.8	-	-	-	-	-	8.3	-	-	-	-	-	4.4	-	-
Pedestrians	-	-	-	-	14	-	-	-	-	-	20	-	-	-	-	-	22	-	-	-	-	-	43	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	95.2	-	-	-	-	-	91.7	-	-	-	-	-	95.6	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Queen Street - Saturday
Site Code:
Start Date: 05/25/2019



Turning Movement Peak Hour Data Plot (3:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Queen Street - Saturday
Site Code:
Start Date: 05/25/2019

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019

Turning Movement Data

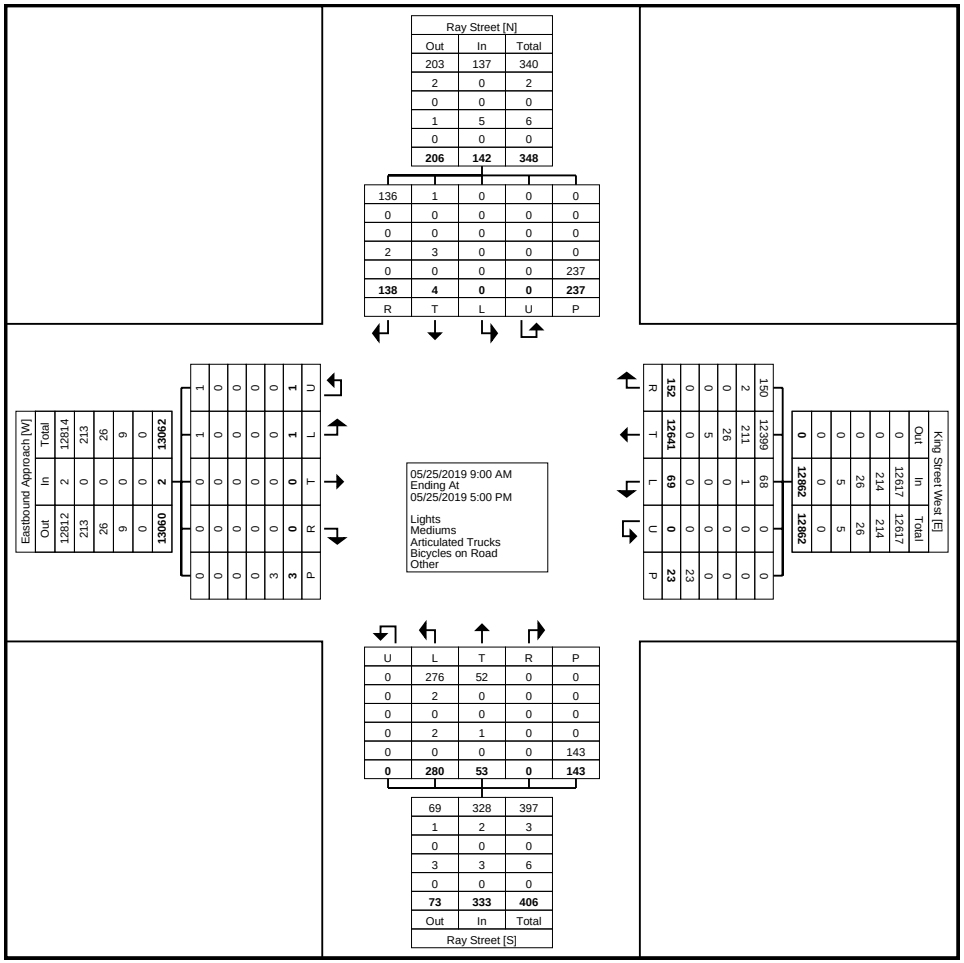
Start Time	Eastbound Approach Eastbound						King Street West Westbound						Ray Street Northbound						Ray Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
9:00 AM	0	0	0	0	0	0	1	253	1	0	0	255	11	1	0	0	0	12	0	0	3	0	0	3	270
9:15 AM	0	0	0	0	0	0	1	241	2	0	0	244	7	2	0	0	0	9	0	0	0	0	1	0	253
9:30 AM	0	0	0	0	1	0	0	334	2	0	0	336	6	1	0	0	1	7	0	0	2	0	4	2	345
9:45 AM	0	0	0	1	0	1	0	330	2	0	1	332	6	0	0	0	2	6	0	0	6	0	3	6	345
Hourly Total	0	0	0	1	1	1	2	1158	7	0	1	1167	30	4	0	0	3	34	0	0	11	0	8	11	1213
10:00 AM	0	0	0	0	0	0	2	346	2	0	0	350	9	1	0	0	1	10	0	0	3	0	4	3	363
10:15 AM	0	0	0	0	0	0	0	351	2	0	1	353	4	0	0	0	3	4	0	0	2	0	3	2	359
10:30 AM	0	0	0	0	0	0	6	340	5	0	0	351	9	0	0	0	3	9	0	1	2	0	6	3	363
10:45 AM	0	0	0	0	0	0	0	354	6	0	0	360	7	0	0	0	0	7	0	0	3	0	5	3	370
Hourly Total	0	0	0	0	0	0	8	1391	15	0	1	1414	29	1	0	0	7	30	0	1	10	0	18	11	1455
11:00 AM	0	0	0	0	0	0	2	392	4	0	0	398	5	2	0	0	9	7	0	0	5	0	4	5	410
11:15 AM	0	0	0	0	1	0	3	376	2	0	0	381	12	3	0	0	7	15	0	0	6	0	2	6	402
11:30 AM	0	0	0	0	0	0	2	357	2	0	0	361	8	2	0	0	4	10	0	0	0	0	12	0	371
11:45 AM	0	0	0	0	0	0	0	409	9	0	0	418	9	0	0	0	5	9	0	0	7	0	6	7	434
Hourly Total	0	0	0	0	1	0	7	1534	17	0	0	1558	34	7	0	0	25	41	0	0	18	0	24	18	1617
12:00 PM	0	0	0	0	0	0	2	436	3	0	1	441	6	3	0	0	5	9	0	0	5	0	5	5	455
12:15 PM	0	0	0	0	0	0	2	424	5	0	0	431	13	0	0	0	5	13	0	0	5	0	10	5	449
12:30 PM	0	0	0	0	0	0	3	349	5	0	0	357	10	2	0	0	13	12	0	0	4	0	5	4	373
12:45 PM	0	0	0	0	0	0	1	403	6	0	0	410	7	2	0	0	9	9	0	0	9	0	7	9	428
Hourly Total	0	0	0	0	0	0	8	1612	19	0	1	1639	36	7	0	0	32	43	0	0	23	0	27	23	1705
1:00 PM	0	0	0	0	0	0	3	431	6	0	1	440	9	4	0	0	5	13	0	0	6	0	12	6	459
1:15 PM	0	0	0	0	0	0	2	444	5	0	1	451	6	2	0	0	7	8	0	0	4	0	11	4	463
1:30 PM	0	0	0	0	1	0	1	459	7	0	2	467	15	1	0	0	4	16	0	1	6	0	15	7	490
1:45 PM	0	0	0	0	0	0	5	479	3	0	1	487	8	0	0	0	5	8	0	0	5	0	10	5	500
Hourly Total	0	0	0	0	1	0	11	1813	21	0	5	1845	38	7	0	0	21	45	0	1	21	0	48	22	1912
2:00 PM	1	0	0	0	0	1	3	461	9	0	0	473	11	3	0	0	5	14	0	0	6	0	6	6	494
2:15 PM	0	0	0	0	0	0	3	414	4	0	2	421	4	2	0	0	8	6	0	0	2	0	8	2	429
2:30 PM	0	0	0	0	0	0	3	407	4	0	0	414	8	2	0	0	3	10	0	0	6	0	15	6	430
2:45 PM	0	0	0	0	0	0	1	431	10	0	3	442	8	3	0	0	7	11	0	0	5	0	8	5	458
Hourly Total	1	0	0	0	0	1	10	1713	27	0	5	1750	31	10	0	0	23	41	0	0	19	0	37	19	1811
3:00 PM	0	0	0	0	0	0	5	449	9	0	3	463	10	3	0	0	6	13	0	1	9	0	22	10	486
3:15 PM	0	0	0	0	0	0	1	464	5	0	1	470	6	4	0	0	3	10	0	0	5	0	9	5	485
3:30 PM	0	0	0	0	0	0	4	409	4	0	1	417	15	1	0	0	2	16	0	0	5	0	2	5	438
3:45 PM	0	0	0	0	0	0	3	452	4	0	1	459	13	4	0	0	3	17	0	0	2	0	8	2	478
Hourly Total	0	0	0	0	0	0	13	1774	22	0	6	1809	44	12	0	0	14	56	0	1	21	0	41	22	1887
4:00 PM	0	0	0	0	0	0	4	406	8	0	2	418	13	0	0	0	3	13	0	0	4	0	9	4	435
4:15 PM	0	0	0	0	0	0	1	445	6	0	1	452	4	2	0	0	5	6	0	0	3	0	7	3	461

4:30 PM	0	0	0	0	0	0	2	415	5	0	1	422	9	2	0	0	3	11	0	0	4	0	9	4	437
4:45 PM	0	0	0	0	0	0	3	380	5	0	0	388	12	1	0	0	7	13	0	1	4	0	9	5	406
Hourly Total	0	0	0	0	0	0	10	1646	24	0	4	1680	38	5	0	0	18	43	0	1	15	0	34	16	1739
Grand Total	1	0	0	1	3	2	69	12641	152	0	23	12862	280	53	0	0	143	333	0	4	138	0	237	142	13339
Approach %	50.0	0.0	0.0	50.0	-	-	0.5	98.3	1.2	0.0	-	-	84.1	15.9	0.0	0.0	-	-	0.0	2.8	97.2	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	0.5	94.8	1.1	0.0	-	96.4	2.1	0.4	0.0	0.0	-	2.5	0.0	0.0	1.0	0.0	-	1.1	-
Lights	1	0	0	1	-	2	68	12399	150	0	-	12617	276	52	0	0	-	328	0	1	136	0	-	137	13084
% Lights	100.0	-	-	100.0	-	100.0	98.6	98.1	98.7	-	-	98.1	98.6	98.1	-	-	-	98.5	-	25.0	98.6	-	-	96.5	98.1
Mediums	0	0	0	0	-	0	1	211	2	0	-	214	2	0	0	0	-	2	0	0	0	0	-	0	216
% Mediums	0.0	-	-	0.0	-	0.0	1.4	1.7	1.3	-	-	1.7	0.7	0.0	-	-	-	0.6	-	0.0	0.0	-	-	0.0	1.6
Articulated Trucks	0	0	0	0	-	0	0	26	0	0	-	26	0	0	0	0	-	0	0	0	0	0	-	0	26
% Articulated Trucks	0.0	-	-	0.0	-	0.0	0.0	0.2	0.0	-	-	0.2	0.0	0.0	-	-	-	0.0	-	0.0	0.0	-	-	0.0	0.2
Bicycles on Road	0	0	0	0	-	0	0	5	0	0	-	5	2	1	0	0	-	3	0	3	2	0	-	5	13
% Bicycles on Road	0.0	-	-	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.7	1.9	-	-	-	0.9	-	75.0	1.4	-	-	3.5	0.1
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	5	-	-
% Bicycles on Crosswalk	-	-	-	-	33.3	-	-	-	-	-	4.3	-	-	-	-	-	2.1	-	-	-	-	-	2.1	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	22	-	-	-	-	-	140	-	-	-	-	-	232	-	-
% Pedestrians	-	-	-	-	66.7	-	-	-	-	-	95.7	-	-	-	-	-	97.9	-	-	-	-	-	97.9	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019

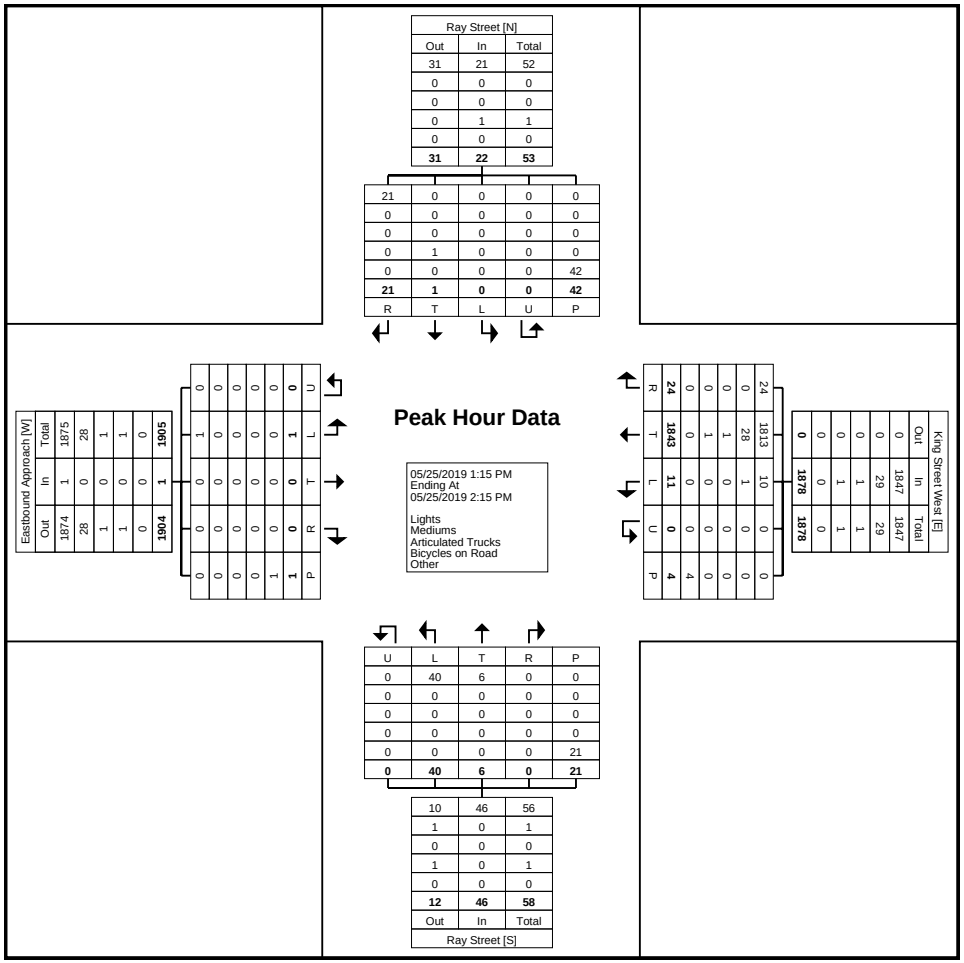
Turning Movement Peak Hour Data (1:15 PM)

Start Time	Eastbound Approach Eastbound						King Street West Westbound						Ray Street Northbound						Ray Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
1:15 PM	0	0	0	0	0	0	2	444	5	0	1	451	6	2	0	0	7	8	0	0	4	0	11	4	463
1:30 PM	0	0	0	0	1	0	1	459	7	0	2	467	15	1	0	0	4	16	0	1	6	0	15	7	490
1:45 PM	0	0	0	0	0	0	5	479	3	0	1	487	8	0	0	0	5	8	0	0	5	0	10	5	500
2:00 PM	1	0	0	0	0	1	3	461	9	0	0	473	11	3	0	0	5	14	0	0	6	0	6	6	494
Total	1	0	0	0	1	1	11	1843	24	0	4	1878	40	6	0	0	21	46	0	1	21	0	42	22	1947
Approach %	100.0	0.0	0.0	0.0	-	-	0.6	98.1	1.3	0.0	-	-	87.0	13.0	0.0	0.0	-	-	0.0	4.5	95.5	0.0	-	-	-
Total %	0.1	0.0	0.0	0.0	-	0.1	0.6	94.7	1.2	0.0	-	96.5	2.1	0.3	0.0	0.0	-	2.4	0.0	0.1	1.1	0.0	-	1.1	-
PHF	0.250	0.000	0.000	0.000	-	0.250	0.550	0.962	0.667	0.000	-	0.964	0.667	0.500	0.000	0.000	-	0.719	0.000	0.250	0.875	0.000	-	0.786	0.974
Lights	1	0	0	0	-	1	10	1813	24	0	-	1847	40	6	0	0	-	46	0	0	21	0	-	21	1915
% Lights	100.0	-	-	-	-	100.0	90.9	98.4	100.0	-	-	98.3	100.0	100.0	-	-	-	100.0	-	0.0	100.0	-	-	95.5	98.4
Mediums	0	0	0	0	-	0	1	28	0	0	-	29	0	0	0	0	-	0	0	0	0	0	-	0	29
% Mediums	0.0	-	-	-	-	0.0	9.1	1.5	0.0	-	-	1.5	0.0	0.0	-	-	-	0.0	-	0.0	0.0	-	-	0.0	1.5
Articulated Trucks	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.0	-	-	-	-	0.0	0.0	0.1	0.0	-	-	0.1	0.0	0.0	-	-	-	0.0	-	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	1	0	0	-	1	2
% Bicycles on Road	0.0	-	-	-	-	0.0	0.0	0.1	0.0	-	-	0.1	0.0	0.0	-	-	-	0.0	-	100.0	0.0	-	-	4.5	0.1
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	100.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	21	-	-	-	-	-	42	-	-
% Pedestrians	-	-	-	-	0.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019



Turning Movement Peak Hour Data Plot (1:15 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street West & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

Turning Movement Data

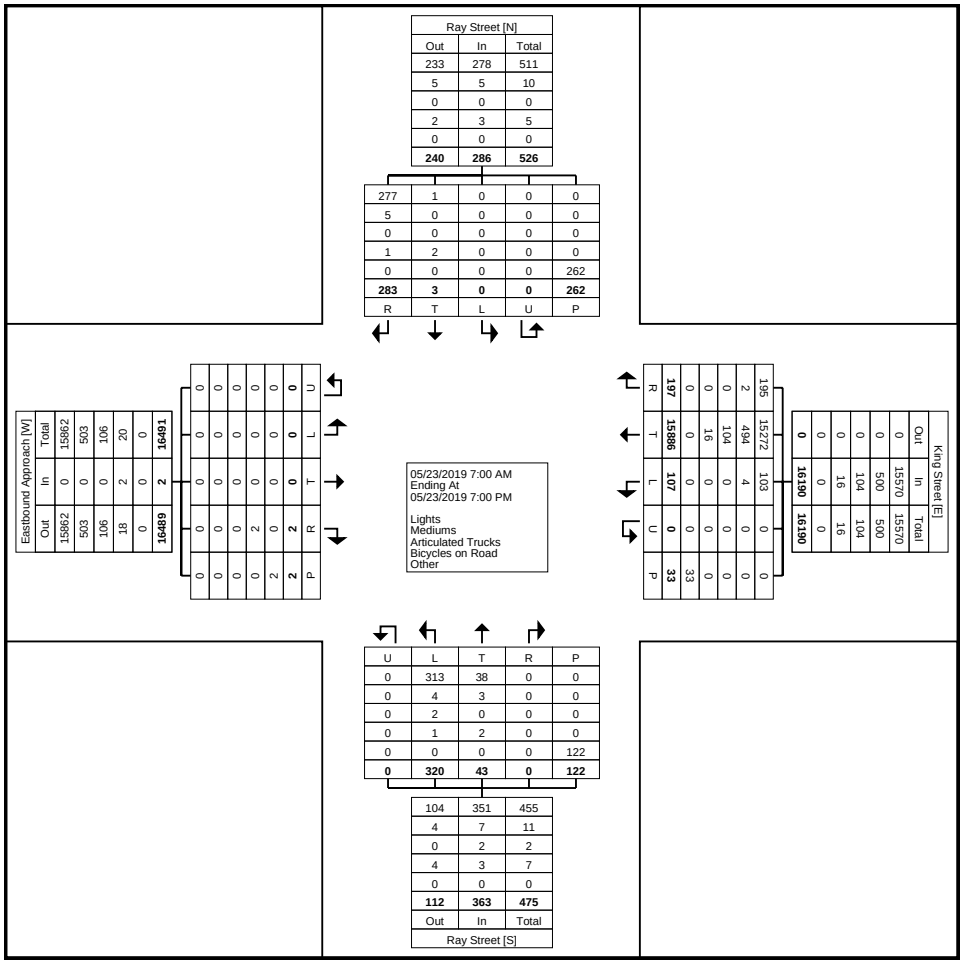
Start Time	Eastbound Approach Eastbound						King Street Westbound						Ray Street Northbound						Ray Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	0	0	0	0	0	1	468	1	0	1	470	9	0	0	0	0	9	0	0	6	0	4	6	485
7:15 AM	0	0	0	0	0	0	0	515	7	0	1	522	11	0	0	0	0	11	0	1	1	0	5	2	535
7:30 AM	0	0	0	0	0	0	2	591	3	0	0	596	11	0	0	0	3	11	0	0	4	0	5	4	611
7:45 AM	0	0	0	0	1	0	2	561	9	0	0	572	8	0	0	0	3	8	0	0	3	0	9	3	583
Hourly Total	0	0	0	0	1	0	5	2135	20	0	2	2160	39	0	0	0	6	39	0	1	14	0	23	15	2214
8:00 AM	0	0	0	0	0	0	4	511	8	0	2	523	10	0	0	0	3	10	0	0	8	0	10	8	541
8:15 AM	0	0	0	0	0	0	5	516	16	0	3	537	15	5	0	0	4	20	0	0	7	0	4	7	564
8:30 AM	0	0	0	0	0	0	3	473	10	0	1	486	10	6	0	0	6	16	0	0	4	0	12	4	506
8:45 AM	0	0	0	0	0	0	8	495	7	0	1	510	11	1	0	0	3	12	0	0	4	0	2	4	526
Hourly Total	0	0	0	0	0	0	20	1995	41	0	7	2056	46	12	0	0	16	58	0	0	23	0	28	23	2137
9:00 AM	0	0	0	0	0	0	4	458	4	0	3	466	8	3	0	0	2	11	0	1	3	0	9	4	481
9:15 AM	0	0	0	0	0	0	3	391	1	0	0	395	6	1	0	0	1	7	0	0	4	0	9	4	406
9:30 AM	0	0	0	0	0	0	1	406	7	0	5	414	10	1	0	0	2	11	0	0	9	0	5	9	434
9:45 AM	0	0	0	0	0	0	5	387	5	0	0	397	7	0	0	0	1	7	0	0	6	0	3	6	410
Hourly Total	0	0	0	0	0	0	13	1642	17	0	8	1672	31	5	0	0	6	36	0	1	22	0	26	23	1731
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	0	0	0	0	0	0	2	365	2	0	3	369	8	3	0	0	6	11	0	0	1	0	7	1	381
11:45 AM	0	0	0	0	0	0	2	405	7	0	2	414	12	0	0	0	4	12	0	0	6	0	13	6	432
Hourly Total	0	0	0	0	0	0	4	770	9	0	5	783	20	3	0	0	10	23	0	0	7	0	20	7	813
12:00 PM	0	0	0	0	0	0	4	395	3	0	0	402	12	0	0	0	6	12	0	0	6	0	5	6	420
12:15 PM	0	0	0	0	0	0	5	422	8	0	0	435	12	0	0	0	4	12	0	0	8	0	6	8	455
12:30 PM	0	0	0	0	0	0	5	453	11	0	0	469	8	0	0	0	6	8	0	0	4	0	5	4	481
12:45 PM	0	0	0	0	0	0	3	448	5	0	1	456	10	1	0	0	4	11	0	0	7	0	2	7	474
Hourly Total	0	0	0	0	0	0	17	1718	27	0	1	1762	42	1	0	0	20	43	0	0	25	0	18	25	1830
1:00 PM	0	0	0	0	0	0	6	417	7	0	0	430	11	1	0	0	5	12	0	0	7	0	8	7	449
1:15 PM	0	0	0	0	0	0	4	423	2	0	2	429	7	0	0	0	4	7	0	0	6	0	5	6	442
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	10	840	9	0	2	859	18	1	0	0	9	19	0	0	13	0	13	13	891
4:00 PM	0	0	0	0	0	0	2	590	5	0	0	597	11	0	0	0	9	11	0	0	13	0	14	13	621
4:15 PM	0	0	1	0	1	1	3	653	6	0	2	662	13	2	0	0	3	15	0	0	12	0	10	12	690
4:30 PM	0	0	1	0	0	1	1	621	7	0	0	629	13	2	0	0	7	15	0	0	16	0	9	16	661
4:45 PM	0	0	0	0	0	0	1	645	3	0	1	649	11	2	0	0	8	13	0	0	16	0	13	16	678
Hourly Total	0	0	2	0	1	2	7	2509	21	0	3	2537	48	6	0	0	27	54	0	0	57	0	46	57	2650
5:00 PM	0	0	0	0	0	0	3	636	7	0	0	646	10	0	0	0	1	10	0	0	38	0	15	38	694
5:15 PM	0	0	0	0	0	0	4	632	7	0	0	643	12	2	0	0	3	14	0	0	34	0	11	34	691
5:30 PM	0	0	0	0	0	0	6	621	5	0	0	632	10	2	0	0	6	12	0	0	14	0	9	14	658
5:45 PM	0	0	0	0	0	0	5	584	8	0	1	597	11	2	0	0	5	13	0	0	8	0	15	8	618

Hourly Total	0	0	0	0	0	0	18	2473	27	0	1	2518	43	6	0	0	15	49	0	0	94	0	50	94	2661
6:00 PM	0	0	0	0	0	0	4	491	5	0	0	500	6	1	0	0	3	7	0	0	6	0	13	6	513
6:15 PM	0	0	0	0	0	0	2	483	8	0	1	493	15	5	0	0	5	20	0	0	9	0	7	9	522
6:30 PM	0	0	0	0	0	0	3	434	3	0	1	440	7	2	0	0	3	9	0	1	3	0	13	4	453
6:45 PM	0	0	0	0	0	0	4	396	10	0	2	410	5	1	0	0	2	6	0	0	10	0	5	10	426
Hourly Total	0	0	0	0	0	0	13	1804	26	0	4	1843	33	9	0	0	13	42	0	1	28	0	38	29	1914
Grand Total	0	0	2	0	2	2	107	15886	197	0	33	16190	320	43	0	0	122	363	0	3	283	0	262	286	16841
Approach %	0.0	0.0	100.0	0.0	-	-	0.7	98.1	1.2	0.0	-	-	88.2	11.8	0.0	0.0	-	-	0.0	1.0	99.0	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	0.6	94.3	1.2	0.0	-	96.1	1.9	0.3	0.0	0.0	-	2.2	0.0	0.0	1.7	0.0	-	1.7	-
Lights	0	0	0	0	-	0	103	15272	195	0	-	15570	313	38	0	0	-	351	0	1	277	0	-	278	16199
% Lights	-	-	0.0	-	-	0.0	96.3	96.1	99.0	-	-	96.2	97.8	88.4	-	-	-	96.7	-	33.3	97.9	-	-	97.2	96.2
Mediums	0	0	0	0	-	0	4	494	2	0	-	500	4	3	0	0	-	7	0	0	5	0	-	5	512
% Mediums	-	-	0.0	-	-	0.0	3.7	3.1	1.0	-	-	3.1	1.3	7.0	-	-	-	1.9	-	0.0	1.8	-	-	1.7	3.0
Articulated Trucks	0	0	0	0	-	0	0	104	0	0	-	104	2	0	0	0	-	2	0	0	0	0	-	0	106
% Articulated Trucks	-	-	0.0	-	-	0.0	0.0	0.7	0.0	-	-	0.6	0.6	0.0	-	-	-	0.6	-	0.0	0.0	-	-	0.0	0.6
Bicycles on Road	0	0	2	0	-	2	0	16	0	0	-	16	1	2	0	0	-	3	0	2	1	0	-	3	24
% Bicycles on Road	-	-	100.0	-	-	100.0	0.0	0.1	0.0	-	-	0.1	0.3	4.7	-	-	-	0.8	-	66.7	0.4	-	-	1.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	7	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	1.6	-	-	-	-	-	2.7	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	33	-	-	-	-	-	120	-	-	-	-	-	255	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	98.4	-	-	-	-	-	97.3	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street West & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street West & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Eastbound Approach Eastbound						King Street Westbound						Ray Street Northbound						Ray Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:30 AM	0	0	0	0	0	0	2	591	3	0	0	596	11	0	0	0	3	11	0	0	4	0	5	4	611
7:45 AM	0	0	0	0	1	0	2	561	9	0	0	572	8	0	0	0	3	8	0	0	3	0	9	3	583
8:00 AM	0	0	0	0	0	0	4	511	8	0	2	523	10	0	0	0	3	10	0	0	8	0	10	8	541
8:15 AM	0	0	0	0	0	0	5	516	16	0	3	537	15	5	0	0	4	20	0	0	7	0	4	7	564
Total	0	0	0	0	1	0	13	2179	36	0	5	2228	44	5	0	0	13	49	0	0	22	0	28	22	2299
Approach %	0.0	0.0	0.0	0.0	-	-	0.6	97.8	1.6	0.0	-	-	89.8	10.2	0.0	0.0	-	-	0.0	0.0	100.0	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	0.6	94.8	1.6	0.0	-	96.9	1.9	0.2	0.0	0.0	-	2.1	0.0	0.0	1.0	0.0	-	1.0	-
PHF	0.000	0.000	0.000	0.000	-	0.000	0.650	0.922	0.563	0.000	-	0.935	0.733	0.250	0.000	0.000	-	0.613	0.000	0.000	0.688	0.000	-	0.688	0.941
Lights	0	0	0	0	-	0	12	2082	36	0	-	2130	43	4	0	0	-	47	0	0	20	0	-	20	2197
% Lights	-	-	-	-	-	-	92.3	95.5	100.0	-	-	95.6	97.7	80.0	-	-	-	95.9	-	-	90.9	-	-	90.9	95.6
Mediums	0	0	0	0	-	0	1	76	0	0	-	77	1	1	0	0	-	2	0	0	1	0	-	1	80
% Mediums	-	-	-	-	-	-	7.7	3.5	0.0	-	-	3.5	2.3	20.0	-	-	-	4.1	-	-	4.5	-	-	4.5	3.5
Articulated Trucks	0	0	0	0	-	0	0	19	0	0	-	19	0	0	0	0	-	0	0	0	0	0	-	0	19
% Articulated Trucks	-	-	-	-	-	-	0.0	0.9	0.0	-	-	0.9	0.0	0.0	-	-	-	0.0	-	-	0.0	-	-	0.0	0.8
Bicycles on Road	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	0	0	1	0	-	1	3
% Bicycles on Road	-	-	-	-	-	-	0.0	0.1	0.0	-	-	0.1	0.0	0.0	-	-	-	0.0	-	-	4.5	-	-	4.5	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	7.1	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	5	-	-	-	-	-	13	-	-	-	-	-	26	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	92.9	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street West & Ray Street - Weekday
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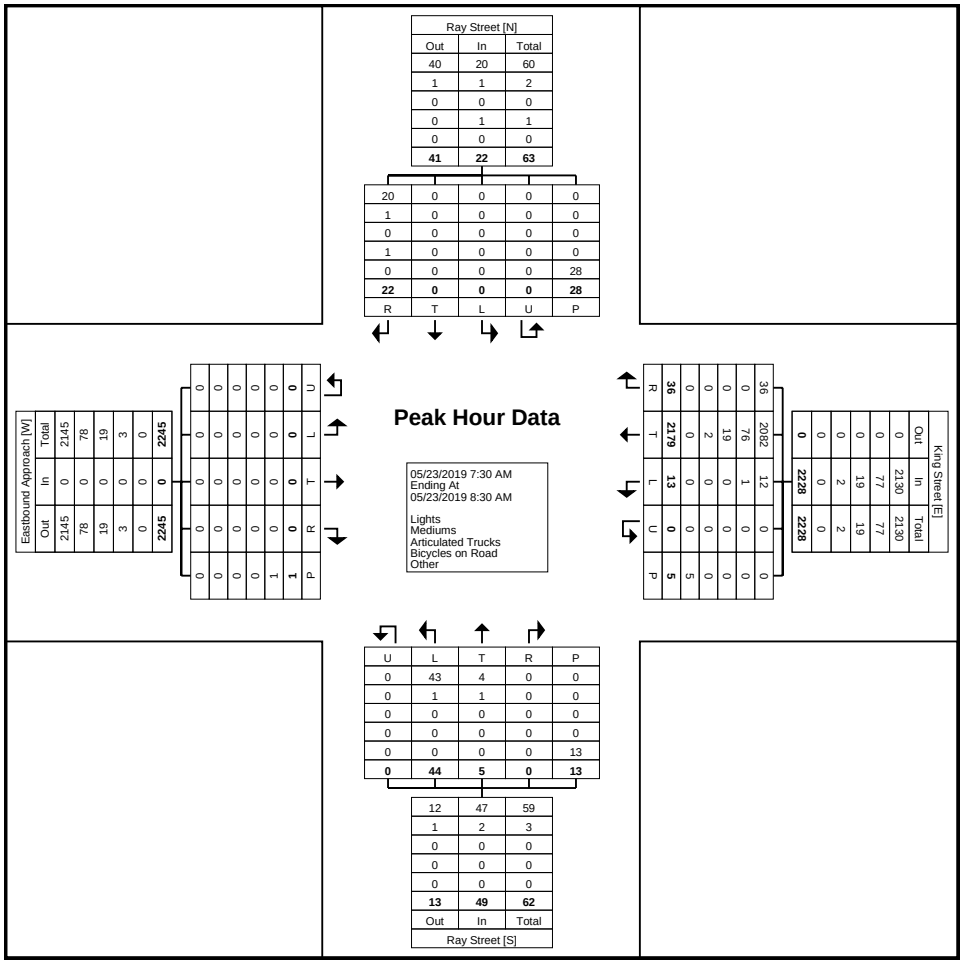
Start Date: 05/23/2019



Turning Movement Peak Hour Data Plot (7:30 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street West & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

Turning Movement Peak Hour Data (12:15 PM)

Start Time	Eastbound Approach Eastbound						King Street Westbound						Ray Street Northbound						Ray Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
12:15 PM	0	0	0	0	0	0	5	422	8	0	0	435	12	0	0	0	4	12	0	0	8	0	6	8	455
12:30 PM	0	0	0	0	0	0	5	453	11	0	0	469	8	0	0	0	6	8	0	0	4	0	5	4	481
12:45 PM	0	0	0	0	0	0	3	448	5	0	1	456	10	1	0	0	4	11	0	0	7	0	2	7	474
1:00 PM	0	0	0	0	0	0	6	417	7	0	0	430	11	1	0	0	5	12	0	0	7	0	8	7	449
Total	0	0	0	0	0	0	19	1740	31	0	1	1790	41	2	0	0	19	43	0	0	26	0	21	26	1859
Approach %	0.0	0.0	0.0	0.0	-	-	1.1	97.2	1.7	0.0	-	-	95.3	4.7	0.0	0.0	-	-	0.0	0.0	100.0	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	1.0	93.6	1.7	0.0	-	96.3	2.2	0.1	0.0	0.0	-	2.3	0.0	0.0	1.4	0.0	-	1.4	-
PHF	0.000	0.000	0.000	0.000	-	0.000	0.792	0.960	0.705	0.000	-	0.954	0.854	0.500	0.000	0.000	-	0.896	0.000	0.000	0.813	0.000	-	0.813	0.966
Lights	0	0	0	0	-	0	18	1671	31	0	-	1720	39	2	0	0	-	41	0	0	25	0	-	25	1786
% Lights	-	-	-	-	-	-	94.7	96.0	100.0	-	-	96.1	95.1	100.0	-	-	-	95.3	-	-	96.2	-	-	96.2	96.1
Mediums	0	0	0	0	-	0	1	57	0	0	-	58	1	0	0	0	-	1	0	0	1	0	-	1	60
% Mediums	-	-	-	-	-	-	5.3	3.3	0.0	-	-	3.2	2.4	0.0	-	-	-	2.3	-	-	3.8	-	-	3.8	3.2
Articulated Trucks	0	0	0	0	-	0	0	12	0	0	-	12	1	0	0	0	-	1	0	0	0	0	-	0	13
% Articulated Trucks	-	-	-	-	-	-	0.0	0.7	0.0	-	-	0.7	2.4	0.0	-	-	-	2.3	-	-	0.0	-	-	0.0	0.7
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	-	-	-	-	-	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-	-	0.0	-	-	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	5.3	-	-	-	-	-	4.8	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	18	-	-	-	-	-	20	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	94.7	-	-	-	-	-	95.2	-	-

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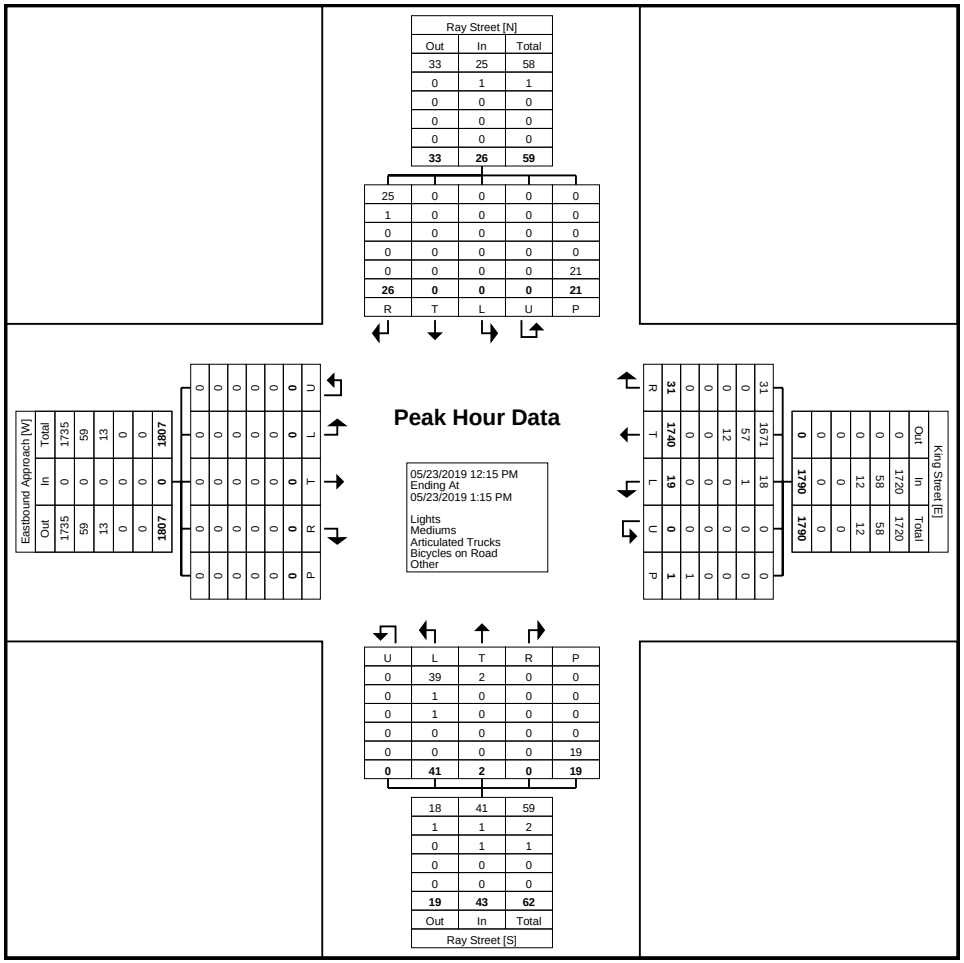


Turning Movement Peak Hour Data Plot (12:15 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street West & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

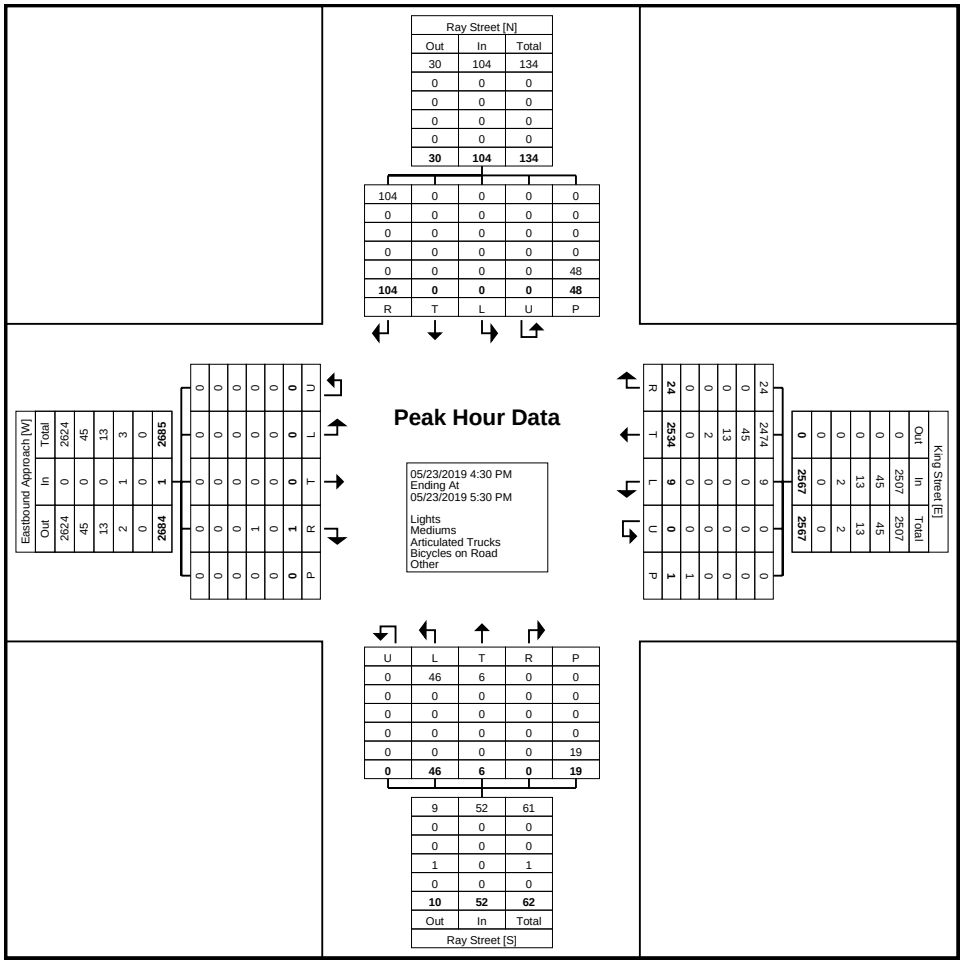
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Eastbound Approach Eastbound						King Street Westbound						Ray Street Northbound						Ray Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:30 PM	0	0	1	0	0	1	1	621	7	0	0	629	13	2	0	0	7	15	0	0	16	0	9	16	661
4:45 PM	0	0	0	0	0	0	1	645	3	0	1	649	11	2	0	0	8	13	0	0	16	0	13	16	678
5:00 PM	0	0	0	0	0	0	3	636	7	0	0	646	10	0	0	0	1	10	0	0	38	0	15	38	694
5:15 PM	0	0	0	0	0	0	4	632	7	0	0	643	12	2	0	0	3	14	0	0	34	0	11	34	691
Total	0	0	1	0	0	1	9	2534	24	0	1	2567	46	6	0	0	19	52	0	0	104	0	48	104	2724
Approach %	0.0	0.0	100.0	0.0	-	-	0.4	98.7	0.9	0.0	-	-	88.5	11.5	0.0	0.0	-	-	0.0	0.0	100.0	0.0	-	-	-
Total %	0.0	0.0	0.0	0.0	-	0.0	0.3	93.0	0.9	0.0	-	94.2	1.7	0.2	0.0	0.0	-	1.9	0.0	0.0	3.8	0.0	-	3.8	-
PHF	0.000	0.000	0.250	0.000	-	0.250	0.563	0.982	0.857	0.000	-	0.989	0.885	0.750	0.000	0.000	-	0.867	0.000	0.000	0.684	0.000	-	0.684	0.981
Lights	0	0	0	0	-	0	9	2474	24	0	-	2507	46	6	0	0	-	52	0	0	104	0	-	104	2663
% Lights	-	-	0.0	-	-	0.0	100.0	97.6	100.0	-	-	97.7	100.0	100.0	-	-	-	100.0	-	-	100.0	-	-	100.0	97.8
Mediums	0	0	0	0	-	0	0	45	0	0	-	45	0	0	0	0	-	0	0	0	0	0	-	0	45
% Mediums	-	-	0.0	-	-	0.0	0.0	1.8	0.0	-	-	1.8	0.0	0.0	-	-	-	0.0	-	-	0.0	-	-	0.0	1.7
Articulated Trucks	0	0	0	0	-	0	0	13	0	0	-	13	0	0	0	0	-	0	0	0	0	0	-	0	13
% Articulated Trucks	-	-	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.5	0.0	0.0	-	-	-	0.0	-	-	0.0	-	-	0.0	0.5
Bicycles on Road	0	0	1	0	-	1	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	3
% Bicycles on Road	-	-	100.0	-	-	100.0	0.0	0.1	0.0	-	-	0.1	0.0	0.0	-	-	-	0.0	-	-	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	4.2	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	19	-	-	-	-	-	46	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	95.8	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street West & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019



Turning Movement Peak Hour Data Plot (4:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: King Street West & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019

Turning Movement Data

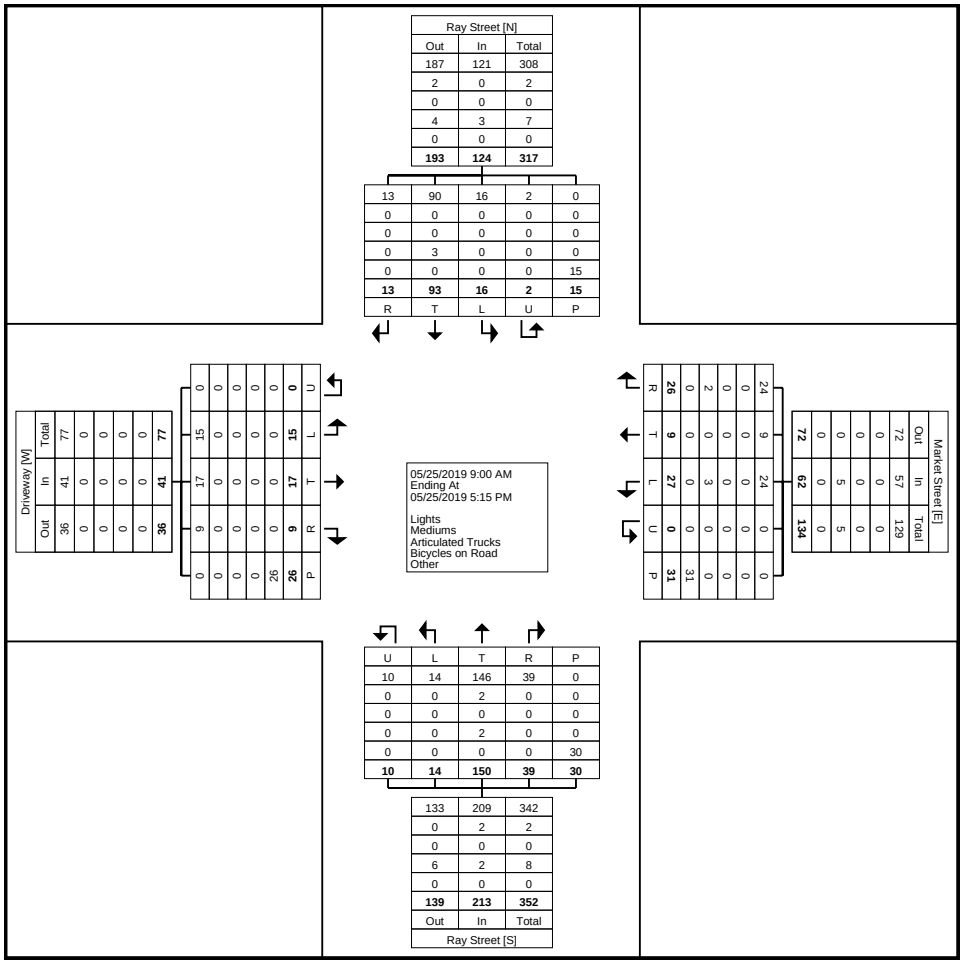
Start Time	Driveway Eastbound						Market Street Westbound						Ray Street Northbound						Ray Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
9:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	1	3
9:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	1	0	1	0	0	2	7
9:30 AM	1	1	0	0	2	2	1	0	0	0	0	1	2	1	0	0	0	3	0	1	0	0	0	1	7
9:45 AM	0	0	1	0	0	1	0	1	2	0	1	3	0	3	1	0	1	4	0	4	0	0	1	4	12
Hourly Total	1	2	2	0	2	5	1	1	2	0	1	4	3	8	1	0	1	12	1	6	1	0	1	8	29
10:00 AM	0	0	0	0	1	0	1	2	0	0	1	3	0	2	1	0	0	3	0	4	1	0	0	5	11
10:15 AM	5	0	0	0	1	5	1	0	0	0	0	1	0	1	1	0	0	2	0	3	0	0	0	3	11
10:30 AM	2	3	0	0	1	5	0	0	1	0	0	1	1	4	2	0	0	7	0	2	1	0	0	3	16
10:45 AM	1	0	1	0	0	2	0	2	1	0	0	3	0	3	0	1	1	4	1	3	0	0	0	4	13
Hourly Total	8	3	1	0	3	12	2	4	2	0	1	8	1	10	4	1	1	16	1	12	2	0	0	15	51
11:00 AM	0	0	0	0	2	0	0	0	1	0	2	1	0	6	0	0	1	6	0	2	0	0	0	2	9
11:15 AM	0	0	0	0	2	0	2	0	0	0	2	2	1	2	0	1	0	4	0	0	1	0	1	1	7
11:30 AM	1	0	0	0	1	1	0	0	0	0	0	0	0	4	1	0	0	5	0	1	0	0	0	1	7
11:45 AM	1	1	0	0	0	2	2	0	0	0	1	2	1	7	2	0	0	10	0	4	0	0	0	4	18
Hourly Total	2	1	0	0	5	3	4	0	1	0	5	5	2	19	3	1	1	25	0	7	1	0	1	8	41
12:00 PM	1	0	1	0	0	2	3	0	1	0	5	4	1	4	1	0	0	6	0	2	3	0	3	5	17
12:15 PM	0	2	0	0	0	2	0	0	1	0	0	1	0	5	0	0	2	5	0	4	1	0	0	5	13
12:30 PM	0	1	0	0	0	1	0	0	1	0	0	1	0	5	2	0	0	7	0	2	0	0	0	2	11
12:45 PM	1	0	1	0	0	2	1	0	0	0	0	1	0	6	0	0	1	6	0	7	0	0	0	7	16
Hourly Total	2	3	2	0	0	7	4	0	3	0	5	7	1	20	3	0	3	24	0	15	4	0	3	19	57
1:00 PM	0	0	0	0	3	0	1	0	2	0	3	3	1	8	3	0	2	12	2	4	0	0	0	6	21
1:15 PM	0	0	0	0	0	0	1	0	2	0	2	3	0	5	1	1	3	7	0	1	2	0	0	3	13
1:30 PM	0	0	0	0	3	0	1	0	1	0	3	2	0	4	2	2	8	8	1	5	0	0	4	6	16
1:45 PM	0	1	0	0	0	1	2	0	2	0	2	4	0	5	0	0	1	5	1	3	1	0	0	5	15
Hourly Total	0	1	0	0	6	1	5	0	7	0	10	12	1	22	6	3	14	32	4	13	3	0	4	20	65
2:00 PM	1	1	0	0	3	2	1	1	2	0	0	4	0	8	3	1	2	12	0	6	0	1	1	7	25
2:15 PM	0	2	0	0	2	2	2	0	2	0	0	4	1	5	1	0	1	7	1	1	0	0	1	2	15
2:30 PM	0	1	0	0	0	1	1	1	0	0	3	2	0	3	2	0	1	5	1	4	0	0	1	5	13
2:45 PM	0	2	0	0	0	2	1	0	2	0	1	3	3	8	1	1	0	13	0	1	0	0	0	1	19
Hourly Total	1	6	0	0	5	7	5	2	6	0	4	13	4	24	7	2	4	37	2	12	0	1	3	15	72
3:00 PM	1	0	2	0	1	3	1	0	0	0	0	1	2	7	0	0	0	9	3	5	0	1	0	9	22
3:15 PM	0	0	0	0	0	0	0	1	1	0	0	2	0	8	2	0	1	10	0	3	0	0	0	3	15
3:30 PM	0	0	1	0	0	1	0	1	0	0	0	1	0	5	0	0	0	5	2	5	0	0	0	7	14
3:45 PM	0	0	0	0	0	0	1	0	1	0	3	2	0	5	4	1	0	10	1	4	1	0	0	6	18
Hourly Total	1	0	3	0	1	4	2	2	2	0	3	6	2	25	6	1	1	34	6	17	1	1	0	25	69
4:00 PM	0	0	1	0	1	1	1	0	0	0	0	1	0	7	2	0	1	9	1	1	0	0	0	2	13
4:15 PM	0	1	0	0	1	1	1	0	2	0	1	3	0	7	2	0	0	9	0	3	0	0	1	3	16

4:30 PM	0	0	0	0	0	0	1	0	0	0	1	1	0	5	3	1	3	9	0	2	0	0	0	2	12
4:45 PM	0	0	0	0	2	0	1	0	1	0	0	2	0	3	2	1	1	6	1	5	1	0	2	7	15
Hourly Total	0	1	1	0	4	2	4	0	3	0	2	7	0	22	9	2	5	33	2	11	1	0	3	14	56
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	15	17	9	0	26	41	27	9	26	0	31	62	14	150	39	10	30	213	16	93	13	2	15	124	440
Approach %	36.6	41.5	22.0	0.0	-	-	43.5	14.5	41.9	0.0	-	-	6.6	70.4	18.3	4.7	-	-	12.9	75.0	10.5	1.6	-	-	-
Total %	3.4	3.9	2.0	0.0	-	9.3	6.1	2.0	5.9	0.0	-	14.1	3.2	34.1	8.9	2.3	-	48.4	3.6	21.1	3.0	0.5	-	28.2	-
Lights	15	17	9	0	-	41	24	9	24	0	-	57	14	146	39	10	-	209	16	90	13	2	-	121	428
% Lights	100.0	100.0	100.0	-	-	100.0	88.9	100.0	92.3	-	-	91.9	100.0	97.3	100.0	100.0	-	98.1	100.0	96.8	100.0	100.0	-	97.6	97.3
Mediums	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	2
% Mediums	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.3	0.0	0.0	-	0.9	0.0	0.0	0.0	0.0	-	0.0	0.5
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	3	0	2	0	-	5	0	2	0	0	-	2	0	3	0	0	-	3	10
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	11.1	0.0	7.7	-	-	8.1	0.0	1.3	0.0	0.0	-	0.9	0.0	3.2	0.0	0.0	-	2.4	2.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	6.7	-	-
Pedestrians	-	-	-	-	26	-	-	-	-	-	31	-	-	-	-	-	30	-	-	-	-	-	14	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	93.3	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019

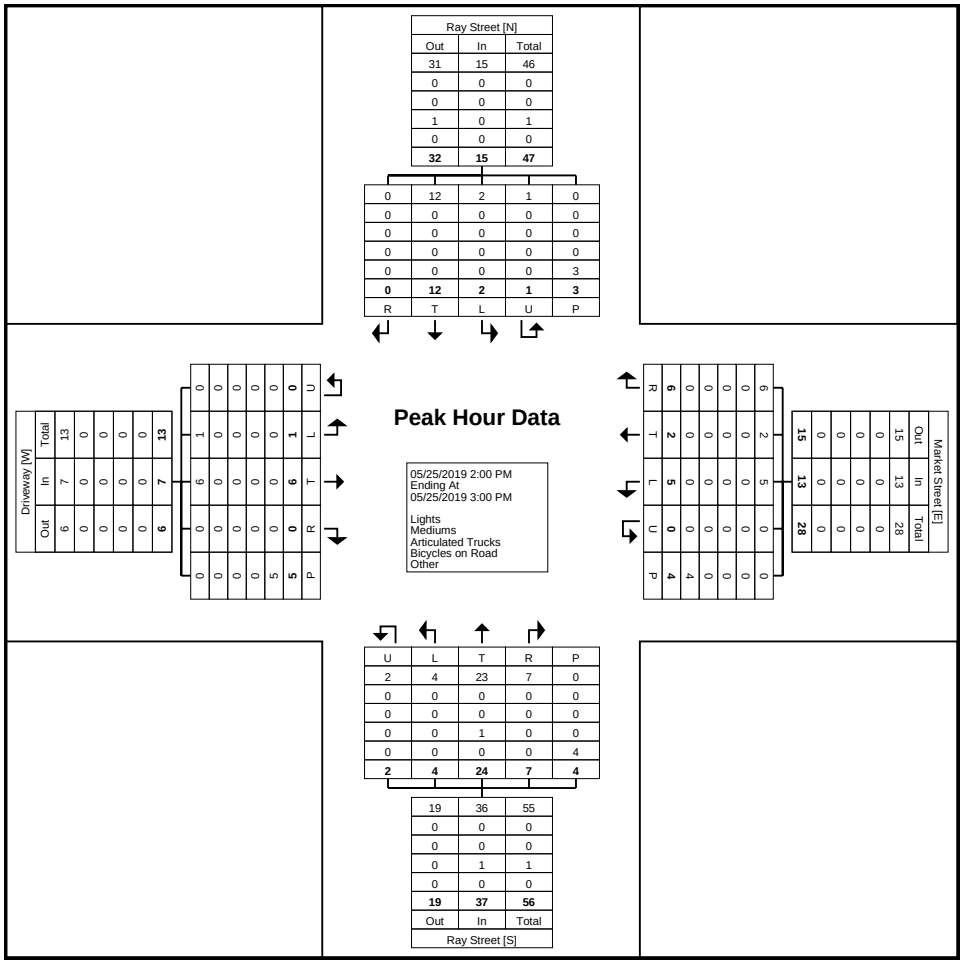
Turning Movement Peak Hour Data (2:00 PM)

Start Time	Driveway Eastbound						Market Street Westbound						Ray Street Northbound						Ray Street Southbound						
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Int. Total
2:00 PM	1	1	0	0	3	2	1	1	2	0	0	4	0	8	3	1	2	12	0	6	0	1	1	7	25
2:15 PM	0	2	0	0	2	2	2	0	2	0	0	4	1	5	1	0	1	7	1	1	0	0	1	2	15
2:30 PM	0	1	0	0	0	1	1	1	0	0	3	2	0	3	2	0	1	5	1	4	0	0	1	5	13
2:45 PM	0	2	0	0	0	2	1	0	2	0	1	3	3	8	1	1	0	13	0	1	0	0	0	1	19
Total	1	6	0	0	5	7	5	2	6	0	4	13	4	24	7	2	4	37	2	12	0	1	3	15	72
Approach %	14.3	85.7	0.0	0.0	-	-	38.5	15.4	46.2	0.0	-	-	10.8	64.9	18.9	5.4	-	-	13.3	80.0	0.0	6.7	-	-	-
Total %	1.4	8.3	0.0	0.0	-	9.7	6.9	2.8	8.3	0.0	-	18.1	5.6	33.3	9.7	2.8	-	51.4	2.8	16.7	0.0	1.4	-	20.8	-
PHF	0.250	0.750	0.000	0.000	-	0.875	0.625	0.500	0.750	0.000	-	0.813	0.333	0.750	0.583	0.500	-	0.712	0.500	0.500	0.000	0.250	-	0.536	0.720
Lights	1	6	0	0	-	7	5	2	6	0	-	13	4	23	7	2	-	36	2	12	0	1	-	15	71
% Lights	100.0	100.0	-	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0	95.8	100.0	100.0	-	97.3	100.0	100.0	-	100.0	-	100.0	98.6
Mediums	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Mediums	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	4.2	0.0	0.0	-	2.7	0.0	0.0	-	0.0	-	0.0	1.4
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	5	-	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019



Turning Movement Peak Hour Data Plot (2:00 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

Turning Movement Data

Start Time	Driveway Eastbound						Market Street Westbound						Market Street Northbound						Market Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	0	3	0	0	3	0	1	2	0	0	3	1	1	3	0	1	5	0	2	0	0	0	2	13
7:15 AM	0	1	1	0	0	2	2	1	2	0	1	5	3	2	2	0	0	7	1	0	0	0	1	1	15
7:30 AM	1	1	2	0	4	4	0	1	1	0	5	2	0	1	4	0	1	5	1	2	1	0	3	4	15
7:45 AM	1	0	0	0	1	1	0	1	0	0	1	1	2	5	4	0	3	11	0	4	1	0	2	5	18
Hourly Total	2	2	6	0	5	10	2	4	5	0	7	11	6	9	13	0	5	28	2	8	2	0	6	12	61
8:00 AM	0	0	1	0	1	1	2	0	0	0	2	2	1	3	3	0	2	7	8	4	0	0	1	12	22
8:15 AM	2	2	0	0	7	4	0	1	0	0	0	1	8	4	6	0	6	18	6	3	6	0	2	15	38
8:30 AM	0	0	0	0	3	0	2	2	0	1	4	5	2	4	11	1	2	18	5	1	0	0	4	6	29
8:45 AM	0	1	0	0	2	1	1	4	2	0	0	7	1	5	1	1	0	8	2	2	1	2	1	7	23
Hourly Total	2	3	1	0	13	6	5	7	2	1	6	15	12	16	21	2	10	51	21	10	7	2	8	40	112
9:00 AM	0	1	1	0	2	2	0	0	0	0	1	0	0	3	2	0	0	5	2	4	1	0	3	7	14
9:15 AM	0	1	0	0	2	1	3	0	2	0	1	5	1	1	1	0	0	3	0	3	1	0	0	4	13
9:30 AM	2	3	1	0	3	6	3	1	0	0	1	4	2	5	1	0	1	8	2	3	1	0	3	6	24
9:45 AM	0	1	3	0	0	4	2	0	0	0	1	2	1	3	1	0	2	5	0	2	1	0	0	3	14
Hourly Total	2	6	5	0	7	13	8	1	2	0	4	11	4	12	5	0	3	21	4	12	4	0	6	20	65
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:30 AM	2	0	0	0	0	2	2	0	1	0	1	3	2	4	1	0	0	7	1	2	1	0	0	4	16
11:45 AM	0	2	1	0	0	3	1	0	4	0	0	5	0	6	1	0	1	7	0	4	1	0	0	5	20
Hourly Total	2	2	1	0	0	5	3	0	5	0	1	8	2	10	2	0	1	14	1	6	2	0	0	9	36
12:00 PM	0	1	2	0	1	3	2	0	0	0	0	2	0	3	1	0	0	4	1	3	0	0	4	4	13
12:15 PM	2	0	1	0	0	3	4	0	0	0	1	4	0	8	3	0	1	11	0	4	1	0	1	5	23
12:30 PM	2	1	0	0	1	3	0	0	0	0	0	0	1	3	5	0	1	9	0	3	1	0	1	4	16
12:45 PM	2	0	2	0	1	4	1	2	1	0	2	4	1	2	1	0	3	4	0	7	3	0	2	10	22
Hourly Total	6	2	5	0	3	13	7	2	1	0	3	10	2	16	10	0	5	28	1	17	5	0	8	23	74
1:00 PM	3	0	0	0	2	3	2	1	1	0	1	4	1	7	3	0	2	11	1	3	2	0	0	6	24
1:15 PM	3	2	2	0	5	7	4	1	1	0	5	6	0	1	1	0	2	2	0	3	1	0	4	4	19
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	6	2	2	0	7	10	6	2	2	0	6	10	1	8	4	0	4	13	1	6	3	0	4	10	43
4:00 PM	0	1	0	0	2	1	8	0	1	0	1	9	0	4	1	0	1	5	1	6	0	0	3	7	22
4:15 PM	4	2	3	0	4	9	5	0	3	0	0	8	3	5	1	0	2	9	2	6	0	0	0	8	34
4:30 PM	3	0	3	0	1	6	7	0	5	0	1	12	0	6	3	0	0	9	0	4	1	0	3	5	32
4:45 PM	4	1	0	0	0	5	3	1	5	0	2	9	0	2	1	1	2	4	0	11	2	1	0	14	32
Hourly Total	11	4	6	0	7	21	23	1	14	0	4	38	3	17	6	1	5	27	3	27	3	1	6	34	120
5:00 PM	2	0	1	0	1	3	21	0	5	0	1	26	1	6	2	0	0	9	0	15	0	0	3	15	53
5:15 PM	1	1	1	0	0	3	19	2	4	0	2	25	1	7	1	0	2	9	2	8	1	0	1	11	48
5:30 PM	2	1	0	0	1	3	6	0	4	0	0	10	2	5	2	0	2	9	3	5	1	0	9	9	31
5:45 PM	2	1	0	0	4	3	3	0	1	0	0	4	1	8	1	0	0	10	1	2	0	0	1	3	20

Hourly Total	7	3	2	0	6	12	49	2	14	0	3	65	5	26	6	0	4	37	6	30	2	0	14	38	152
6:00 PM	1	2	0	0	0	3	2	1	1	0	0	4	0	2	3	0	1	5	2	6	0	0	0	8	20
6:15 PM	0	1	1	0	1	2	5	1	1	0	5	7	3	5	4	0	2	12	1	2	1	0	2	4	25
6:30 PM	1	0	0	0	1	1	3	1	0	0	1	4	0	3	2	1	0	6	1	3	2	0	0	6	17
6:45 PM	1	0	0	0	0	1	2	2	0	0	2	4	1	8	2	1	1	12	0	6	1	0	0	7	24
Hourly Total	3	3	1	0	2	7	12	5	2	0	8	19	4	18	11	2	4	35	4	17	4	0	2	25	86
Grand Total	41	27	29	0	50	97	115	24	47	1	42	187	39	132	78	5	41	254	43	133	32	3	54	211	749
Approach %	42.3	27.8	29.9	0.0	-	-	61.5	12.8	25.1	0.5	-	-	15.4	52.0	30.7	2.0	-	-	20.4	63.0	15.2	1.4	-	-	-
Total %	5.5	3.6	3.9	0.0	-	13.0	15.4	3.2	6.3	0.1	-	25.0	5.2	17.6	10.4	0.7	-	33.9	5.7	17.8	4.3	0.4	-	28.2	-
Lights	39	27	28	0	-	94	112	19	43	1	-	175	39	125	77	5	-	246	42	128	32	3	-	205	720
% Lights	95.1	100.0	96.6	-	-	96.9	97.4	79.2	91.5	100.0	-	93.6	100.0	94.7	98.7	100.0	-	96.9	97.7	96.2	100.0	100.0	-	97.2	96.1
Mediums	0	0	1	0	-	1	2	2	0	0	-	4	0	5	0	0	-	5	0	4	0	0	-	4	14
% Mediums	0.0	0.0	3.4	-	-	1.0	1.7	8.3	0.0	0.0	-	2.1	0.0	3.8	0.0	0.0	-	2.0	0.0	3.0	0.0	0.0	-	1.9	1.9
Articulated Trucks	2	0	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	2
% Articulated Trucks	4.9	0.0	0.0	-	-	2.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.3
Bicycles on Road	0	0	0	0	-	0	1	3	4	0	-	8	0	2	1	0	-	3	1	1	0	0	-	2	13
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.9	12.5	8.5	0.0	-	4.3	0.0	1.5	1.3	0.0	-	1.2	2.3	0.8	0.0	0.0	-	0.9	1.7
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	1.9	-	-
Pedestrians	-	-	-	-	50	-	-	-	-	-	42	-	-	-	-	-	41	-	-	-	-	-	53	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	98.1	-	-

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Count Name: Market Street & Ray Street - Weekday
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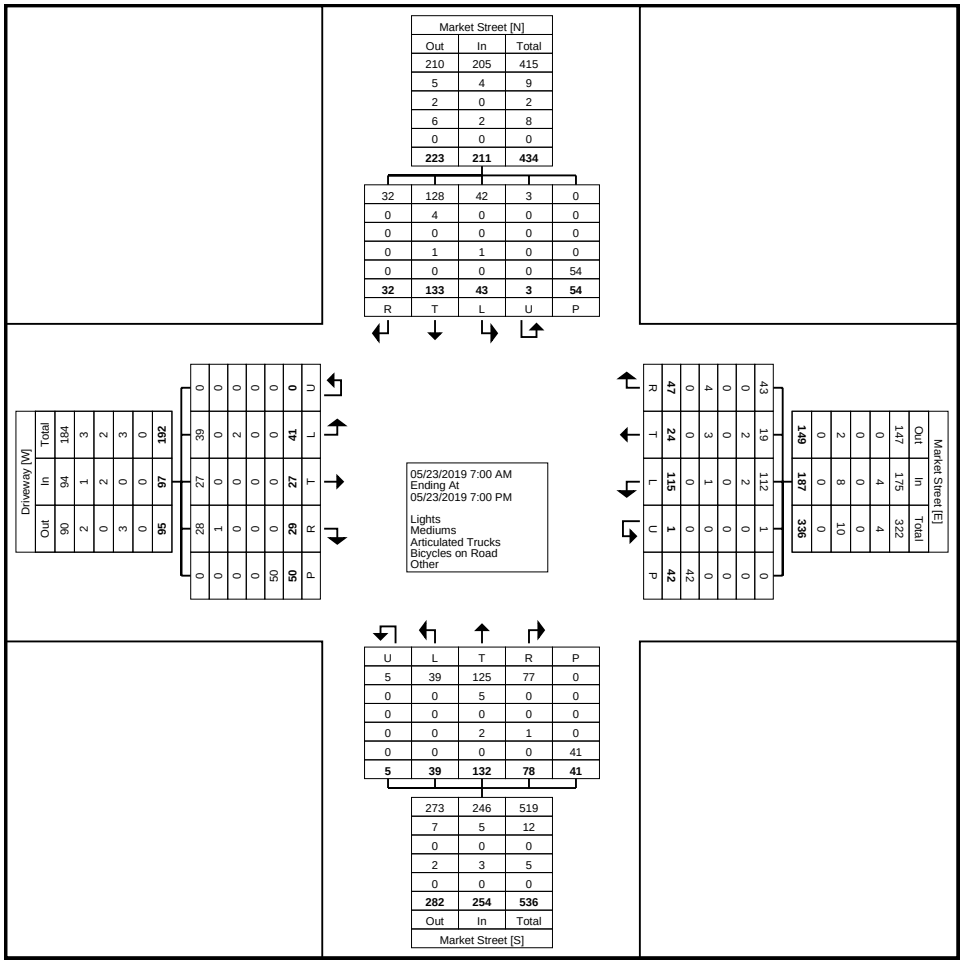
Start Date: 05/23/2019



Turning Movement Data Plot

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

Turning Movement Peak Hour Data (8:00 AM)

Start Time	Driveway Eastbound						Market Street Westbound						Market Street Northbound						Market Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	0	0	1	0	1	1	2	0	0	0	2	2	1	3	3	0	2	7	8	4	0	0	1	12	22
8:15 AM	2	2	0	0	7	4	0	1	0	0	0	1	8	4	6	0	6	18	6	3	6	0	2	15	38
8:30 AM	0	0	0	0	3	0	2	2	0	1	4	5	2	4	11	1	2	18	5	1	0	0	4	6	29
8:45 AM	0	1	0	0	2	1	1	4	2	0	0	7	1	5	1	1	0	8	2	2	1	2	1	7	23
Total	2	3	1	0	13	6	5	7	2	1	6	15	12	16	21	2	10	51	21	10	7	2	8	40	112
Approach %	33.3	50.0	16.7	0.0	-	-	33.3	46.7	13.3	6.7	-	-	23.5	31.4	41.2	3.9	-	-	52.5	25.0	17.5	5.0	-	-	-
Total %	1.8	2.7	0.9	0.0	-	5.4	4.5	6.3	1.8	0.9	-	13.4	10.7	14.3	18.8	1.8	-	45.5	18.8	8.9	6.3	1.8	-	35.7	-
PHF	0.250	0.375	0.250	0.000	-	0.375	0.625	0.438	0.250	0.250	-	0.536	0.375	0.800	0.477	0.500	-	0.708	0.656	0.625	0.292	0.250	-	0.667	0.737
Lights	2	3	1	0	-	6	5	7	2	1	-	15	12	14	21	2	-	49	21	9	7	2	-	39	109
% Lights	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	100.0	-	100.0	100.0	87.5	100.0	100.0	-	96.1	100.0	90.0	100.0	100.0	-	97.5	97.3
Mediums	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	0	1	0	0	-	1	3
% Mediums	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	12.5	0.0	0.0	-	3.9	0.0	10.0	0.0	0.0	-	2.5	2.7
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	12.5	-	-
Pedestrians	-	-	-	-	13	-	-	-	-	-	6	-	-	-	-	-	10	-	-	-	-	-	7	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	87.5	-	-

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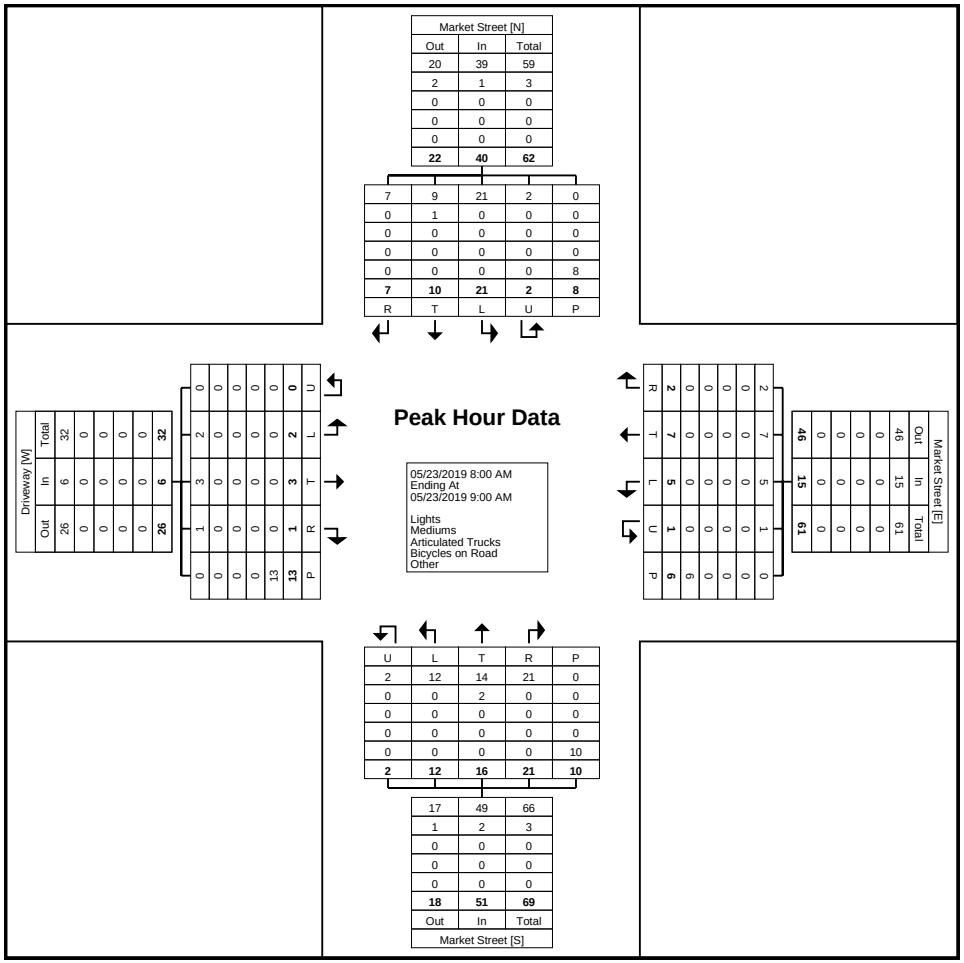
Start Date: 05/23/2019



Turning Movement Peak Hour Data Plot (8:00 AM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

Turning Movement Peak Hour Data (12:15 PM)

Start Time	Driveway Eastbound						Market Street Westbound						Market Street Northbound						Market Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
12:15 PM	2	0	1	0	0	3	4	0	0	0	1	4	0	8	3	0	1	11	0	4	1	0	1	5	23
12:30 PM	2	1	0	0	1	3	0	0	0	0	0	0	1	3	5	0	1	9	0	3	1	0	1	4	16
12:45 PM	2	0	2	0	1	4	1	2	1	0	2	4	1	2	1	0	3	4	0	7	3	0	2	10	22
1:00 PM	3	0	0	0	2	3	2	1	1	0	1	4	1	7	3	0	2	11	1	3	2	0	0	6	24
Total	9	1	3	0	4	13	7	3	2	0	4	12	3	20	12	0	7	35	1	17	7	0	4	25	85
Approach %	69.2	7.7	23.1	0.0	-	-	58.3	25.0	16.7	0.0	-	-	8.6	57.1	34.3	0.0	-	-	4.0	68.0	28.0	0.0	-	-	-
Total %	10.6	1.2	3.5	0.0	-	15.3	8.2	3.5	2.4	0.0	-	14.1	3.5	23.5	14.1	0.0	-	41.2	1.2	20.0	8.2	0.0	-	29.4	-
PHF	0.750	0.250	0.375	0.000	-	0.813	0.438	0.375	0.500	0.000	-	0.750	0.750	0.625	0.600	0.000	-	0.795	0.250	0.607	0.583	0.000	-	0.625	0.885
Lights	8	1	3	0	-	12	7	1	2	0	-	10	3	20	12	0	-	35	1	16	7	0	-	24	81
% Lights	88.9	100.0	100.0	-	-	92.3	100.0	33.3	100.0	-	-	83.3	100.0	100.0	100.0	-	-	100.0	100.0	94.1	100.0	-	-	96.0	95.3
Mediums	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	0	1	0	0	-	1	3
% Mediums	0.0	0.0	0.0	-	-	0.0	0.0	66.7	0.0	-	-	16.7	0.0	0.0	0.0	-	-	0.0	0.0	5.9	0.0	-	-	4.0	3.5
Articulated Trucks	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	11.1	0.0	0.0	-	-	7.7	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	1.2
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	7	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

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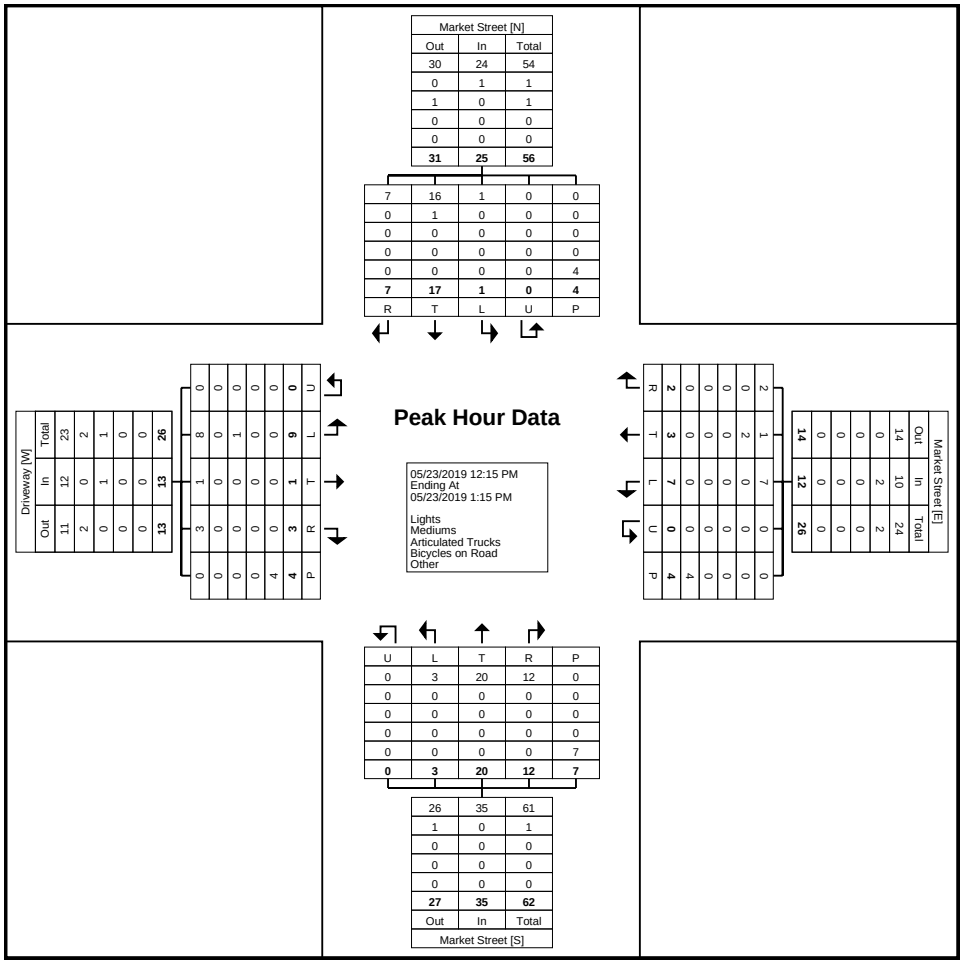

Turning Movement Peak Hour Data Plot (12:15 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

Turning Movement Peak Hour Data (4:30 PM)

Start Time	Driveway Eastbound						Market Street Westbound						Market Street Northbound						Market Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:30 PM	3	0	3	0	1	6	7	0	5	0	1	12	0	6	3	0	0	9	0	4	1	0	3	5	32
4:45 PM	4	1	0	0	0	5	3	1	5	0	2	9	0	2	1	1	2	4	0	11	2	1	0	14	32
5:00 PM	2	0	1	0	1	3	21	0	5	0	1	26	1	6	2	0	0	9	0	15	0	0	3	15	53
5:15 PM	1	1	1	0	0	3	19	2	4	0	2	25	1	7	1	0	2	9	2	8	1	0	1	11	48
Total	10	2	5	0	2	17	50	3	19	0	6	72	2	21	7	1	4	31	2	38	4	1	7	45	165
Approach %	58.8	11.8	29.4	0.0	-	-	69.4	4.2	26.4	0.0	-	-	6.5	67.7	22.6	3.2	-	-	4.4	84.4	8.9	2.2	-	-	-
Total %	6.1	1.2	3.0	0.0	-	10.3	30.3	1.8	11.5	0.0	-	43.6	1.2	12.7	4.2	0.6	-	18.8	1.2	23.0	2.4	0.6	-	27.3	-
PHF	0.625	0.500	0.417	0.000	-	0.708	0.595	0.375	0.950	0.000	-	0.692	0.500	0.750	0.583	0.250	-	0.861	0.250	0.633	0.500	0.250	-	0.750	0.778
Lights	10	2	5	0	-	17	50	2	18	0	-	70	2	21	7	1	-	31	1	38	4	1	-	44	162
% Lights	100.0	100.0	100.0	-	-	100.0	100.0	66.7	94.7	-	-	97.2	100.0	100.0	100.0	100.0	-	100.0	50.0	100.0	100.0	100.0	-	97.8	98.2
Mediums	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Mediums	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	1	1	0	-	2	0	0	0	0	-	0	1	0	0	0	-	1	3
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	33.3	5.3	-	-	2.8	0.0	0.0	0.0	0.0	-	0.0	50.0	0.0	0.0	0.0	-	2.2	1.8
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	6	-	-	-	-	-	4	-	-	-	-	-	7	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

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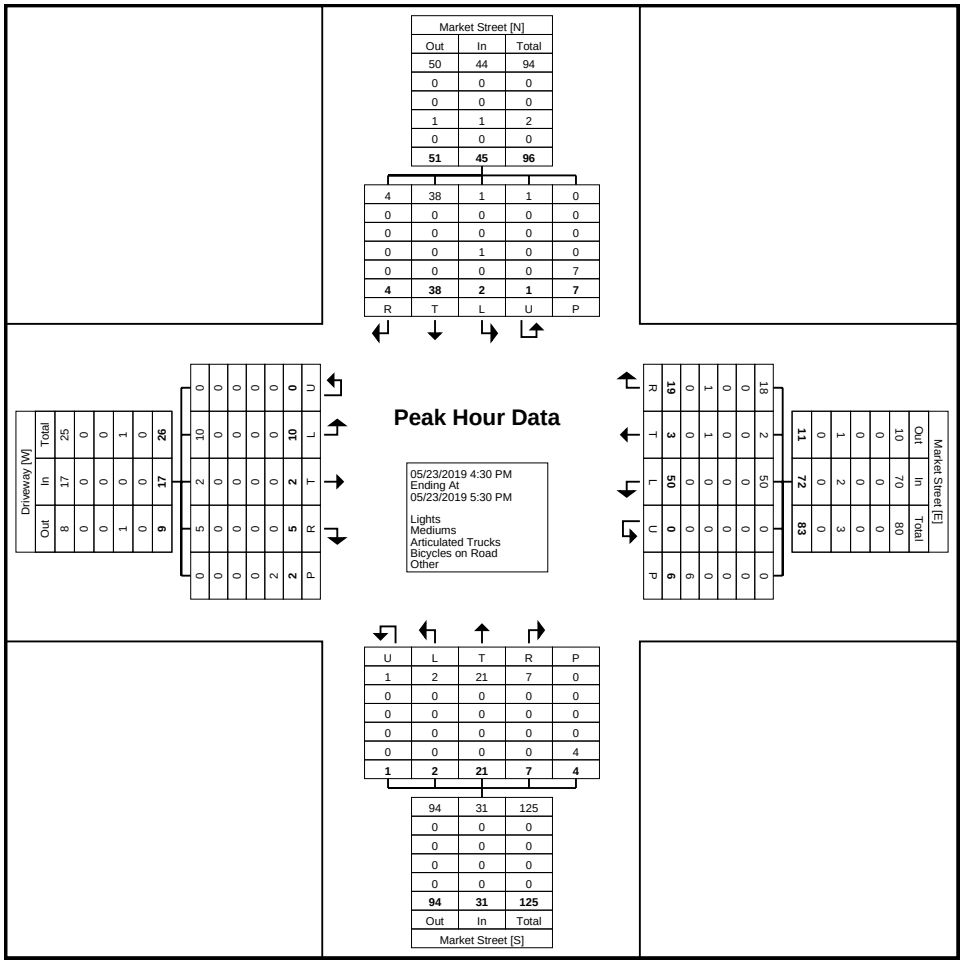


Turning Movement Peak Hour Data Plot (4:30 PM)

Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Market Street & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

Appendix C

Trip Distribution

Thu Sep 26 2019 14:32:40 GMT-0400 (Eastern Daylight Time) - Run Time: 1669ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of household - gta06_hhld
Column: Planning district of employment - pd_emp

Filters:
2006 GTA 5195 5192 5187

Trip 2016
Table:

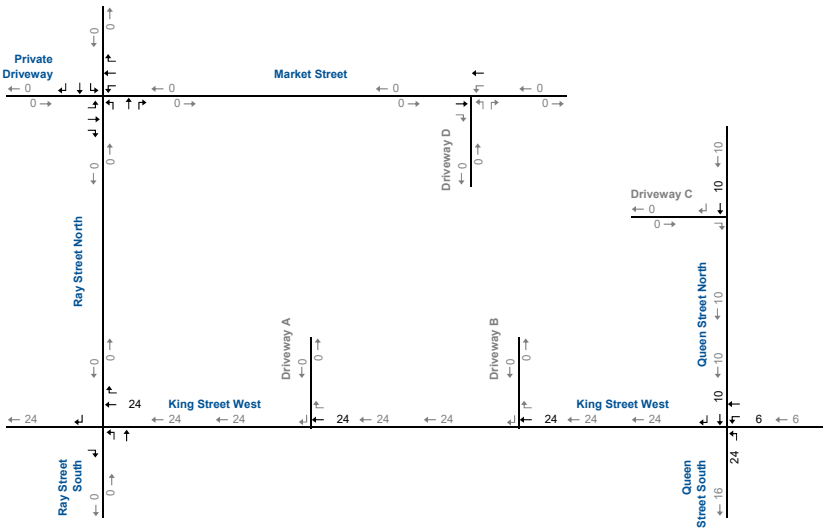
	PD 1 of To QEW	PD 3 of To QEW	PD 4 of To QEW	PD 7 of To QEW	Mississaug QEW	Milton QEW	Oakville QEW	Burlington QEW	Flamborou QEW	Dundas QEW	Ancaster QEW	Glanbrook	Stoney Creek	Hamilton	South Queen	
5187	42	0	0	0	51	0	359	613	0	0	0	0	153	3274		
5192	65	12	0	0	122	0	0	627	89	46	0	0	0	1663		
5195	0	0	207	0	77	101	0	82	0	141	43	0	0	476		
5200	117	0	0	41	0	0	48	514	0	244	150	36	117	1714		
	224	**12**	**207**	**41**	**250**	**101**	**407**	**1836**	**89**	**431**	**193**	**36**	**270**	**7127**		**11224**
	2%	0%	2%	0%	2%	1%	4%	16%	1%	4%	2%	0%	2%	63%		

Appendix D

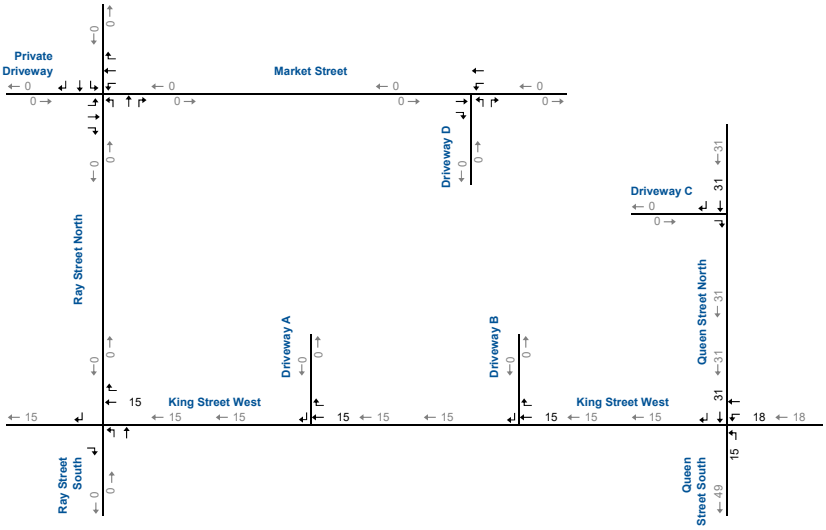
Background Development Projections

15 Queen Street

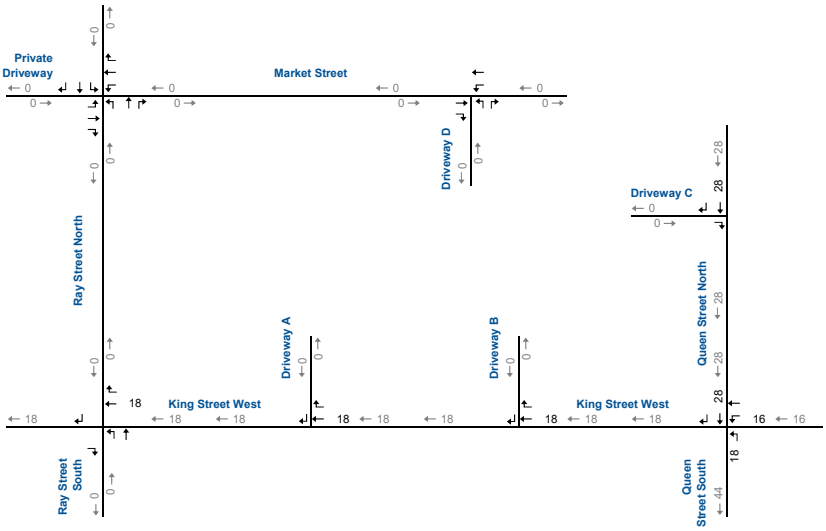
AM Peak Hour



PM Peak Hour

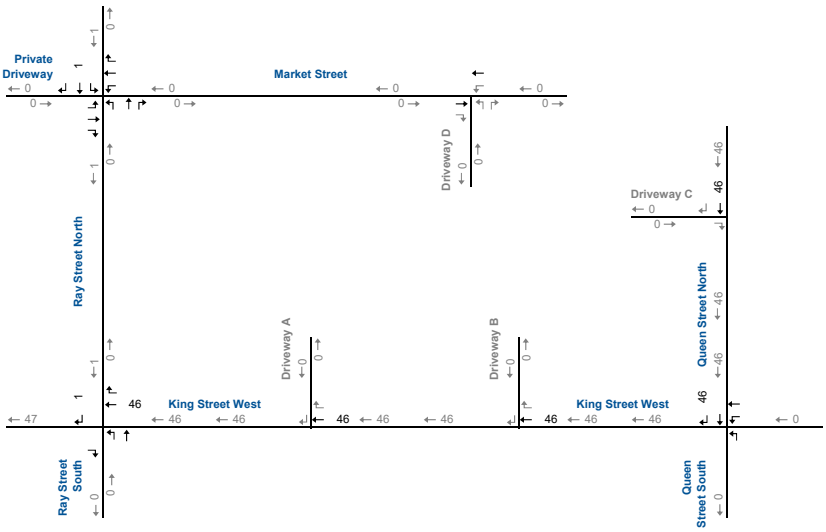


SAT Peak Hour

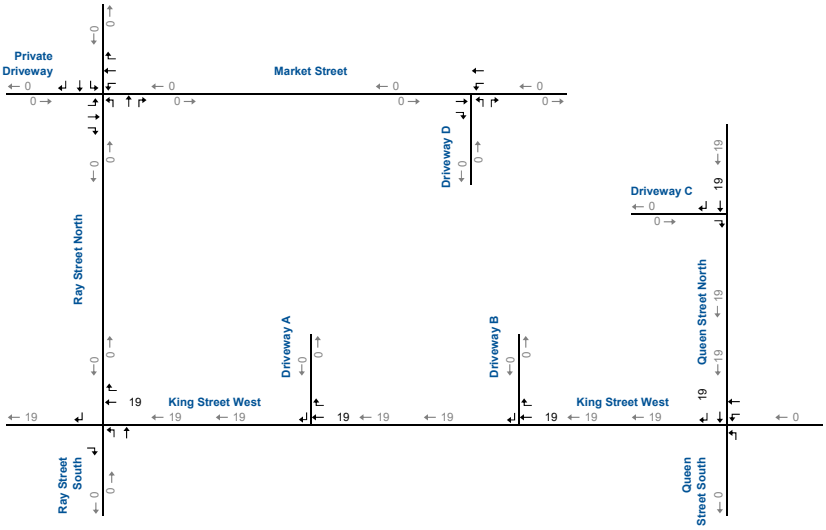


200 Market Street

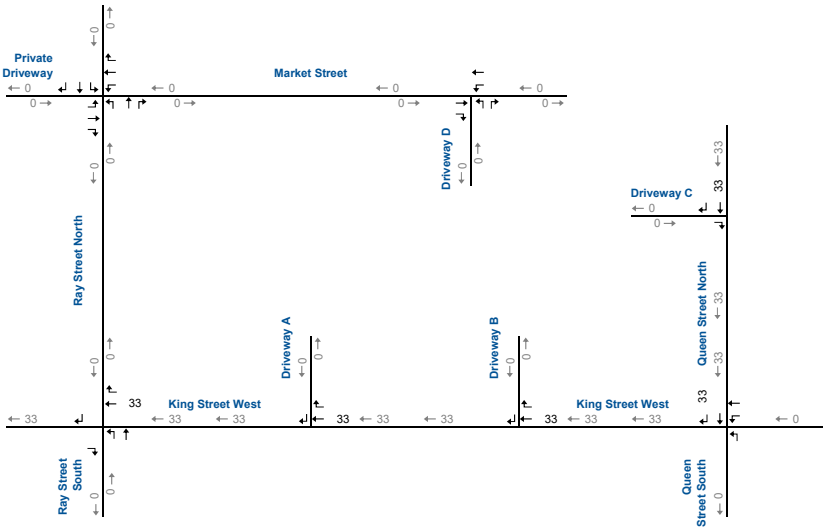
AM Peak Hour



PM Peak Hour



SAT Peak Hour

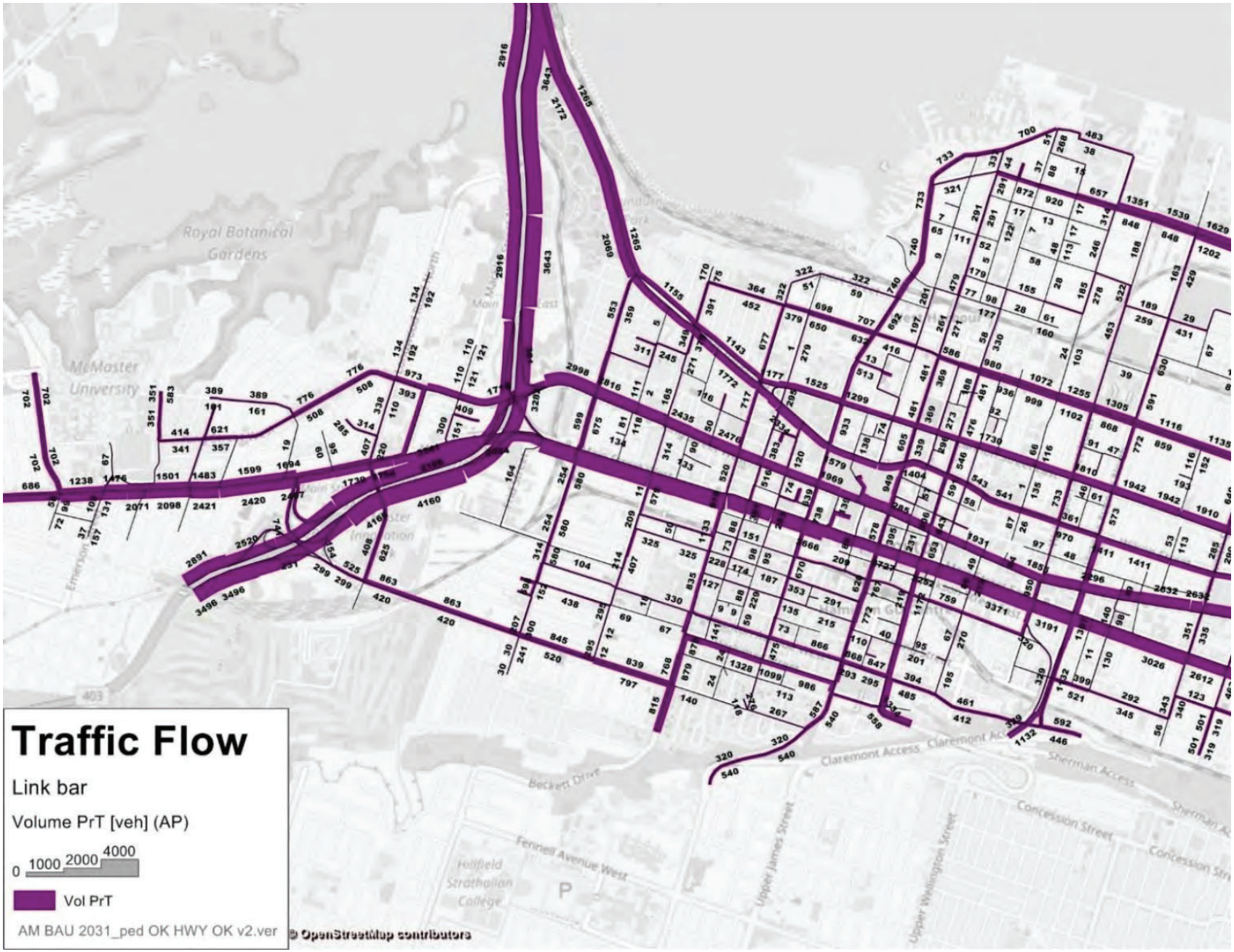


Appendix E

EMME Projections

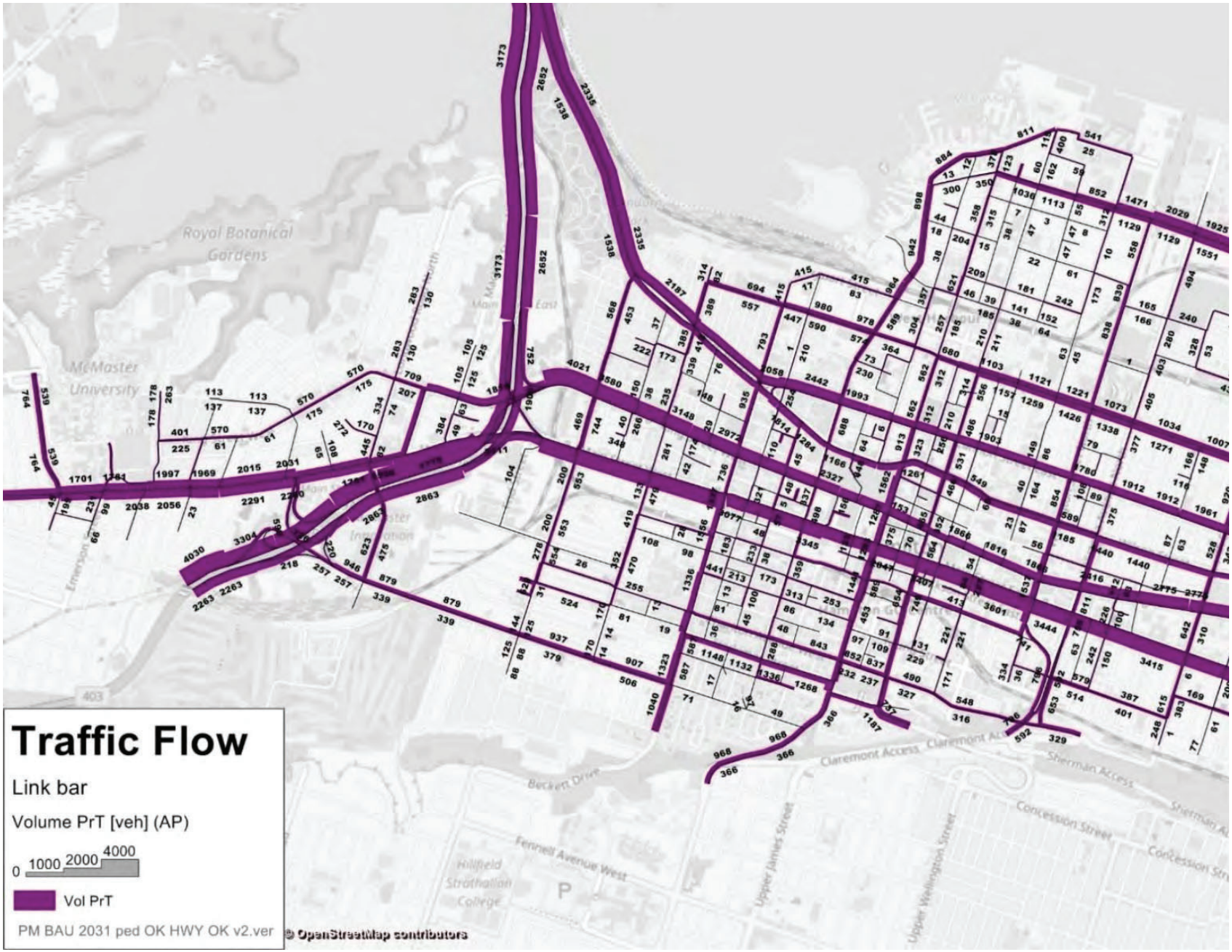
AM BAU VOLUMES

West



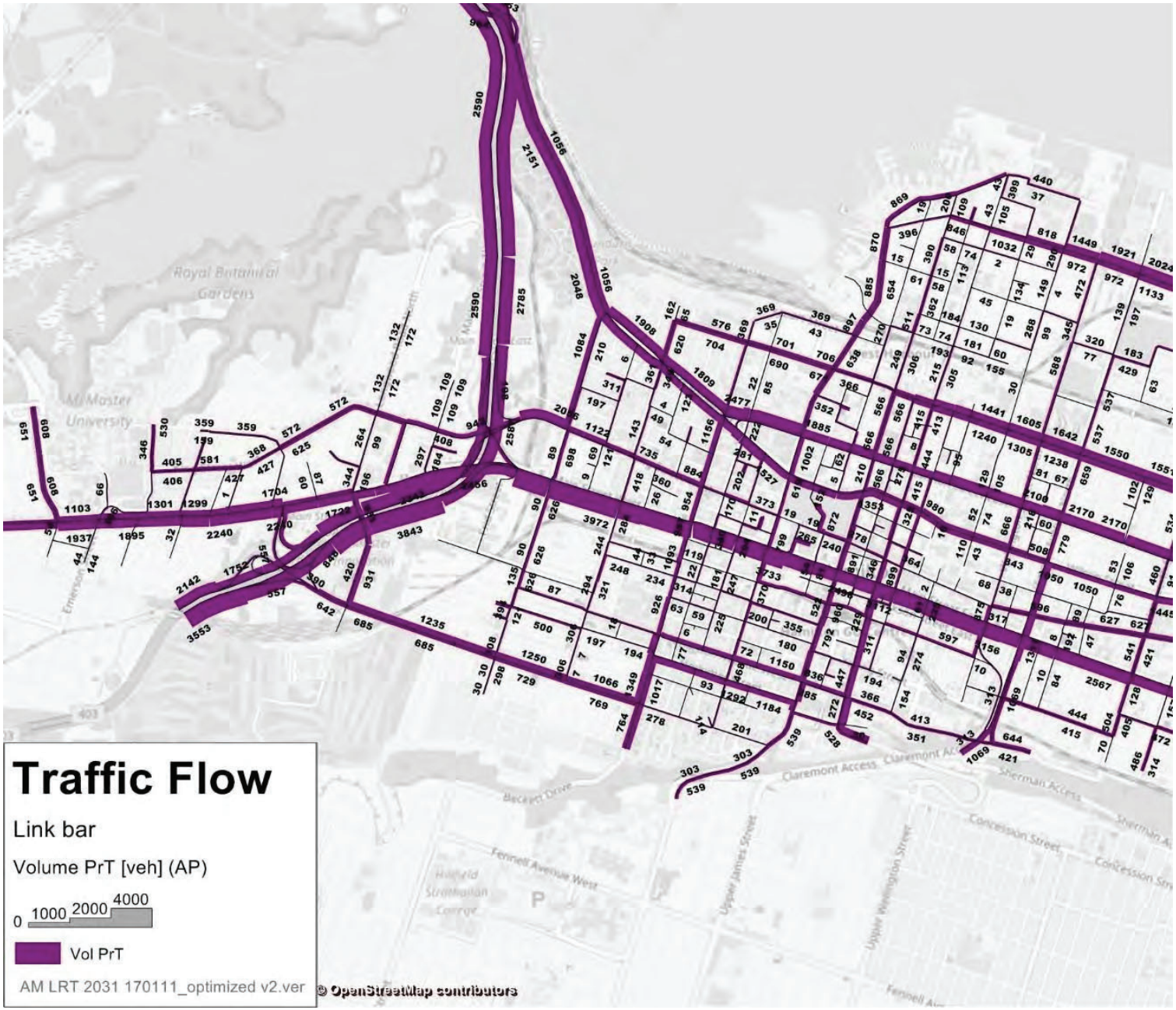
PM BAU VOLUMES

West



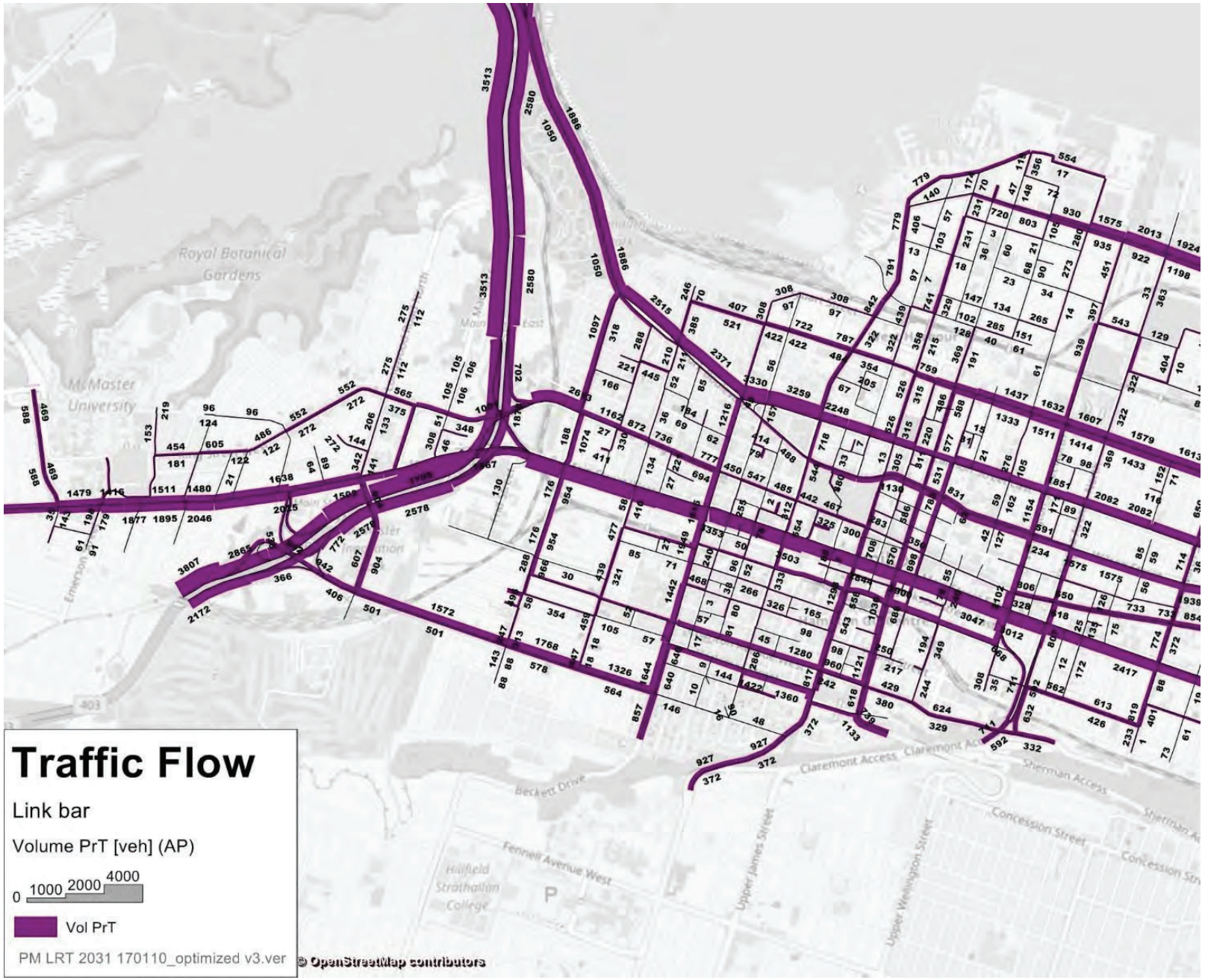
AM LRT VOLUMES

West



PM LRT VOLUMES

West



Appendix F

Operational Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	3	1	5	7	2	12	16	21	21	10	7
Future Volume (vph)	2	3	1	5	7	2	12	16	21	21	10	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.977			0.982			0.941			0.974	
Flt Protected		0.984			0.984			0.988			0.973	
Satd. Flow (prot)	0	1827	0	0	1836	0	0	1701	0	0	1755	0
Flt Permitted		0.984			0.984			0.988			0.973	
Satd. Flow (perm)	0	1827	0	0	1836	0	0	1701	0	0	1755	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			144.9			94.4			96.5	
Travel Time (s)		6.0			13.0			8.5			8.7	
Confl. Peds. (#/hr)	7		10	10		7	13		6	6		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	10%	0%
Adj. Flow (vph)	2	3	1	5	8	2	13	17	23	23	11	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	6	0	0	15	0	0	53	0	0	42	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	3	1	5	7	2	12	16	21	21	10	7
Future Volume (Veh/h)	2	3	1	5	7	2	12	16	21	21	10	7
Sign Control		Stop			Stop			Free			Free	
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)	2	3	1	5	8	2	13	17	23	23	11	8
Pedestrians		13			6			10			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	142	146	38	134	138	42	32			46		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	142	146	38	134	138	42	32			46		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	99	100	99			99		
cM capacity (veh/h)	787	720	1020	803	727	1024	1576			1567		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	6	15	53	42
Volume Left	2	5	13	23
Volume Right	1	2	23	8
cSH	781	782	1576	1567
Volume to Capacity	0.01	0.02	0.01	0.01
Queue Length 95th (m)	0.2	0.5	0.2	0.4
Control Delay (s)	9.6	9.7	1.8	4.1
Lane LOS	A	A	A	A
Approach Delay (s)	9.6	9.7	1.8	4.1
Approach LOS	A	A		

Intersection Summary					
Average Delay		4.1			
Intersection Capacity Utilization	20.5%	ICU Level of Service		A	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	13	2049	37	45	5	0	0	0	22
Future Volume (vph)	0	0	0	13	2049	37	45	5	0	0	0	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.997						0.865	
Flt Protected								0.957				
Satd. Flow (prot)	0	0	0	0	6269	0	0	1754	0	0	1508	0
Flt Permitted								0.957				
Satd. Flow (perm)	0	0	0	0	6269	0	0	1754	0	0	1508	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			161.8			102.8			94.4	
Travel Time (s)		8.7			11.6			7.4			6.8	
Confl. Peds. (#/hr)	26		13	13		26	1		5	5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	4%	0%	2%	20%	2%	2%	0%	9%
Adj. Flow (vph)	0	0	0	14	2227	40	49	5	0	0	0	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2281	0	0	54	0	0	24	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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	13	2049	37	45	5	0	0	0	22
Future Volume (Veh/h)	0	0	0	13	2049	37	45	5	0	0	0	22
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	14	2227	40	49	5	0	0	0	24
Pedestrians		1			5			13			26	
Lane Width (m)		0.0			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			1			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.73						0.73	0.73		0.73	0.73	0.73
vC, conflicting volume	2293			13			623	2334	18	2308	2314	604
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	887			13			0	944	18	908	916	0
tC, single (s)	4.1			4.3			7.5	6.9	6.9	7.5	6.5	7.1
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.5	4.0	3.4
p0 queue free %	100			99			93	97	100	100	100	97
cM capacity (veh/h)	538			1544			688	161	1040	154	191	753

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	385	742	742	411	54	24
Volume Left	14	0	0	0	49	0
Volume Right	0	0	0	40	0	24
cSH	1544	1700	1700	1700	528	753
Volume to Capacity	0.01	0.44	0.44	0.24	0.10	0.03
Queue Length 95th (m)	0.2	0.0	0.0	0.0	2.7	0.8
Control Delay (s)	0.3	0.0	0.0	0.0	12.6	9.9
Lane LOS	A				B	A
Approach Delay (s)	0.1				12.6	9.9
Approach LOS					B	A

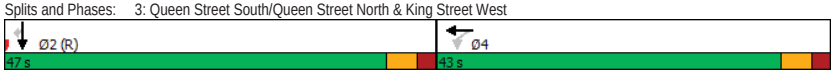
Intersection Summary					
Average Delay	0.4				
Intersection Capacity Utilization	48.9%	ICU Level of Service		A	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	72	1787	0	0	0	0	0	311	312
Future Volume (vph)	0	0	0	72	1787	0	0	0	0	0	311	312
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	0.91	0.91
Ped Bike Factor					1.00						0.98	0.94
Frt											0.959	0.850
Flt Protected					0.998							
Satd. Flow (prot)	0	0	0	0	5986	0	0	0	0	0	2814	1245
Flt Permitted					0.998							
Satd. Flow (perm)	0	0	0	0	5981	0	0	0	0	0	2814	1167
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)					30						1	30
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		161.8			121.6			93.7			69.6	
Travel Time (s)		11.6			8.8			6.7			5.0	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	78	1942	0	0	0	0	0	338	339
Shared Lane Traffic (%)												38%
Lane Group Flow (vph)	0	0	0	0	2020	0	0	0	0	0	467	210
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA						NA	Perm
Protected Phases					4						2	
Permitted Phases				4								2
Minimum Split (s)				32.5	32.5						28.5	28.5
Total Split (s)				43.0	43.0						47.0	47.0
Total Split (%)				47.8%	47.8%						52.2%	52.2%
Maximum Green (s)				37.5	37.5						41.5	41.5
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				2.2	2.2						2.2	2.2
Lost Time Adjust (s)					0.0						0.0	0.0
Total Lost Time (s)					5.5						5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				12.0	12.0						12.0	12.0
Flash Dont Walk (s)				15.0	15.0						11.0	11.0
Pedestrian Calls (#/hr)				0	0						0	0
Act Effct Green (s)					37.5						41.5	41.5
Actuated g/C Ratio					0.42						0.46	0.46
v/c Ratio					0.81						0.36	0.38

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					25.8						16.6	15.9
Queue Delay					0.0						0.0	0.0
Total Delay					25.8						16.6	15.9
LOS					C						B	B
Approach Delay					25.8						16.4	
Approach LOS					C						B	
Queue Length 50th (m)					90.1						29.0	22.3
Queue Length 95th (m)					105.9						41.4	41.7
Internal Link Dist (m)		137.8			97.6			69.7			45.6	
Turn Bay Length (m)												
Base Capacity (vph)					2509						1298	554
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.81						0.36	0.38

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBT and 6:, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 23.4		Intersection LOS: C	
Intersection Capacity Utilization 57.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: Queen Street South/Queen Street North & King Street West



HCM Signalized Intersection Capacity Analysis
3: Queen Street South/Queen Street North & King Street West

Existing AM.syn
10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	72	1787	0	0	0	0	0	311	312
Future Volume (vph)	0	0	0	72	1787	0	0	0	0	0	311	312
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5						5.5	5.5
Lane Util. Factor					0.86						0.91	0.91
Frpb, ped/bikes					1.00						0.98	0.94
Flpb, ped/bikes					1.00						1.00	1.00
Frt					1.00						0.96	0.85
Flt Protected					1.00						1.00	1.00
Satd. Flow (prot)					5981						2812	1167
Flt Permitted					1.00						1.00	1.00
Satd. Flow (perm)					5981						2812	1167
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	78	1942	0	0	0	0	0	338	339
RTOR Reduction (vph)	0	0	0	0	18	0	0	0	0	0	1	16
Lane Group Flow (vph)	0	0	0	0	2003	0	0	0	0	0	466	194
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA						NA	Perm
Protected Phases					4						2	
Permitted Phases				4								2
Actuated Green, G (s)					37.5						41.5	41.5
Effective Green, g (s)					37.5						41.5	41.5
Actuated g/C Ratio					0.42						0.46	0.46
Clearance Time (s)					5.5						5.5	5.5
Lane Grp Cap (vph)					2492						1296	538
v/s Ratio Prot											0.17	
v/s Ratio Perm					0.33							c0.17
v/c Ratio					0.80						0.36	0.36
Uniform Delay, d1					23.0						15.7	15.7
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					2.9						0.8	1.9
Delay (s)					25.9						16.4	17.5
Level of Service					C						B	B
Approach Delay (s)		0.0			25.9			0.0			16.8	
Approach LOS		A			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	57.0%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
1: Ray Street North & Market Street

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	5	51	3	19	2	21	7	2	39	4
Future Volume (vph)	10	2	5	51	3	19	2	21	7	2	39	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
Ped Bike Factor												
Frt		0.962			0.964			0.967			0.989	
Flt Protected		0.970			0.966			0.997			0.998	
Satd. Flow (prot)	0	1773	0	0	1769	0	0	1832	0	0	1875	0
Flt Permitted		0.970			0.966			0.997			0.998	
Satd. Flow (perm)	0	1773	0	0	1769	0	0	1832	0	0	1875	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		76.7			144.9			94.4			96.5	
Travel Time (s)		5.5			13.0			8.5			8.7	
Confl. Peds. (#/hr)	7		4	4		7	2		6	6		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	11	2	5	55	3	21	2	23	8	2	42	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	18	0	0	79	0	0	33	0	0	48	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	19.0%	ICU Level of Service A	
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: Ray Street North & Market Street

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	2	5	51	3	19	2	21	7	2	39	4
Future Volume (Veh/h)	10	2	5	51	3	19	2	21	7	2	39	4
Sign Control		Stop			Stop			Free			Free	
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)	11	2	5	55	3	21	2	23	8	2	42	4
Pedestrians		2			6			4			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	110	91	50	95	89	40	48			37		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	110	91	50	95	89	40	48			37		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	94	100	98	100			100		
cM capacity (veh/h)	840	796	1019	873	798	1026	1570			1579		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	18	79	33	48
Volume Left	11	55	2	2
Volume Right	5	21	8	4
cSH	877	906	1570	1579
Volume to Capacity	0.02	0.09	0.00	0.00
Queue Length 95th (m)	0.5	2.3	0.0	0.0
Control Delay (s)	9.2	9.4	0.5	0.3
Lane LOS	A	A	A	A
Approach Delay (s)	9.2	9.4	0.5	0.3
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.2			
Intersection Capacity Utilization	19.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Lanes, Volumes, Timings
2: Ray Street South/Ray Street North & King Street West

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	19	2130	31	42	2	0	0	0	89
Future Volume (vph)	0	0	0	19	2130	31	42	2	0	0	0	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.998						0.865	
Flt Protected								0.954				
Satd. Flow (prot)	0	0	0	0	6398	0	0	1813	0	0	1644	0
Flt Permitted								0.954				
Satd. Flow (perm)	0	0	0	0	6398	0	0	1813	0	0	1644	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			161.8			102.8			94.4	
Travel Time (s)		8.7			11.6			7.4			6.8	
Confl. Peds. (#/hr)	46		19	19		46			1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	21	2315	34	46	2	0	0	0	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2370	0	0	48	0	0	97	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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.3%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
2: Ray Street South/Ray Street North & King Street West

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	19	2130	31	42	2	0	0	0	89
Future Volume (Veh/h)	0	0	0	19	2130	31	42	2	0	0	0	89
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	21	2315	34	46	2	0	0	0	97
Pedestrians					1			19			46	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			2			4	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.75						0.75	0.75		0.75	0.75	0.75
vC, conflicting volume	2395			19			737	2456	20	2422	2439	642
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1186			19			0	1268	20	1222	1245	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			99			93	98	100	100	100	88
cM capacity (veh/h)	429			1585			631	119	1042	93	123	786

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	407	772	772	420	48	97
Volume Left	21	0	0	0	46	0
Volume Right	0	0	0	34	0	97
cSH	1585	1700	1700	1700	535	786
Volume to Capacity	0.01	0.45	0.45	0.25	0.09	0.12
Queue Length 95th (m)	0.3	0.0	0.0	0.0	2.4	3.4
Control Delay (s)	0.5	0.0	0.0	0.0	12.4	10.2
Lane LOS	A				B	B
Approach Delay (s)	0.1				12.4	10.2
Approach LOS					B	B

Intersection Summary					
Average Delay	0.7				
Intersection Capacity Utilization	49.3%	ICU Level of Service		A	
Analysis Period (min)	15				

Lanes, Volumes, Timings
3: Queen Street South/Queen Street North & King Street West

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	132	1768	0	0	0	0	0	493	413
Future Volume (vph)	0	0	0	132	1768	0	0	0	0	0	493	413
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	0.91	0.91
Ped Bike Factor					1.00						0.99	0.95
Frt											0.968	0.850
Flt Protected					0.997							
Satd. Flow (prot)	0	0	0	0	5975	0	0	0	0	0	3032	1289
Flt Permitted					0.997							
Satd. Flow (perm)	0	0	0	0	5963	0	0	0	0	0	3032	1230
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)					30						2	30
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		161.8			121.6			93.7			69.6	
Travel Time (s)		11.6			8.8			6.7			5.0	
Confl. Peds. (#/hr)	83		27	27		83	31		27	27		31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	10%	9%	2%	2%	2%	2%	2%	8%	14%
Adj. Flow (vph)	0	0	0	143	1922	0	0	0	0	0	536	449
Shared Lane Traffic (%)												33%
Lane Group Flow (vph)	0	0	0	0	2065	0	0	0	0	0	684	301
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA						NA	Perm
Protected Phases					4						2	
Permitted Phases				4								2
Minimum Split (s)				33.5	33.5						29.8	29.8
Total Split (s)				48.0	48.0						42.0	42.0
Total Split (%)				53.3%	53.3%						46.7%	46.7%
Maximum Green (s)				42.5	42.5						36.5	36.5
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				2.2	2.2						2.2	2.2
Lost Time Adjust (s)					0.0						0.0	0.0
Total Lost Time (s)					5.5						5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				12.0	12.0						12.0	12.0
Flash Dont Walk (s)				15.0	15.0						12.0	12.0
Pedestrian Calls (#/hr)				0	0						0	0
Act Effct Green (s)					42.5						36.5	36.5
Actuated g/C Ratio					0.47						0.41	0.41
v/c Ratio					0.73						0.56	0.58

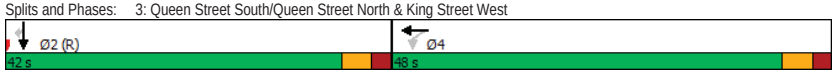
Lanes, Volumes, Timings
3: Queen Street South/Queen Street North & King Street West

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					20.7						22.6	24.1
Queue Delay					0.0						0.0	0.0
Total Delay					20.7						22.6	24.1
LOS					C						C	C
Approach Delay					20.7						23.1	
Approach LOS					C						C	
Queue Length 50th (m)					83.3						51.0	41.0
Queue Length 95th (m)					97.8						69.5	71.7
Internal Link Dist (m)		137.8			97.6			69.7			45.6	
Turn Bay Length (m)												
Base Capacity (vph)					2831						1230	516
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.73						0.56	0.58

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBT and 6:, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 21.5		Intersection LOS: C	
Intersection Capacity Utilization 58.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: Queen Street South/Queen Street North & King Street West



HCM Signalized Intersection Capacity Analysis
3: Queen Street South/Queen Street North & King Street West

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	132	1768	0	0	0	0	0	493	413
Future Volume (vph)	0	0	0	132	1768	0	0	0	0	0	493	413
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5						5.5	5.5
Lane Util. Factor					0.86						0.91	0.91
Frpb, ped/bikes					1.00						0.99	0.95
Flpb, ped/bikes					1.00						1.00	1.00
Frt					1.00						0.97	0.85
Flt Protected					1.00						1.00	1.00
Satd. Flow (prot)					5961						3031	1230
Flt Permitted					1.00						1.00	1.00
Satd. Flow (perm)					5961						3031	1230
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	143	1922	0	0	0	0	0	536	449
RTOR Reduction (vph)	0	0	0	0	16	0	0	0	0	0	1	18
Lane Group Flow (vph)	0	0	0	0	2049	0	0	0	0	0	683	283
Confl. Peds. (#/hr)	83		27	27		83	31		27	27		31
Heavy Vehicles (%)	2%	2%	2%	10%	9%	2%	2%	2%	2%	2%	8%	14%
Turn Type				Perm	NA						NA	Perm
Protected Phases					4						2	
Permitted Phases				4								2
Actuated Green, G (s)					42.5						36.5	36.5
Effective Green, g (s)					42.5						36.5	36.5
Actuated g/C Ratio					0.47						0.41	0.41
Clearance Time (s)					5.5						5.5	5.5
Lane Grp Cap (vph)					2814						1229	498
v/s Ratio Prot											0.23	
v/s Ratio Perm					0.34							c0.23
v/c Ratio					0.73						0.56	0.57
Uniform Delay, d1					19.1						20.5	20.7
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					1.7						1.8	4.7
Delay (s)					20.8						22.3	25.3
Level of Service					C						C	C
Approach Delay (s)		0.0			20.8			0.0			23.3	
Approach LOS		A			C			A			C	

Intersection Summary				
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	58.4%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
1: Ray Street North & Market Street

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	6	0	5	2	6	4	24	7	2	12	0
Future Volume (vph)	1	6	0	5	2	6	4	24	7	2	12	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
Ped Bike Factor												
Frt					0.932			0.972				
Flt Protected		0.994			0.982			0.995			0.993	
Satd. Flow (prot)	0	1889	0	0	1734	0	0	1785	0	0	1887	0
Flt Permitted		0.994			0.982			0.995			0.993	
Satd. Flow (perm)	0	1889	0	0	1734	0	0	1785	0	0	1887	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		80.0			67.6			94.4			96.5	
Travel Time (s)		5.8			6.1			8.5			8.7	
Confl. Peds. (#/hr)	3		4	4		3	5		4	5		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%	2%	0%	2%	4%	0%	0%	0%	2%
Adj. Flow (vph)	1	7	0	5	2	7	4	26	8	2	13	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	14	0	0	38	0	0	15	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: Ray Street North & Market Street

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	6	0	5	2	6	4	24	7	2	12	0
Future Volume (Veh/h)	1	6	0	5	2	6	4	24	7	2	12	0
Sign Control		Stop			Stop			Free			Free	
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)	1	7	0	5	2	7	4	26	8	2	13	0
Pedestrians		5			5			4			3	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	71	69	22	68	65	38	18			39		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	71	69	22	68	65	38	18			39		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	99	100	99	100			100		
cM capacity (veh/h)	903	815	1053	909	816	1033	1592			1577		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	8	14	38	15
Volume Left	1	5	4	2
Volume Right	0	7	8	0
cSH	825	950	1592	1577
Volume to Capacity	0.01	0.01	0.00	0.00
Queue Length 95th (m)	0.2	0.4	0.1	0.0
Control Delay (s)	9.4	8.8	0.8	1.0
Lane LOS	A	A	A	A
Approach Delay (s)	9.4	8.8	0.8	1.0
Approach LOS	A	A		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: Ray Street South/Ray Street North & King Street West

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	11	1880	24	41	6	0	0	1	21
Future Volume (vph)	0	0	0	11	1880	24	41	6	0	0	1	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.998						0.871	
Flt Protected								0.959				
Satd. Flow (prot)	0	0	0	0	6394	0	0	1822	0	0	1655	0
Flt Permitted								0.959				
Satd. Flow (perm)	0	0	0	0	6394	0	0	1822	0	0	1655	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			161.8			102.8			94.4	
Travel Time (s)		8.7			11.6			7.4			6.8	
Confl. Peds. (#/hr)	42		21	21		42			4	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 (%)	2%	2%	2%	9%	2%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	12	2043	26	45	7	0	0	1	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2081	0	0	52	0	0	24	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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: Ray Street South/Ray Street North & King Street West

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	11	1880	24	41	6	0	0	1	21
Future Volume (Veh/h)	0	0	0	11	1880	24	41	6	0	0	1	21
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	12	2043	26	45	7	0	0	1	23
Pedestrians					4			21			42	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			2			4	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.76						0.76	0.76		0.76	0.76	0.76
vC, conflicting volume	2111			21			579	2156	25	2130	2143	566
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	883			21			0	942	25	907	925	0
tC, single (s)	4.1			4.3			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			94	96	100	100	99	97
cM capacity (veh/h)	559			1517			709	189	1030	159	194	800

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	352	681	681	366	52	24
Volume Left	12	0	0	0	45	0
Volume Right	0	0	0	26	0	23
cSH	1517	1700	1700	1700	518	708
Volume to Capacity	0.01	0.40	0.40	0.22	0.10	0.03
Queue Length 95th (m)	0.2	0.0	0.0	0.0	2.7	0.8
Control Delay (s)	0.3	0.0	0.0	0.0	12.7	10.3
Lane LOS	A				B	B
Approach Delay (s)	0.1				12.7	10.3
Approach LOS					B	B

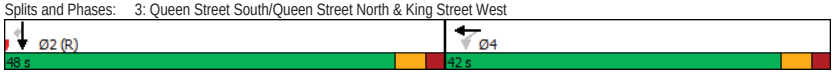
Intersection Summary					
Average Delay	0.5				
Intersection Capacity Utilization	45.9%	ICU Level of Service		A	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	172	1631	0	0	0	0	0	467	285
Future Volume (vph)	0	0	0	172	1631	0	0	0	0	0	467	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	0.91	0.91
Ped Bike Factor					1.00						1.00	0.97
Frt											0.984	0.850
Flt Protected					0.995							
Satd. Flow (prot)	0	0	0	0	6388	0	0	0	0	0	3359	1455
Flt Permitted					0.995							
Satd. Flow (perm)	0	0	0	0	6374	0	0	0	0	0	3359	1414
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)					33						2	30
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		161.8			121.6			93.7			199.6	
Travel Time (s)		11.6			8.8			6.7			14.4	
Confl. Peds. (#/hr)	43		22	22		43	14		20	20		14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	2%	2%	2%	2%	2%	2%	1%	1%
Adj. Flow (vph)	0	0	0	187	1773	0	0	0	0	0	508	310
Shared Lane Traffic (%)												20%
Lane Group Flow (vph)	0	0	0	0	1960	0	0	0	0	0	570	248
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA						NA	Perm
Protected Phases					4						2	
Permitted Phases				4								2
Minimum Split (s)				32.5	32.5						28.5	28.5
Total Split (s)				42.0	42.0						48.0	48.0
Total Split (%)				46.7%	46.7%						53.3%	53.3%
Maximum Green (s)				36.5	36.5						42.5	42.5
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				2.2	2.2						2.2	2.2
Lost Time Adjust (s)					0.0						0.0	0.0
Total Lost Time (s)					5.5						5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				12.0	12.0						12.0	12.0
Flash Dont Walk (s)				15.0	15.0						11.0	11.0
Pedestrian Calls (#/hr)				0	0						0	0
Act Effct Green (s)					36.5						42.5	42.5
Actuated g/C Ratio					0.41						0.47	0.47
v/c Ratio					0.75						0.36	0.36

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					24.7						15.9	15.0
Queue Delay					0.0						0.0	0.0
Total Delay					24.7						15.9	15.0
LOS					C						B	B
Approach Delay					24.7						15.6	
Approach LOS					C						B	
Queue Length 50th (m)					85.2						34.6	26.2
Queue Length 95th (m)					99.8						47.5	46.2
Internal Link Dist (m)		137.8			97.6			69.7			175.6	
Turn Bay Length (m)												
Base Capacity (vph)					2604						1587	683
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.75						0.36	0.36

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBT and 6:, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 22.0		Intersection LOS: C	
Intersection Capacity Utilization 56.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: Queen Street South/Queen Street North & King Street West



HCM Signalized Intersection Capacity Analysis
3: Queen Street South/Queen Street North & King Street West

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	172	1631	0	0	0	0	0	467	285
Future Volume (vph)	0	0	0	172	1631	0	0	0	0	0	467	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5						5.5	5.5
Lane Util. Factor					0.86						0.91	0.91
Frpb, ped/bikes					1.00						1.00	0.97
Flpb, ped/bikes					1.00						1.00	1.00
Frt					1.00						0.98	0.85
Flt Protected					1.00						1.00	1.00
Satd. Flow (prot)					6376						3358	1414
Flt Permitted					1.00						1.00	1.00
Satd. Flow (perm)					6376						3358	1414
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	187	1773	0	0	0	0	0	508	310
RTOR Reduction (vph)	0	0	0	0	20	0	0	0	0	0	1	16
Lane Group Flow (vph)	0	0	0	0	1940	0	0	0	0	0	569	232
Confl. Peds. (#/hr)	43		22	22		43	14		20	20		14
Heavy Vehicles (%)	2%	2%	2%	0%	2%	2%	2%	2%	2%	2%	1%	1%
Turn Type				Perm	NA						NA	Perm
Protected Phases					4						2	
Permitted Phases				4								2
Actuated Green, G (s)					36.5						42.5	42.5
Effective Green, g (s)					36.5						42.5	42.5
Actuated g/C Ratio					0.41						0.47	0.47
Clearance Time (s)					5.5						5.5	5.5
Lane Grp Cap (vph)					2585						1585	667
v/s Ratio Prot											c0.17	
v/s Ratio Perm					0.30							0.16
v/c Ratio					0.75						0.36	0.35
Uniform Delay, d1					22.9						15.1	15.0
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					2.1						0.6	1.4
Delay (s)					24.9						15.7	16.4
Level of Service					C						B	B
Approach Delay (s)		0.0			24.9			0.0			15.9	
Approach LOS		A			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.54			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	56.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
1: Ray Street North & Market Street

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	1	6	8	2	14	19	25	25	13	8
Future Volume (vph)	2	4	1	6	8	2	14	19	25	25	13	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981			0.985			0.942			0.976	
Flt Protected		0.986			0.981			0.988			0.974	
Satd. Flow (prot)	0	1838	0	0	1836	0	0	1700	0	0	1757	0
Flt Permitted		0.986			0.981			0.988			0.974	
Satd. Flow (perm)	0	1838	0	0	1836	0	0	1700	0	0	1757	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			58.5			94.4			96.5	
Travel Time (s)		6.0			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		10	10		7	13		6	6		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	10%	0%
Adj. Flow (vph)	2	4	1	7	9	2	15	21	27	27	14	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	7	0	0	18	0	0	63	0	0	50	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.0%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
1: Ray Street North & Market Street

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	4	1	6	8	2	14	19	25	25	13	8
Future Volume (Veh/h)	2	4	1	6	8	2	14	19	25	25	13	8
Sign Control		Stop			Stop			Free			Free	
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)	2	4	1	7	9	2	15	21	27	27	14	9
Pedestrians		13			6			10			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	164	170	42	156	160	48	36			54		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	164	170	42	156	160	48	36			54		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	99	99	100	99			98		
cM capacity (veh/h)	758	696	1015	774	704	1016	1571			1556		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	7	18	63	50
Volume Left	2	7	15	27
Volume Right	1	2	27	9
cSH	747	757	1571	1556
Volume to Capacity	0.01	0.02	0.01	0.02
Queue Length 95th (m)	0.2	0.6	0.2	0.4
Control Delay (s)	9.9	9.9	1.8	4.0
Lane LOS	A	A	A	A
Approach Delay (s)	9.9	9.9	1.8	4.0
Approach LOS	A	A		

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	21.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Lanes, Volumes, Timings
2: Ray Street South/Ray Street North & King Street West

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	15	2592	42	52	6	0	0	0	27
Future Volume (vph)	0	0	0	15	2592	42	52	6	0	0	0	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.998						0.865	
Flt Protected								0.957				
Satd. Flow (prot)	0	0	0	0	6275	0	0	1749	0	0	1508	0
Flt Permitted								0.957				
Satd. Flow (perm)	0	0	0	0	6275	0	0	1749	0	0	1508	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			59.8			102.8			94.4	
Travel Time (s)		8.7			4.3			7.4			6.8	
Confl. Peds. (#/hr)	26		13	13		26	1		5	5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	4%	0%	2%	20%	2%	2%	0%	9%
Adj. Flow (vph)	0	0	0	16	2817	46	57	7	0	0	0	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2879	0	0	64	0	0	29	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	Yes
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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization 57.3%		ICU Level of Service B		
Analysis Period (min) 15				

HCM Unsignalized Intersection Capacity Analysis
2: Ray Street South/Ray Street North & King Street West

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	15	2592	42	52	6	0	0	0	27
Future Volume (Veh/h)	0	0	0	15	2592	42	52	6	0	0	0	27
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	16	2817	46	57	7	0	0	0	29
Pedestrians		1			5			13			26	
Lane Width (m)		0.0			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			1			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.68						0.68	0.68		0.68	0.68	0.68
vC, conflicting volume	2889			13			779	2934	18	2906	2911	754
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1449			13			0	1515	18	1474	1481	0
tC, single (s)	4.1			4.3			7.5	6.9	6.9	7.5	6.5	7.1
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.5	4.0	3.4
p0 queue free %	100			99			91	89	100	100	100	96
cM capacity (veh/h)	310			1544			642	66	1040	52	83	710

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	486	939	939	516	64	29
Volume Left	16	0	0	0	57	0
Volume Right	0	0	0	46	0	29
cSH	1544	1700	1700	1700	327	710
Volume to Capacity	0.01	0.55	0.55	0.30	0.20	0.04
Queue Length 95th (m)	0.3	0.0	0.0	0.0	5.7	1.0
Control Delay (s)	0.3	0.0	0.0	0.0	18.7	10.3
Lane LOS	A				C	B
Approach Delay (s)	0.1				18.7	10.3
Approach LOS					C	B

Intersection Summary					
Average Delay	0.6				
Intersection Capacity Utilization	57.3%	ICU Level of Service		B	
Analysis Period (min)	15				

Lanes, Volumes, Timings
3: Queen Street South/Queen Street North & King Street West

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	2052	0	193	0	0	0	367	404
Future Volume (vph)	0	0	0	82	2052	0	193	0	0	0	367	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00		0.98					0.94
Frt												0.850
Flt Protected					0.998		0.950					
Satd. Flow (prot)	0	0	0	0	5986	0	1770	0	0	0	1652	1369
Flt Permitted					0.998		0.206					
Satd. Flow (perm)	0	0	0	0	5978	0	376	0	0	0	1652	1287
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												76
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	89	2230	0	210	0	0	0	399	439
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2319	0	210	0	0	0	399	439
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		9.5				28.5	28.5
Total Split (s)				47.0	47.0		13.0				30.0	30.0
Total Split (%)				52.2%	52.2%		14.4%				33.3%	33.3%
Maximum Green (s)				42.2	42.2		8.5				24.5	24.5
Yellow Time (s)				3.3	3.3		3.5				3.3	3.3
All-Red Time (s)				1.5	1.5		1.0				2.2	2.2
Lost Time Adjust (s)					0.0		0.0				0.0	0.0
Total Lost Time (s)					4.8		4.5				5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0							
Flash Dont Walk (s)				8.0	8.0							
Pedestrian Calls (#/hr)				0	0							
Act Effct Green (s)					42.2		38.5				24.5	24.5
Actuated g/C Ratio					0.47		0.43				0.27	0.27
v/c Ratio					0.83		0.72				0.89	1.08

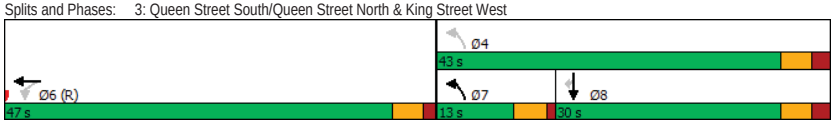
Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Minimum Split (s)	28.5
Total Split (s)	43.0
Total Split (%)	48%
Maximum Green (s)	37.5
Yellow Time (s)	3.3
All-Red Time (s)	2.2
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	10.0
Flash Dont Walk (s)	8.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					24.0		32.9				55.3	97.5
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					24.0		32.9				55.3	97.5
LOS					C		C				E	F
Approach Delay					24.0			32.9			77.4	
Approach LOS					C			C			E	
Queue Length 50th (m)					102.3		24.1				69.6	~79.6
Queue Length 95th (m)					119.1		#43.4				#122.8	#139.0
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					2803		292				449	405
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					0.83		0.72				0.89	1.08

Intersection Summary

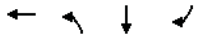
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 37.8 Intersection LOS: D
Intersection Capacity Utilization 82.7% ICU Level of Service E
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: 3: Queen Street South/Queen Street North & King Street West



Lane Group	Ø4
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	WBT	NBL	SBT	SBR
Lane Group Flow (vph)	2319	210	399	439
v/c Ratio	0.83	0.72	0.89	1.08
Control Delay	24.0	32.9	55.3	97.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	24.0	32.9	55.3	97.5
Queue Length 50th (m)	102.3	24.1	69.6	~79.6
Queue Length 95th (m)	119.1	#43.4	#122.8	#139.0
Internal Link Dist (m)	97.6		43.5	
Turn Bay Length (m)				
Base Capacity (vph)	2803	292	449	405
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	0.83	0.72	0.89	1.08

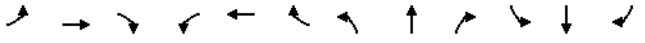
Intersection Summary

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

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

HCM Signalized Intersection Capacity Analysis
3: Queen Street South/Queen Street North & King Street West

10-20-2020

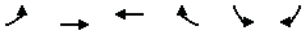


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	2052	0	193	0	0	0	367	404
Future Volume (vph)	0	0	0	82	2052	0	193	0	0	0	367	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		4.5				5.5	5.5
Lane Util. Factor					0.86		1.00				1.00	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.94
Flpb, ped/bikes					1.00		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					1.00		0.95				1.00	1.00
Satd. Flow (prot)					5979		1764				1652	1287
Flt Permitted					1.00		0.21				1.00	1.00
Satd. Flow (perm)					5979		383				1652	1287
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	2230	0	210	0	0	0	399	439
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	55
Lane Group Flow (vph)	0	0	0	0	2319	0	210	0	0	0	399	384
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Actuated Green, G (s)					42.2		37.5				24.5	24.5
Effective Green, g (s)					42.2		37.5				24.5	24.5
Actuated g/C Ratio					0.47		0.42				0.27	0.27
Clearance Time (s)					4.8		4.5				5.5	5.5
Lane Grp Cap (vph)					2803		290				449	350
v/s Ratio Prot							c0.07				0.24	
v/s Ratio Perm					0.39		0.23					c0.30
v/c Ratio					0.83		0.72				0.89	1.10
Uniform Delay, d1					20.7		19.6				31.4	32.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					3.0		14.6				22.2	76.5
Delay (s)					23.7		34.2				53.6	109.2
Level of Service					C		C				D	F
Approach Delay (s)		0.0			23.7			34.2			82.8	
Approach LOS		A			C			C			F	

Intersection Summary				
HCM 2000 Control Delay	39.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.8	
Intersection Capacity Utilization	82.7%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
4: King Street West & Driveway A

10-20-2020

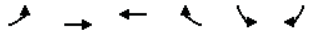


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2649	0	0	0
Future Volume (vph)	0	0	2649	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	0.86	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	0	6408	0	0	1863
Flt Permitted						
Satd. Flow (perm)	0	0	6408	0	0	1863
Link Speed (k/h)		50	50		50	
Link Distance (m)		59.8	48.5		28.1	
Travel Time (s)		4.3	3.5		2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2879	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2879	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		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
4: King Street West & Driveway A

10-20-2020



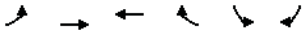
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2649	0	0	0
Future Volume (Veh/h)	0	0	2649	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2879	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			103			
pX, platoon unblocked	0.68				0.68	0.68
vC, conflicting volume	2879				2879	720
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1392				1392	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 %	100				100	100
cM capacity (veh/h)	330				90	734

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	823	823	823	411	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.48	0.48	0.48	0.24	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0				0.0
Approach LOS					A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		41.7%	ICU Level of Service A
Analysis Period (min)		15	

Lanes, Volumes, Timings
5: King Street West & Driveway B

10-20-2020

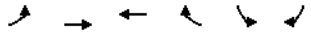


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2649	0	0	0
Future Volume (vph)	0	0	2649	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	0	6408	0	0	1863
Flt Permitted						
Satd. Flow (perm)	0	0	6408	0	0	1863
Link Speed (k/h)		50	50		50	
Link Distance (m)		48.5	54.2		30.3	
Travel Time (s)		3.5	3.9		2.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2879	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2879	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		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.7%	ICU Level of Service A	
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: King Street West & Driveway B

10-20-2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑↑↑			↱
Traffic Volume (veh/h)	0	0	2649	0	0	0
Future Volume (Veh/h)	0	0	2649	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2879	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			54			
pX, platoon unblocked	0.67				0.67	0.67
vC, conflicting volume	2879				2879	720
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1357				1357	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 %	100				100	100
cM capacity (veh/h)	338				94	729

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	720	720	720	720	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.42	0.42	0.42	0.42	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0				0.0
Approach LOS					A

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	41.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Lanes, Volumes, Timings
6: Queen Street North & Driveway C

10-20-2020

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱			↑↕	
Traffic Volume (vph)	0	0	0	0	771	0
Future Volume (vph)	0	0	0	0	771	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	0	0	3539	0
Flt Permitted						
Satd. Flow (perm)	0	1863	0	0	3539	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	61.4			67.5	263.6	
Travel Time (s)	4.4			4.9	19.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	838	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	838	0
Enter Blocked Intersection	No	Yes	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 24.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
6: Queen Street North & Driveway C

10-20-2020

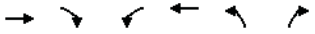
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	771	0
Future Volume (Veh/h)	0	0	0	0	771	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	838	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				67		
pX, platoon unblocked						
vC, conflicting volume	838	419	838			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	838	419	838			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	305	583	792			

Direction, Lane #	EB 1	SB 1	SB 2
Volume Total	0	559	279
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.00	0.33	0.16
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	
Approach LOS	A		

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		24.6%	ICU Level of Service A
Analysis Period (min)		15	

Lanes, Volumes, Timings
7: Driveway D & Market Street

10-20-2020

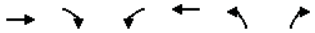


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	53	0	0	16	0	0
Future Volume (vph)	53	0	0	16	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	58.5			57.6	42.7	
Travel Time (s)	4.2			5.2	3.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	0	0	17	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	58	0	0	17	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

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

HCM Unsignalized Intersection Capacity Analysis
7: Driveway D & Market Street

10-20-2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	53	0	0	16	0	0
Future Volume (Veh/h)	53	0	0	16	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	58	0	0	17	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			58		75	58
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			58		75	58
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1546		928	1008

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	58	17	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1546	1700
Volume to Capacity	0.03	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		6.7%	ICU Level of Service A
Analysis Period (min)		15	

Lanes, Volumes, Timings
1: Ray Street North & Market Street

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	2	6	59	4	22	2	25	8	2	44	5
Future Volume (vph)	12	2	6	59	4	22	2	25	8	2	44	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.957			0.965			0.968			0.988	
Flt Protected		0.971			0.966			0.997			0.998	
Satd. Flow (prot)	0	1766	0	0	1771	0	0	1834	0	0	1873	0
Flt Permitted		0.971			0.966			0.997			0.998	
Satd. Flow (perm)	0	1766	0	0	1771	0	0	1834	0	0	1873	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		76.7			58.5			94.4			96.5	
Travel Time (s)		5.5			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		4	4		7	2		6	6		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	13	2	7	64	4	24	2	27	9	2	48	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	92	0	0	38	0	0	55	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
1: Ray Street North & Market Street

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	2	6	59	4	22	2	25	8	2	44	5
Future Volume (Veh/h)	12	2	6	59	4	22	2	25	8	2	44	5
Sign Control		Stop			Stop			Free			Free	
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)	13	2	7	64	4	24	2	27	9	2	48	5
Pedestrians		2			6			4			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	125	102	56	108	100	44	55			42		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	125	102	56	108	100	44	55			42		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	99	93	99	98	100			100		
cM capacity (veh/h)	818	784	1011	855	786	1020	1560			1572		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	92	38	55
Volume Left	13	64	2	2
Volume Right	7	24	9	5
cSH	867	889	1560	1572
Volume to Capacity	0.03	0.10	0.00	0.00
Queue Length 95th (m)	0.6	2.8	0.0	0.0
Control Delay (s)	9.3	9.5	0.4	0.3
Lane LOS	A	A	A	A
Approach Delay (s)	9.3	9.5	0.4	0.3
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.4			
Intersection Capacity Utilization	19.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Lanes, Volumes, Timings
2: Ray Street South/Ray Street North & King Street West

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	22	2577	36	48	2	0	0	0	102
Future Volume (vph)	0	0	0	22	2577	36	48	2	0	0	0	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.998						0.865	
Flt Protected								0.954				
Satd. Flow (prot)	0	0	0	0	6398	0	0	1813	0	0	1644	0
Flt Permitted								0.954				
Satd. Flow (perm)	0	0	0	0	6398	0	0	1813	0	0	1644	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			61.0			102.8			94.4	
Travel Time (s)		8.7			4.4			7.4			6.8	
Confl. Peds. (#/hr)	46		19	19		46			1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	24	2801	39	52	2	0	0	0	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2864	0	0	54	0	0	111	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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	56.2%	ICU Level of Service B	
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: Ray Street South/Ray Street North & King Street West

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	22	2577	36	48	2	0	0	0	102
Future Volume (Veh/h)	0	0	0	22	2577	36	48	2	0	0	0	102
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	24	2801	39	52	2	0	0	0	111
Pedestrians					1			19			46	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			2			4	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.67						0.67	0.67		0.67	0.67	0.67
vC, conflicting volume	2886			19			878	2953	20	2916	2934	766
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1368			19			0	1467	20	1413	1438	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			98			90	98	100	100	100	84
cM capacity (veh/h)	329			1585			544	81	1042	60	84	705

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	491	934	934	506	54	111
Volume Left	24	0	0	0	52	0
Volume Right	0	0	0	39	0	111
cSH	1585	1700	1700	1700	449	705
Volume to Capacity	0.02	0.55	0.55	0.30	0.12	0.16
Queue Length 95th (m)	0.4	0.0	0.0	0.0	3.3	4.4
Control Delay (s)	0.5	0.0	0.0	0.0	14.1	11.1
Lane LOS	A				B	B
Approach Delay (s)	0.1				14.1	11.1
Approach LOS					B	B

Intersection Summary					
Average Delay	0.7				
Intersection Capacity Utilization	56.2%	ICU Level of Service		B	
Analysis Period (min)	15				

Lanes, Volumes, Timings
3: Queen Street South/Queen Street North & King Street West

10-20-2020

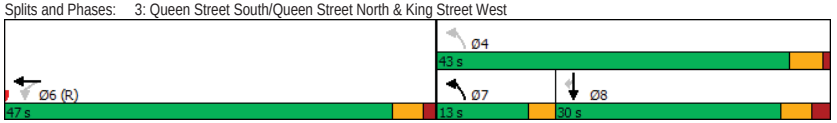
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	2029	0	113	0	0	0	597	493
Future Volume (vph)	0	0	0	169	2029	0	113	0	0	0	597	493
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00							0.95
Frt												0.850
Flt Protected					0.996		0.950					
Satd. Flow (prot)	0	0	0	0	5968	0	1770	0	0	0	1759	1417
Flt Permitted					0.996		0.140					
Satd. Flow (perm)	0	0	0	0	5950	0	261	0	0	0	1759	1352
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												78
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		52.4			121.6			93.7			66.0	
Travel Time (s)		3.8			8.8			6.7			4.8	
Confl. Peds. (#/hr)	83		27	27		83	31		27	27		31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	10%	9%	2%	2%	2%	2%	2%	8%	14%
Adj. Flow (vph)	0	0	0	184	2205	0	123	0	0	0	649	536
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2389	0	123	0	0	0	649	536
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Minimum Split (s)				29.8	29.8		8.0				29.8	29.8
Total Split (s)				47.0	47.0		13.0				30.0	30.0
Total Split (%)				52.2%	52.2%		14.4%				33.3%	33.3%
Maximum Green (s)				42.2	42.2		10.0				24.5	24.5
Yellow Time (s)				3.3	3.3		3.0				3.3	3.3
All-Red Time (s)				1.5	1.5		0.0				2.2	2.2
Lost Time Adjust (s)					0.0		0.0				0.0	0.0
Total Lost Time (s)					4.8		3.0				5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0							
Flash Dont Walk (s)				8.0	8.0							
Pedestrian Calls (#/hr)				0	0							
Act Effct Green (s)					42.2		40.0				24.5	24.5
Actuated g/C Ratio					0.47		0.44				0.27	0.27
v/c Ratio					0.86		0.43				1.36	1.26

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Minimum Split (s)	25.5
Total Split (s)	43.0
Total Split (%)	48%
Maximum Green (s)	38.5
Yellow Time (s)	3.5
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	10.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					25.1		20.0				203.7	163.6
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					25.1		20.0				203.7	163.6
LOS					C		C				F	F
Approach Delay					25.1			20.0			185.6	
Approach LOS					C			C			F	
Queue Length 50th (m)					107.7		12.9				~156.7	~113.4
Queue Length 95th (m)					125.6		23.8				#223.2	#177.1
Internal Link Dist (m)		28.4			97.6			69.7			42.0	
Turn Bay Length (m)												
Base Capacity (vph)					2789		283				478	424
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					0.86		0.43				1.36	1.26

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Pretimed			
Maximum v/c Ratio: 1.36			
Intersection Signal Delay: 76.4		Intersection LOS: E	
Intersection Capacity Utilization 83.5%		ICU Level of Service E	
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: 3: Queen Street South/Queen Street North & King Street West



Lane Group	Ø4
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

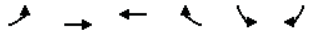
Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	2029	0	113	0	0	0	597	493
Future Volume (vph)	0	0	0	169	2029	0	113	0	0	0	597	493
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.0				5.5	5.5
Lane Util. Factor					0.86		1.00				1.00	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.95
Flpb, ped/bikes					1.00		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					1.00		0.95				1.00	1.00
Satd. Flow (prot)					5950		1770				1759	1352
Flt Permitted					1.00		0.14				1.00	1.00
Satd. Flow (perm)					5950		261				1759	1352
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	184	2205	0	123	0	0	0	649	536
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	57
Lane Group Flow (vph)	0	0	0	0	2389	0	123	0	0	0	649	479
Confl. Peds. (#/hr)	83		27	27		83	31		27	27		31
Heavy Vehicles (%)	2%	2%	2%	10%	9%	2%	2%	2%	2%	2%	8%	14%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Actuated Green, G (s)					42.2		38.5				24.5	24.5
Effective Green, g (s)					42.2		38.5				24.5	24.5
Actuated g/C Ratio					0.47		0.43				0.27	0.27
Clearance Time (s)					4.8		3.0				5.5	5.5
Lane Grp Cap (vph)					2789		279				478	368
v/s Ratio Prot							c0.05				c0.37	
v/s Ratio Perm					0.40		0.14					0.35
v/c Ratio					0.86		0.44				1.36	1.30
Uniform Delay, d1					21.2		19.4				32.8	32.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					3.6		5.0				174.2	154.6
Delay (s)					24.9		24.4				206.9	187.3
Level of Service					C		C				F	F
Approach Delay (s)		0.0			24.9			24.4			198.1	
Approach LOS		A			C			C			F	

Intersection Summary					
HCM 2000 Control Delay	80.4	HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	0.96				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		13.3	
Intersection Capacity Utilization	83.5%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

Lanes, Volumes, Timings
4: King Street West & Driveway A

10-20-2020

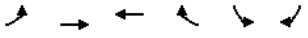


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2635	0	0	0
Future Volume (vph)	0	0	2635	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	0.86	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	0	6408	0	0	1863
Flt Permitted						
Satd. Flow (perm)	0	0	6408	0	0	1863
Link Speed (k/h)		50	50		50	
Link Distance (m)		61.0	48.5		36.7	
Travel Time (s)		4.4	3.5		2.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2864	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2864	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		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
4: King Street West & Driveway A

10-20-2020



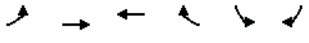
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2635	0	0	0
Future Volume (Veh/h)	0	0	2635	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2864	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			101			
pX, platoon unblocked	0.66				0.66	0.66
vC, conflicting volume	2864				2864	716
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1273				1273	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 %	100				100	100
cM capacity (veh/h)	359				106	719

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	818	818	818	409	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.48	0.48	0.48	0.24	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0				0.0
Approach LOS					A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		41.5%	ICU Level of Service	A
Analysis Period (min)		15		

Lanes, Volumes, Timings
5: King Street West & Driveway B

10-20-2020

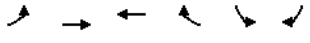


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑↑↑			↱
Traffic Volume (vph)	0	0	2635	0	0	0
Future Volume (vph)	0	0	2635	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	0	6408	0	0	1863
Flt Permitted						
Satd. Flow (perm)	0	0	6408	0	0	1863
Link Speed (k/h)		50	50		50	
Link Distance (m)		48.5	52.4		31.3	
Travel Time (s)		3.5	3.8		2.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2864	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2864	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		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: King Street West & Driveway B

10-20-2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑↑↑			↱
Traffic Volume (veh/h)	0	0	2635	0	0	0
Future Volume (Veh/h)	0	0	2635	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2864	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			52			
pX, platoon unblocked	0.66				0.66	0.66
vC, conflicting volume	2864				2864	716
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1222				1222	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 %	100				100	100
cM capacity (veh/h)	372				113	712

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	716	716	716	716	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.42	0.42	0.42	0.42	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0				0.0
Approach LOS					A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		41.5%	ICU Level of Service	A
Analysis Period (min)		15		

Lanes, Volumes, Timings
6: Queen Street North & Driveway C

10-20-2020

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	1090	0
Future Volume (vph)	0	0	0	0	1090	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	0	0	3539	0
Flt Permitted						
Satd. Flow (perm)	0	1863	0	0	3539	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	56.2			66.0	165.6	
Travel Time (s)	4.0			4.8	11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1185	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	1185	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
6: Queen Street North & Driveway C

10-20-2020

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	1090	0
Future Volume (Veh/h)	0	0	0	0	1090	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	1185	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)				66		
pX, platoon unblocked						
vC, conflicting volume	1185	592	1185			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1185	592	1185			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	182	449	585			

Direction, Lane #	EB 1	SB 1	SB 2
Volume Total	0	790	395
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.11	0.46	0.23
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
7: Driveway D & Market Street

10-20-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	26	0	0	169	0	0
Future Volume (vph)	26	0	0	169	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	58.5			81.9	31.8	
Travel Time (s)	4.2			7.4	2.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	0	0	184	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	0	0	184	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	12.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Driveway D & Market Street

10-20-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	26	0	0	169	0	0
Future Volume (Veh/h)	26	0	0	169	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	0	0	184	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			28		212	28
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			28		212	28
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1585		776	1047

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	28	184	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1585	1700
Volume to Capacity	0.02	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	12.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
1: Ray Street North & Market Street

10-20-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	7	0	6	2	6	5	28	8	2	14	0
Future Volume (vph)	1	7	0	6	2	6	5	28	8	2	14	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
Ped Bike Factor												
Frt					0.941			0.972				
Flt Protected		0.994			0.979			0.994			0.994	
Satd. Flow (prot)	0	1889	0	0	1746	0	0	1783	0	0	1889	0
Flt Permitted		0.994			0.979			0.994			0.994	
Satd. Flow (perm)	0	1889	0	0	1746	0	0	1783	0	0	1889	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		80.0			58.5			94.4			96.5	
Travel Time (s)		5.8			5.3			8.5			8.7	
Confl. Peds. (#/hr)	3		4	4		3	5		4	5		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%	2%	0%	2%	4%	0%	0%	0%	2%
Adj. Flow (vph)	1	8	0	7	2	7	5	30	9	2	15	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	0	16	0	0	44	0	0	17	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: Ray Street North & Market Street

10-20-2020

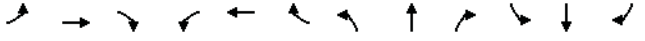
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	7	0	6	2	6	5	28	8	2	14	0
Future Volume (Veh/h)	1	7	0	6	2	6	5	28	8	2	14	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	8	0	7	2	7	5	30	9	2	15	0
Pedestrians		5			5			4			3	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	80	78	24	76	74	42	20			44		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	80	78	24	76	74	42	20			44		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	99	100	99	100			100		
cM capacity (veh/h)	891	806	1050	895	807	1027	1589			1571		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	16	44	17
Volume Left	1	7	5	2
Volume Right	0	7	9	0
cSH	814	935	1589	1571
Volume to Capacity	0.01	0.02	0.00	0.00
Queue Length 95th (m)	0.3	0.4	0.1	0.0
Control Delay (s)	9.5	8.9	0.8	0.9
Lane LOS	A	A	A	A
Approach Delay (s)	9.5	8.9	0.8	0.9
Approach LOS	A	A		

Intersection Summary				
Average Delay		3.3		
Intersection Capacity Utilization		15.8%	ICU Level of Service	A
Analysis Period (min)		15		

Lanes, Volumes, Timings
2: Ray Street South/Ray Street North & King Street West

10-20-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	13	2309	28	47	7	0	0	1	25
Future Volume (vph)	0	0	0	13	2309	28	47	7	0	0	1	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	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.998						0.870	
Flt Protected								0.959				
Satd. Flow (prot)	0	0	0	0	6394	0	0	1822	0	0	1653	0
Flt Permitted								0.959				
Satd. Flow (perm)	0	0	0	0	6394	0	0	1822	0	0	1653	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			60.5			102.8			94.4	
Travel Time (s)		8.7			4.4			7.4			6.8	
Confl. Peds. (#/hr)	42		21	21		42			4	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 (%)	2%	2%	2%	9%	2%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	14	2510	30	51	8	0	0	1	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2554	0	0	59	0	0	28	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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: Ray Street South/Ray Street North & King Street West

10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	13	2309	28	47	7	0	0	1	25
Future Volume (Veh/h)	0	0	0	13	2309	28	47	7	0	0	1	25
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	14	2510	30	51	8	0	0	1	27
Pedestrians					4			21			42	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			2			4	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.71						0.71	0.71		0.71	0.71	0.71
vC, conflicting volume	2582			21			704	2631	25	2603	2616	684
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1166			21			0	1235	25	1196	1214	0
tC, single (s)	4.1			4.3			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			92	93	100	100	99	96
cM capacity (veh/h)	406			1517			653	118	1030	89	122	744

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	432	837	837	448	59	28
Volume Left	14	0	0	0	51	0
Volume Right	0	0	0	30	0	27
cSH	1517	1700	1700	1700	404	629
Volume to Capacity	0.01	0.49	0.49	0.26	0.15	0.04
Queue Length 95th (m)	0.2	0.0	0.0	0.0	4.1	1.1
Control Delay (s)	0.3	0.0	0.0	0.0	15.4	11.0
Lane LOS	A				C	B
Approach Delay (s)	0.1				15.4	11.0
Approach LOS					C	B

Intersection Summary					
Average Delay	0.5				
Intersection Capacity Utilization	52.6%	ICU Level of Service		A	
Analysis Period (min)	15				

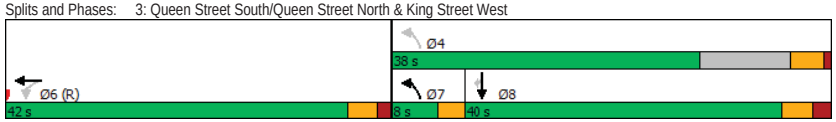
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	1872	0	118	0	0	0	564	360
Future Volume (vph)	0	0	0	214	1872	0	118	0	0	0	564	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99							0.97
Frt												0.850
Flt Protected					0.995		0.950					
Satd. Flow (prot)	0	0	0	0	6389	0	1770	0	0	0	1881	1599
Flt Permitted					0.995		0.129					
Satd. Flow (perm)	0	0	0	0	6353	0	240	0	0	0	1881	1552
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												58
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		52.4			121.6			93.7			65.9	
Travel Time (s)		3.8			8.8			6.7			4.7	
Confl. Peds. (#/hr)	43		22	22		43	14		20	20		14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	2%	2%	2%	2%	2%	2%	1%	1%
Adj. Flow (vph)	0	0	0	233	2035	0	128	0	0	0	613	391
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2268	0	128	0	0	0	613	391
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Minimum Split (s)				28.5	28.5		8.0				28.5	28.5
Total Split (s)				42.0	42.0		8.0				40.0	40.0
Total Split (%)				46.7%	46.7%		8.9%				44.4%	44.4%
Maximum Green (s)				37.2	37.2		5.0				34.5	34.5
Yellow Time (s)				3.3	3.3		3.0				3.3	3.3
All-Red Time (s)				1.5	1.5		0.0				2.2	2.2
Lost Time Adjust (s)					-1.3		0.0				-1.8	-1.8
Total Lost Time (s)					3.5		3.0				3.7	3.7
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0						10.0	10.0
Flash Dont Walk (s)				8.0	8.0						11.0	11.0
Pedestrian Calls (#/hr)				0	0						0	0
Act Effct Green (s)					38.5		45.0				36.3	36.3
Actuated g/C Ratio					0.43		0.50				0.40	0.40
v/c Ratio					0.83		0.62				0.81	0.59

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Minimum Split (s)	25.5
Total Split (s)	38.0
Total Split (%)	42%
Maximum Green (s)	33.5
Yellow Time (s)	3.5
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	10.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					26.4		27.4				33.9	22.1
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					26.4		27.4				33.9	22.1
LOS					C		C				C	C
Approach Delay					26.4			27.4			29.3	
Approach LOS					C			C			C	
Queue Length 50th (m)					103.6		12.0				96.4	46.2
Queue Length 95th (m)					120.2		#25.1				#154.8	76.4
Internal Link Dist (m)		28.4			97.6			69.7			41.9	
Turn Bay Length (m)												
Base Capacity (vph)					2717		205				758	660
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					0.83		0.62				0.81	0.59

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Pretimed			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 27.3		Intersection LOS: C	
Intersection Capacity Utilization 78.2%		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: 3: Queen Street South/Queen Street North & King Street West



Lane Group	Ø4
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Queen Street South/Queen Street North & King Street West

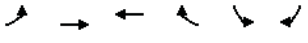
10-20-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	1872	0	118	0	0	0	564	360
Future Volume (vph)	0	0	0	214	1872	0	118	0	0	0	564	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5		3.0				3.7	3.7
Lane Util. Factor					0.86		1.00				1.00	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.97
Flpb, ped/bikes					0.99		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.99		0.95				1.00	1.00
Satd. Flow (prot)					6352		1770				1881	1552
Flt Permitted					0.99		0.13				1.00	1.00
Satd. Flow (perm)					6352		240				1881	1552
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	233	2035	0	128	0	0	0	613	391
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	35
Lane Group Flow (vph)	0	0	0	0	2268	0	128	0	0	0	613	356
Confl. Peds. (#/hr)	43		22	22		43	14		20	20		14
Heavy Vehicles (%)	2%	2%	2%	0%	2%	2%	2%	2%	2%	2%	1%	1%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Actuated Green, G (s)					37.2		43.5				34.5	34.5
Effective Green, g (s)					38.5		43.5				36.3	36.3
Actuated g/C Ratio					0.43		0.48				0.40	0.40
Clearance Time (s)					4.8		3.0				5.5	5.5
Lane Grp Cap (vph)					2717		201				758	625
v/s Ratio Prot							c0.04				c0.33	
v/s Ratio Perm					0.36		0.27					0.23
v/c Ratio					0.83		0.64				0.81	0.57
Uniform Delay, d1					22.9		17.8				23.8	20.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					3.2		14.4				9.1	3.7
Delay (s)					26.1		32.2				32.9	24.6
Level of Service					C		C				C	C
Approach Delay (s)		0.0			26.1			32.2			29.6	
Approach LOS		A			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	27.4	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)	10.2	
Intersection Capacity Utilization	78.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings
4: King Street West & Driveway A

10-20-2020

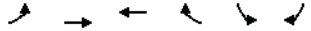


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2350	0	0	0
Future Volume (vph)	0	0	2350	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	0.86	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	0	6408	0	0	1863
Flt Permitted						
Satd. Flow (perm)	0	0	6408	0	0	1863
Link Speed (k/h)		50	50		50	
Link Distance (m)		60.5	49.0		43.5	
Travel Time (s)		4.4	3.5		3.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2554	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2554	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		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		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
4: King Street West & Driveway A

10-20-2020



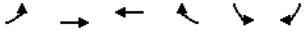
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2350	0	0	0
Future Volume (Veh/h)	0	0	2350	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2554	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			101			
pX, platoon unblocked	0.70				0.70	0.70
vC, conflicting volume	2554				2554	638
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1076				1076	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 %	100				100	100
cM capacity (veh/h)	450				150	759

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	730	730	730	365	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.43	0.43	0.43	0.21	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0				0.0
Approach LOS					A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		37.4%	ICU Level of Service A
Analysis Period (min)		15	

Lanes, Volumes, Timings
5: King Street West & Driveway B

10-20-2020

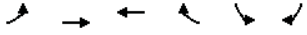


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2350	0	0	0
Future Volume (vph)	0	0	2350	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	0	6408	0	0	1863
Flt Permitted						
Satd. Flow (perm)	0	0	6408	0	0	1863
Link Speed (k/h)		50	50		50	
Link Distance (m)		49.0	52.4		47.7	
Travel Time (s)		3.5	3.8		3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2554	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2554	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		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		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
5: King Street West & Driveway B

10-20-2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑↑↑			↱
Traffic Volume (veh/h)	0	0	2350	0	0	0
Future Volume (Veh/h)	0	0	2350	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2554	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			52			
pX, platoon unblocked	0.69				0.69	0.69
vC, conflicting volume	2554				2554	638
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1035				1035	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 %	100				100	100
cM capacity (veh/h)	463				158	753

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	638	638	638	638	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.38	0.38	0.38	0.38	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0				0.0
Approach LOS					A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		37.4%	ICU Level of Service A
Analysis Period (min)		15	

Lanes, Volumes, Timings
6: Queen Street North & Driveway C

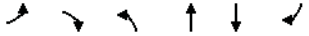
10-20-2020

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱			↑↕	
Traffic Volume (vph)	0	0	0	0	924	0
Future Volume (vph)	0	0	0	0	924	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt						
Flt Protected						
Satd. Flow (prot)	0	1863	0	0	3539	0
Flt Permitted						
Satd. Flow (perm)	0	1863	0	0	3539	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	53.9			65.9	138.5	
Travel Time (s)	3.9			4.7	10.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1004	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	1004	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization 28.9%			ICU Level of Service A	
Analysis Period (min) 15				

HCM Unsignalized Intersection Capacity Analysis
6: Queen Street North & Driveway C

10-20-2020



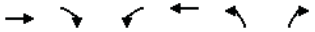
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	924	0
Future Volume (Veh/h)	0	0	0	0	924	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	1004	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				66		
pX, platoon unblocked						
vC, conflicting volume	1004	502	1004			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1004	502	1004			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	238	515	686			

Direction, Lane #	EB 1	SB 1	SB 2
Volume Total	0	669	335
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.09	0.39	0.20
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	
Approach LOS	A		

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		28.9%	ICU Level of Service	A
Analysis Period (min)		15		

Lanes, Volumes, Timings
7: Driveway D & Market Street

10-20-2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	18	0	0	15	0	0
Future Volume (vph)	18	0	0	15	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	58.5			77.4	28.6	
Travel Time (s)	4.2			7.0	2.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	0	16	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	20	0	0	16	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

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

HCM Unsignalized Intersection Capacity Analysis
7: Driveway D & Market Street 10-20-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	18	0	0	15	0	0
Future Volume (Veh/h)	18	0	0	15	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	0	0	16	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			20		36	20
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			20		36	20
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1596		977	1058

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	20	16	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1596	1700
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		6.7%	ICU Level of Service A
Analysis Period (min)		15	

Lanes, Volumes, Timings 2027 Background AM (LRT).syn
1: Ray Street North & Market Street 10-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	1	6	8	2	14	19	25	25	13	8
Future Volume (vph)	2	4	1	6	8	2	14	19	25	25	13	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981			0.985			0.942			0.976	
Flt Protected		0.986			0.981			0.988			0.974	
Satd. Flow (prot)	0	1838	0	0	1836	0	0	1700	0	0	1757	0
Flt Permitted		0.986			0.981			0.988			0.974	
Satd. Flow (perm)	0	1838	0	0	1836	0	0	1700	0	0	1757	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			58.5			94.4			96.5	
Travel Time (s)		6.0			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		10	10		7	13		6	6		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	10%	0%
Adj. Flow (vph)	2	4	1	7	9	2	15	21	27	27	14	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	7	0	0	18	0	0	63	0	0	50	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.0%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	4	1	6	8	2	14	19	25	25	13	8
Future Volume (Veh/h)	2	4	1	6	8	2	14	19	25	25	13	8
Sign Control		Stop			Stop			Free			Free	
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)	2	4	1	7	9	2	15	21	27	27	14	9
Pedestrians		13			6			10			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	164	170	42	156	160	48	36			54		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	164	170	42	156	160	48	36			54		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	99	99	100	99			98		
cM capacity (veh/h)	758	696	1015	774	704	1016	1571			1556		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	7	18	63	50
Volume Left	2	7	15	27
Volume Right	1	2	27	9
cSH	747	757	1571	1556
Volume to Capacity	0.01	0.02	0.01	0.02
Queue Length 95th (m)	0.2	0.6	0.2	0.4
Control Delay (s)	9.9	9.9	1.8	4.0
Lane LOS	A	A	A	A
Approach Delay (s)	9.9	9.9	1.8	4.0
Approach LOS	A	A		

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	21.0%	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	360	0	1174	42	0	0	0	0	0	27
Future Volume (vph)	0	0	360	0	1174	42	0	0	0	0	0	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.865		0.995							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1611	0	1820	0	0	0	0	0	0	1508
Flt Permitted												
Satd. Flow (perm)	0	0	1611	0	1820	0	0	0	0	0	0	1508
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			59.8			102.8			94.4	
Travel Time (s)		8.7			4.3			7.4			6.8	
Confl. Peds. (#/hr)	26		13	13		26	1		5	5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	4%	0%	2%	20%	2%	2%	0%	9%
Adj. Flow (vph)	0	0	391	0	1276	46	0	0	0	0	0	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	391	0	1322	0	0	0	0	0	0	29
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	Yes
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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization 74.7%		ICU Level of Service D		
Analysis Period (min) 15				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	360	0	1174	42	0	0	0	0	0	27
Future Volume (Veh/h)	0	0	360	0	1174	42	0	0	0	0	0	27
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	391	0	1276	46	0	0	0	0	0	29
Pedestrians		1			5			13			26	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.87						0.87	0.87		0.87	0.87	0.87
vC, conflicting volume	1348			404			1342	1361	18	1526	1729	1326
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1326			404			1319	1341	18	1529	1762	1301
tC, single (s)	4.1			4.2			7.1	6.7	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.5	4.0	3.4
p0 queue free %	100			100			100	100	100	100	100	82
cM capacity (veh/h)	445			1123			94	120	1056	80	73	162

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	391	1322	29
Volume Left	0	0	0
Volume Right	391	46	29
cSH	1700	1700	162
Volume to Capacity	0.23	0.78	0.18
Queue Length 95th (m)	0.0	0.0	5.0
Control Delay (s)	0.0	0.0	32.0
Lane LOS			D
Approach Delay (s)	0.0	0.0	32.0
Approach LOS			D

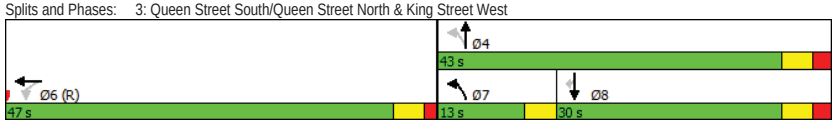
Intersection Summary					
Average Delay	0.5				
Intersection Capacity Utilization	74.7%	ICU Level of Service		D	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	317	0	277	0	0	0	586	622
Future Volume (vph)	0	0	0	82	317	0	277	0	0	0	586	622
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	0.95	1.00
Ped Bike Factor					0.99		0.97					0.87
Frt												0.850
Flt Protected					0.990		0.950					
Satd. Flow (prot)	0	0	0	0	1729	0	1770	1863	0	0	3139	1369
Flt Permitted					0.990		0.220					
Satd. Flow (perm)	0	0	0	0	1716	0	398	1863	0	0	3139	1194
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												309
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	89	345	0	301	0	0	0	637	676
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	434	0	301	0	0	0	637	676
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		9.5	28.5			28.5	28.5
Total Split (s)				47.0	47.0		13.0	43.0			30.0	30.0
Total Split (%)				52.2%	52.2%		14.4%	47.8%			33.3%	33.3%
Maximum Green (s)				42.2	42.2		9.5	37.5			24.5	24.5
Yellow Time (s)				3.3	3.3		3.5	3.3			3.3	3.3
All-Red Time (s)				1.5	1.5		0.0	2.2			2.2	2.2
Lost Time Adjust (s)					0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)					4.8		3.5	5.5			5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0			10.0			10.0	10.0
Flash Dont Walk (s)				8.0	8.0			8.0			8.0	8.0
Pedestrian Calls (#/hr)				0	0			0			0	0
Act Effct Green (s)					42.2		39.5				24.5	24.5
Actuated g/C Ratio					0.47		0.44				0.27	0.27
v/c Ratio					0.54		0.94				0.75	1.23

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					20.1		59.9				36.2	138.3
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					20.1		59.9				36.2	138.3
LOS					C		E				D	F
Approach Delay					20.1			59.9			88.8	
Approach LOS					C			E			F	
Queue Length 50th (m)					54.0		35.9				55.6	~109.5
Queue Length 95th (m)					82.6		#79.4				76.0	#178.4
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					804		319				854	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					0.54		0.94				0.75	1.23

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Pretimed			
Maximum v/c Ratio: 1.23			
Intersection Signal Delay: 70.0		Intersection LOS: E	
Intersection Capacity Utilization 90.6%		ICU Level of Service E	
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: 3: Queen Street South/Queen Street North & King Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	317	0	277	0	0	0	586	622
Future Volume (vph)	0	0	0	82	317	0	277	0	0	0	586	622
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.5				5.5	5.5
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.87
Flpb, ped/bikes					0.99		0.99				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.99		0.95				1.00	1.00
Satd. Flow (prot)					1716		1760				3139	1194
Flt Permitted					0.99		0.22				1.00	1.00
Satd. Flow (perm)					1716		407				3139	1194
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	345	0	301	0	0	0	637	676
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	225
Lane Group Flow (vph)	0	0	0	0	434	0	301	0	0	0	637	451
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Actuated Green, G (s)					42.2		37.5				24.5	24.5
Effective Green, g (s)					42.2		37.5				24.5	24.5
Actuated g/C Ratio					0.47		0.42				0.27	0.27
Clearance Time (s)					4.8		3.5				5.5	5.5
Lane Grp Cap (vph)					804		312				854	325
v/s Ratio Prot							c0.10				0.20	
v/s Ratio Perm					0.25		0.30					c0.38
v/c Ratio					0.54		0.96				0.75	1.39
Uniform Delay, d1					17.0		21.7				29.9	32.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					2.6		42.7				5.9	192.6
Delay (s)					19.6		64.4				35.8	225.3
Level of Service					B		E				D	F
Approach Delay (s)		0.0			19.6			64.4			133.4	
Approach LOS		A			B			E			F	

Intersection Summary					
HCM 2000 Control Delay		99.1	HCM 2000 Level of Service		F
HCM 2000 Volume to Capacity ratio		0.87			
Actuated Cycle Length (s)		90.0	Sum of lost time (s)		13.8
Intersection Capacity Utilization		90.6%	ICU Level of Service		E
Analysis Period (min)		15			
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	2	6	59	4	22	2	25	8	2	44	5
Future Volume (vph)	12	2	6	59	4	22	2	25	8	2	44	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.957			0.965			0.968			0.988	
Flt Protected		0.971			0.966			0.997			0.998	
Satd. Flow (prot)	0	1766	0	0	1771	0	0	1690	0	0	1723	0
Flt Permitted		0.971			0.966			0.997			0.998	
Satd. Flow (perm)	0	1766	0	0	1771	0	0	1690	0	0	1723	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			58.5			94.4			96.5	
Travel Time (s)		6.0			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		10	10		7	13		6	6		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	10%	0%
Adj. Flow (vph)	13	2	7	64	4	24	2	27	9	2	48	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	92	0	0	38	0	0	55	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	2	6	59	4	22	2	25	8	2	44	5
Future Volume (Veh/h)	12	2	6	59	4	22	2	25	8	2	44	5
Sign Control		Stop			Stop			Free			Free	
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)	13	2	7	64	4	24	2	27	9	2	48	5
Pedestrians		13			6			10			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	136	114	74	114	112	44	66			42		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	136	114	74	114	112	44	66			42		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	99	92	99	98	100			100		
cM capacity (veh/h)	792	766	975	837	768	1020	1532			1572		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	92	38	55
Volume Left	13	64	2	2
Volume Right	7	24	9	5
cSH	840	874	1532	1572
Volume to Capacity	0.03	0.11	0.00	0.00
Queue Length 95th (m)	0.6	2.8	0.0	0.0
Control Delay (s)	9.4	9.6	0.4	0.3
Lane LOS	A	A	A	A
Approach Delay (s)	9.4	9.6	0.4	0.3
Approach LOS	A	A		

Intersection Summary				
Average Delay		5.4		
Intersection Capacity Utilization		21.3%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	221	0	1041	36	0	0	0	0	0	102
Future Volume (vph)	0	0	221	0	1041	36	0	0	0	0	0	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.865		0.996							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1611	0	1822	0	0	0	0	0	0	1508
Flt Permitted												
Satd. Flow (perm)	0	0	1611	0	1822	0	0	0	0	0	0	1508
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			59.8			102.8			94.4	
Travel Time (s)		8.7			4.3			7.4			6.8	
Confl. Peds. (#/hr)	26		13	13		26	1		5	5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	4%	0%	2%	20%	2%	2%	0%	9%
Adj. Flow (vph)	0	0	240	0	1132	39	0	0	0	0	0	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	240	0	1171	0	0	0	0	0	0	111
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	Yes
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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	221	0	1041	36	0	0	0	0	0	102
Future Volume (Veh/h)	0	0	221	0	1041	36	0	0	0	0	0	102
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	240	0	1132	39	0	0	0	0	0	111
Pedestrians		1			5			13			26	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked												
vC, conflicting volume	1197			253			1276	1210	18	1302	1430	1178
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1197			253			1276	1210	18	1302	1430	1178
tC, single (s)	4.1			4.2			7.1	6.7	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.5	4.0	3.4
p0 queue free %	100			100			100	100	100	100	100	49
cM capacity (veh/h)	570			1278			70	165	1056	132	133	220

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	240	1171	111
Volume Left	0	0	0
Volume Right	240	39	111
cSH	1700	1700	220
Volume to Capacity	0.14	0.69	0.51
Queue Length 95th (m)	0.0	0.0	20.6
Control Delay (s)	0.0	0.0	37.1
Lane LOS			E
Approach Delay (s)	0.0	0.0	37.1
Approach LOS			E

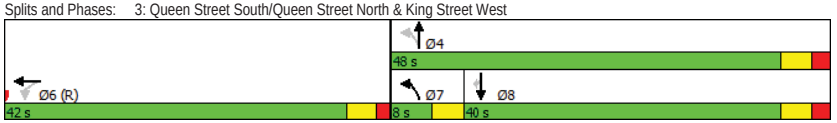
Intersection Summary					
Average Delay	2.7				
Intersection Capacity Utilization	70.4%	ICU Level of Service		C	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	219	263	0	187	0	0	0	775	627
Future Volume (vph)	0	0	0	219	263	0	187	0	0	0	775	627
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	0.95	1.00
Ped Bike Factor					0.98		0.98					0.87
Frt												0.850
Flt Protected					0.978		0.950					
Satd. Flow (prot)	0	0	0	0	1712	0	1770	1863	0	0	3139	1369
Flt Permitted					0.978		0.193					
Satd. Flow (perm)	0	0	0	0	1684	0	353	1863	0	0	3139	1194
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												340
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	238	286	0	203	0	0	0	842	682
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	524	0	203	0	0	0	842	682
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		8.0	28.5			28.5	28.5
Total Split (s)				42.0	42.0		8.0	48.0			40.0	40.0
Total Split (%)				46.7%	46.7%		8.9%	53.3%			44.4%	44.4%
Maximum Green (s)				37.2	37.2		4.5	42.5			34.5	34.5
Yellow Time (s)				3.3	3.3		3.5	3.3			3.3	3.3
All-Red Time (s)				1.5	1.5		0.0	2.2			2.2	2.2
Lost Time Adjust (s)					0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)					4.8		3.5	5.5			5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0			10.0			10.0	10.0
Flash Dont Walk (s)				8.0	8.0			8.0			8.0	8.0
Pedestrian Calls (#/hr)				0	0			0			0	0
Act Effct Green (s)					37.2		44.5				34.5	34.5
Actuated g/C Ratio					0.41		0.49				0.38	0.38
v/c Ratio					0.75		0.83				0.70	1.02

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					30.8		45.0				27.2	56.9
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					30.8		45.0				27.2	56.9
LOS					C		D				C	E
Approach Delay					30.8			45.0			40.5	
Approach LOS					C			D			D	
Queue Length 50th (m)					79.1		20.2				66.6	~84.3
Queue Length 95th (m)					120.4		#48.7				88.8	#160.7
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					696		245				1203	667
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					0.75		0.83				0.70	1.02

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Pretimed			
Maximum v/c Ratio: 1.02			
Intersection Signal Delay: 38.7		Intersection LOS: D	
Intersection Capacity Utilization 90.7%		ICU Level of Service E	
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: 3: Queen Street South/Queen Street North & King Street West



HCM Signalized Intersection Capacity Analysis 2027 Background PM (LRT).syn
3: Queen Street South/Queen Street North & King Street West 10-21-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	219	263	0	187	0	0	0	775	627
Future Volume (vph)	0	0	0	219	263	0	187	0	0	0	775	627
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.5				5.5	5.5
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.87
Flpb, ped/bikes					0.98		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.98		0.95				1.00	1.00
Satd. Flow (prot)					1684		1765				3139	1194
Flt Permitted					0.98		0.19				1.00	1.00
Satd. Flow (perm)					1684		358				3139	1194
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	238	286	0	203	0	0	0	842	682
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	210
Lane Group Flow (vph)	0	0	0	0	524	0	203	0	0	0	842	472
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Actuated Green, G (s)					37.2		42.5				34.5	34.5
Effective Green, g (s)					37.2		42.5				34.5	34.5
Actuated g/C Ratio					0.41		0.47				0.38	0.38
Clearance Time (s)					4.8		3.5				5.5	5.5
Lane Grp Cap (vph)					696		239				1203	457
v/s Ratio Prot							c0.04				0.27	
v/s Ratio Perm					0.31		0.36					c0.40
v/c Ratio					0.75		0.85				0.70	1.03
Uniform Delay, d1					22.5		20.1				23.4	27.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					7.4		29.6				3.4	51.0
Delay (s)					29.9		49.6				26.8	78.8
Level of Service					C		D				C	E
Approach Delay (s)		0.0			29.9			49.6			50.0	
Approach LOS		A			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	45.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	90.7%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings 2027 Background SAT (LRT).syn
1: Ray Street North & Market Street 10-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	7	0	6	2	7	5	28	8	2	13	0
Future Volume (vph)	1	7	0	6	2	7	5	28	8	2	13	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
Ped Bike Factor												
Frt					0.936			0.972				
Flt Protected		0.994			0.980			0.994			0.994	
Satd. Flow (prot)	0	1889	0	0	1743	0	0	1697	0	0	1737	0
Flt Permitted		0.994			0.980			0.994			0.994	
Satd. Flow (perm)	0	1889	0	0	1743	0	0	1697	0	0	1737	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			58.5			94.4			96.5	
Travel Time (s)		6.0			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		10	10		7	13		6	6		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	10%	0%
Adj. Flow (vph)	1	8	0	7	2	8	5	30	9	2	14	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	0	17	0	0	44	0	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	7	0	6	2	7	5	28	8	2	13	0
Future Volume (Veh/h)	1	7	0	6	2	7	5	28	8	2	13	0
Sign Control		Stop			Stop			Free			Free	
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)	1	8	0	7	2	8	5	30	9	2	14	0
Pedestrians		13			6			10			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	92	86	37	82	82	48	27			45		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	92	86	37	82	82	48	27			45		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	99	100	99	100			100		
cM capacity (veh/h)	861	792	1021	877	796	1016	1583			1568		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	17	44	16
Volume Left	1	7	5	2
Volume Right	0	8	9	0
cSH	799	926	1583	1568
Volume to Capacity	0.01	0.02	0.00	0.00
Queue Length 95th (m)	0.3	0.4	0.1	0.0
Control Delay (s)	9.6	9.0	0.8	0.9
Lane LOS	A	A	A	A
Approach Delay (s)	9.6	9.0	0.8	0.9
Approach LOS	A	A		

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	19.7%	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)	0	0	221	0	769	28	0	0	0	0	0	25
Future Volume (vph)	0	0	221	0	769	28	0	0	0	0	0	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												
Frt			0.865		0.995							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1611	0	1820	0	0	0	0	0	0	1508
Flt Permitted												
Satd. Flow (perm)	0	0	1611	0	1820	0	0	0	0	0	0	1508
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			59.8			102.8			94.4	
Travel Time (s)		8.7			4.3			7.4			6.8	
Confl. Peds. (#/hr)	26		13	13		26	1		5	5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	4%	0%	2%	20%	2%	2%	0%	9%
Adj. Flow (vph)	0	0	240	0	836	30	0	0	0	0	0	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	240	0	866	0	0	0	0	0	0	27
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	Yes
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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	52.6%	ICU Level of Service A		
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	221	0	769	28	0	0	0	0	0	25
Future Volume (Veh/h)	0	0	221	0	769	28	0	0	0	0	0	25
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	240	0	836	30	0	0	0	0	0	27
Pedestrians		1			5			13			26	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked												
vC, conflicting volume	892			253			892	905	18	1002	1130	878
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	892			253			892	905	18	1002	1130	878
tC, single (s)	4.1			4.2			7.1	6.7	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.5	4.0	3.4
p0 queue free %	100			100			100	100	100	100	100	92
cM capacity (veh/h)	744			1278			237	253	1056	212	201	330

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	240	866	27
Volume Left	0	0	0
Volume Right	240	30	27
cSH	1700	1700	330
Volume to Capacity	0.14	0.51	0.08
Queue Length 95th (m)	0.0	0.0	2.1
Control Delay (s)	0.0	0.0	16.9
Lane LOS			C
Approach Delay (s)	0.0	0.0	16.9
Approach LOS			C

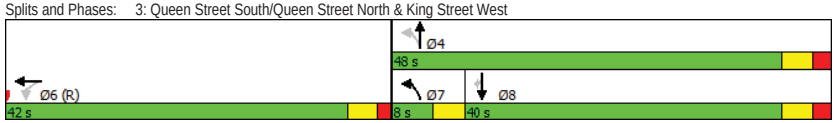
Intersection Summary					
Average Delay			0.4		
Intersection Capacity Utilization			52.6%	ICU Level of Service	A
Analysis Period (min)			15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	195	0	139	0	0	0	720	463
Future Volume (vph)	0	0	0	214	195	0	139	0	0	0	720	463
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	0.95	1.00
Ped Bike Factor					0.98		0.98					0.87
Frt												0.850
Flt Protected					0.974		0.950					
Satd. Flow (prot)	0	0	0	0	1706	0	1770	1863	0	0	3139	1369
Flt Permitted					0.974		0.220					
Satd. Flow (perm)	0	0	0	0	1674	0	401	1863	0	0	3139	1194
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												441
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	233	212	0	151	0	0	0	783	503
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	445	0	151	0	0	0	783	503
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		8.0	28.5			28.5	28.5
Total Split (s)				42.0	42.0		8.0	48.0			40.0	40.0
Total Split (%)				46.7%	46.7%		8.9%	53.3%			44.4%	44.4%
Maximum Green (s)				37.2	37.2		4.5	42.5			34.5	34.5
Yellow Time (s)				3.3	3.3		3.5	3.3			3.3	3.3
All-Red Time (s)				1.5	1.5		0.0	2.2			2.2	2.2
Lost Time Adjust (s)					0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)					4.8		3.5	5.5			5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0			10.0			10.0	10.0
Flash Dont Walk (s)				8.0	8.0			8.0			8.0	8.0
Pedestrian Calls (#/hr)				0	0			0			0	0
Act Effct Green (s)					37.2		44.5				34.5	34.5
Actuated g/C Ratio					0.41		0.49				0.38	0.38
v/c Ratio					0.64		0.57				0.65	0.69

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					26.4		22.4				25.9	9.3
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					26.4		22.4				25.9	9.3
LOS					C		C				C	A
Approach Delay					26.4			22.4			19.4	
Approach LOS					C			C			B	
Queue Length 50th (m)					63.1		14.5				60.4	7.2
Queue Length 95th (m)					96.8		25.7				81.0	41.5
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					691		266				1203	729
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					0.64		0.57				0.65	0.69

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 21.3		Intersection LOS: C	
Intersection Capacity Utilization 74.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Queen Street South/Queen Street North & King Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	195	0	139	0	0	0	720	463
Future Volume (vph)	0	0	0	214	195	0	139	0	0	0	720	463
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.5				5.5	5.5
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.87
Flpb, ped/bikes					0.98		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.97		0.95				1.00	1.00
Satd. Flow (prot)					1675		1763				3139	1194
Flt Permitted					0.97		0.22				1.00	1.00
Satd. Flow (perm)					1675		408				3139	1194
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	233	212	0	151	0	0	0	783	503
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	272
Lane Group Flow (vph)	0	0	0	0	445	0	151	0	0	0	783	231
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Actuated Green, G (s)					37.2		42.5				34.5	34.5
Effective Green, g (s)					37.2		42.5				34.5	34.5
Actuated g/C Ratio					0.41		0.47				0.38	0.38
Clearance Time (s)					4.8		3.5				5.5	5.5
Lane Grp Cap (vph)					692		260				1203	457
v/s Ratio Prot							c0.03				c0.25	
v/s Ratio Perm					0.27		0.24					0.19
v/c Ratio					0.64		0.58				0.65	0.51
Uniform Delay, d1					21.1		15.2				22.8	21.2
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					4.6		9.1				2.7	4.0
Delay (s)					25.7		24.4				25.5	25.2
Level of Service					C		C				C	C
Approach Delay (s)		0.0			25.7			24.4			25.4	
Approach LOS		A			C			C			C	

Intersection Summary					
HCM 2000 Control Delay		25.4	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.64			
Actuated Cycle Length (s)		90.0	Sum of lost time (s)		13.8
Intersection Capacity Utilization		74.0%	ICU Level of Service		D
Analysis Period (min)		15			
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	1	14	8	10	14	28	49	28	13	8
Future Volume (vph)	2	4	1	14	8	10	14	28	49	28	13	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981			0.958			0.927			0.977	
Flt Protected		0.986			0.979			0.992			0.972	
Satd. Flow (prot)	0	1838	0	0	1782	0	0	1685	0	0	1758	0
Flt Permitted		0.986			0.979			0.992			0.972	
Satd. Flow (perm)	0	1838	0	0	1782	0	0	1685	0	0	1758	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			58.5			94.4			96.5	
Travel Time (s)		6.0			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		10	10		7	13		6	6		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	10%	0%
Adj. Flow (vph)	2	4	1	15	9	11	15	30	53	30	14	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	7	0	0	35	0	0	98	0	0	53	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	4	1	14	8	10	14	28	49	28	13	8
Future Volume (Veh/h)	2	4	1	14	8	10	14	28	49	28	13	8
Sign Control		Stop			Stop			Free			Free	
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)	2	4	1	15	9	11	15	30	53	30	14	9
Pedestrians		13			6			10			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	200	210	42	184	188	70	36			89		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	200	210	42	184	188	70	36			89		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	98	99	99	99			98		
cM capacity (veh/h)	709	659	1015	741	678	988	1571			1512		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	7	35	98	53
Volume Left	2	15	15	30
Volume Right	1	11	53	9
cSH	709	784	1571	1512
Volume to Capacity	0.01	0.04	0.01	0.02
Queue Length 95th (m)	0.2	1.1	0.2	0.5
Control Delay (s)	10.1	9.8	1.2	4.3
Lane LOS	B	A	A	A
Approach Delay (s)	10.1	9.8	1.2	4.3
Approach LOS	B	A		

Intersection Summary				
Average Delay		3.9		
Intersection Capacity Utilization		22.6%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	15	2634	75	52	6	0	0	0	35
Future Volume (vph)	0	0	0	15	2634	75	52	6	0	0	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.996						0.865	
Flt Protected								0.957				
Satd. Flow (prot)	0	0	0	0	6265	0	0	1749	0	0	1508	0
Flt Permitted								0.957				
Satd. Flow (perm)	0	0	0	0	6265	0	0	1749	0	0	1508	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			59.8			102.8			94.4	
Travel Time (s)		8.7			4.3			7.4			6.8	
Confl. Peds. (#/hr)	26		13	13		26	1		5	5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	4%	0%	2%	20%	2%	2%	0%	9%
Adj. Flow (vph)	0	0	0	16	2863	82	57	7	0	0	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2961	0	0	64	0	0	38	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	Yes
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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	15	2634	75	52	6	0	0	0	35
Future Volume (Veh/h)	0	0	0	15	2634	75	52	6	0	0	0	35
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	16	2863	82	57	7	0	0	0	38
Pedestrians		1			5			13			26	
Lane Width (m)		0.0			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			1			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.68						0.68	0.68		0.68	0.68	0.68
vC, conflicting volume	2971			13			800	3016	18	2970	2975	784
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1541			13			0	1607	18	1540	1547	0
tC, single (s)	4.1			4.3			7.5	6.9	6.9	7.5	6.5	7.1
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.5	4.0	3.4
p0 queue free %	100			99			91	88	100	100	100	95
cM capacity (veh/h)	284			1544			629	57	1040	46	75	706

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	493	954	954	559	64	38
Volume Left	16	0	0	0	57	0
Volume Right	0	0	0	82	0	38
cSH	1544	1700	1700	1700	299	706
Volume to Capacity	0.01	0.56	0.56	0.33	0.21	0.05
Queue Length 95th (m)	0.3	0.0	0.0	0.0	6.4	1.4
Control Delay (s)	0.3	0.0	0.0	0.0	20.3	10.4
Lane LOS	A				C	B
Approach Delay (s)	0.1				20.3	10.4
Approach LOS					C	B

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	58.4%	ICU Level of Service	B	
Analysis Period (min)	15			

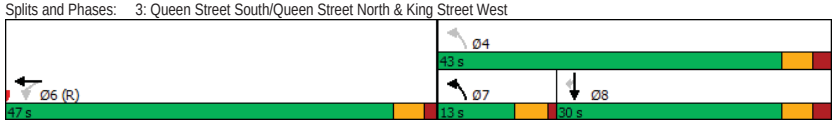
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	2070	0	209	0	0	0	410	422
Future Volume (vph)	0	0	0	82	2070	0	209	0	0	0	410	422
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00							0.94
Frt												0.850
Flt Protected					0.998		0.950					
Satd. Flow (prot)	0	0	0	0	5986	0	1770	0	0	0	1652	1369
Flt Permitted					0.998		0.147					
Satd. Flow (perm)	0	0	0	0	5978	0	274	0	0	0	1652	1287
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												76
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	89	2250	0	227	0	0	0	446	459
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2339	0	227	0	0	0	446	459
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		9.5				28.5	28.5
Total Split (s)				47.0	47.0		13.0				30.0	30.0
Total Split (%)				52.2%	52.2%		14.4%				33.3%	33.3%
Maximum Green (s)				42.2	42.2		8.5				24.5	24.5
Yellow Time (s)				3.3	3.3		3.5				3.3	3.3
All-Red Time (s)				1.5	1.5		1.0				2.2	2.2
Lost Time Adjust (s)					0.0		0.0				0.0	0.0
Total Lost Time (s)					4.8		4.5				5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0							
Flash Dont Walk (s)				8.0	8.0							
Pedestrian Calls (#/hr)				0	0							
Act Effct Green (s)					42.2		38.5				24.5	24.5
Actuated g/C Ratio					0.47		0.43				0.27	0.27
v/c Ratio					0.83		0.88				0.99	1.13

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Minimum Split (s)	28.5
Total Split (s)	43.0
Total Split (%)	48%
Maximum Green (s)	37.5
Yellow Time (s)	3.3
All-Red Time (s)	2.2
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	10.0
Flash Dont Walk (s)	8.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					24.2		53.2				75.6	114.2
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					24.2		53.2				75.6	114.2
LOS					C		D				E	F
Approach Delay					24.2			53.2			95.2	
Approach LOS					C			D			F	
Queue Length 50th (m)					103.8		26.3				80.8	~87.4
Queue Length 95th (m)					120.8		#65.4				#143.1	#148.0
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					2803		258				449	405
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					0.83		0.88				0.99	1.13

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Pretimed			
Maximum v/c Ratio: 1.13			
Intersection Signal Delay: 44.6		Intersection LOS: D	
Intersection Capacity Utilization 84.9%		ICU Level of Service E	
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: 3: Queen Street South/Queen Street North & King Street West



Lane Group	Ø4
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

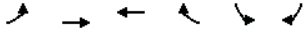
Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	2070	0	209	0	0	0	410	422
Future Volume (vph)	0	0	0	82	2070	0	209	0	0	0	410	422
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		4.5				5.5	5.5
Lane Util. Factor					0.86		1.00				1.00	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.94
Flpb, ped/bikes					1.00		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					1.00		0.95				1.00	1.00
Satd. Flow (prot)					5979		1770				1652	1287
Flt Permitted					1.00		0.15				1.00	1.00
Satd. Flow (perm)					5979		273				1652	1287
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	2250	0	227	0	0	0	446	459
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	55
Lane Group Flow (vph)	0	0	0	0	2339	0	227	0	0	0	446	404
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Actuated Green, G (s)					42.2		37.5				24.5	24.5
Effective Green, g (s)					42.2		37.5				24.5	24.5
Actuated g/C Ratio					0.47		0.42				0.27	0.27
Clearance Time (s)					4.8		4.5				5.5	5.5
Lane Grp Cap (vph)					2803		255				449	350
v/s Ratio Prot							c0.08				0.27	
v/s Ratio Perm					0.39		0.29					c0.31
v/c Ratio					0.83		0.89				0.99	1.15
Uniform Delay, d1					20.9		20.7				32.7	32.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					3.1		33.9				40.9	96.6
Delay (s)					24.0		54.6				73.5	129.4
Level of Service					C		D				E	F
Approach Delay (s)		0.0			24.0			54.6			101.9	
Approach LOS		A			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	46.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2707	10	0	16
Future Volume (vph)	0	0	2707	10	0	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	0.86	1.00	1.00
Frt			0.999			0.865
Flt Protected						
Satd. Flow (prot)	0	0	6401	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	6401	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		59.8	48.5		28.1	
Travel Time (s)		4.3	3.5		2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2942	11	0	17
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2953	0	0	17
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

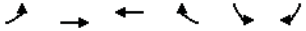
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2707	10	0	16
Future Volume (Veh/h)	0	0	2707	10	0	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2942	11	0	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			103			
pX, platoon unblocked	0.67				0.67	0.67
vC, conflicting volume	2953				2948	741
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1469				1460	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 %	100				100	98
cM capacity (veh/h)	306				81	729

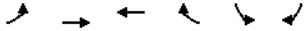
Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	841	841	841	431	17
Volume Left	0	0	0	0	0
Volume Right	0	0	0	11	17
cSH	1700	1700	1700	1700	729
Volume to Capacity	0.49	0.49	0.49	0.25	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.6
Control Delay (s)	0.0	0.0	0.0	0.0	10.1
Lane LOS					B
Approach Delay (s)	0.0				10.1
Approach LOS					B

Intersection Summary			
Average Delay		0.1	
Intersection Capacity Utilization		49.4%	ICU Level of Service A
Analysis Period (min)		15	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2701	0	0	17
Future Volume (vph)	0	0	2701	0	0	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	0	6408	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	6408	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		48.5	54.2		30.3	
Travel Time (s)		3.5	3.9		2.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2936	0	0	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2936	0	0	18
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.1%			ICU Level of Service A
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2701	0	0	17
Future Volume (Veh/h)	0	0	2701	0	0	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2936	0	0	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			54			
pX, platoon unblocked	0.67				0.67	0.67
vC, conflicting volume	2936				2936	734
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1408				1408	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 %	100				100	98
cM capacity (veh/h)	321				87	724

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	734	734	734	734	18
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	18
cSH	1700	1700	1700	1700	724
Volume to Capacity	0.43	0.43	0.43	0.43	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.6
Control Delay (s)	0.0	0.0	0.0	0.0	10.1
Lane LOS					B
Approach Delay (s)	0.0				10.1
Approach LOS					B

Intersection Summary				
Average Delay		0.1		
Intersection Capacity Utilization		49.1%	ICU Level of Service	A
Analysis Period (min)		15		

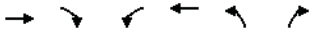
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	30	0	0	803	42
Future Volume (vph)	0	30	0	0	803	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.865			0.992	
Flt Protected						
Satd. Flow (prot)	0	1611	0	0	3511	0
Flt Permitted						
Satd. Flow (perm)	0	1611	0	0	3511	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	61.4			67.5	263.6	
Travel Time (s)	4.4			4.9	19.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	33	0	0	873	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	33	0	0	919	0
Enter Blocked Intersection	No	Yes	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	30	0	0	803	42
Future Volume (Veh/h)	0	30	0	0	803	42
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	33	0	0	873	46
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				67		
pX, platoon unblocked						
vC, conflicting volume	896	460	919			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	896	460	919			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	94	100			
cM capacity (veh/h)	280	549	738			

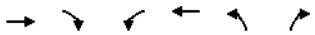
Direction, Lane #	EB 1	SB 1	SB 2
Volume Total	33	582	337
Volume Left	0	0	0
Volume Right	33	0	46
cSH	549	1700	1700
Volume to Capacity	0.06	0.34	0.20
Queue Length 95th (m)	1.5	0.0	0.0
Control Delay (s)	12.0	0.0	0.0
Lane LOS	B		
Approach Delay (s)	12.0	0.0	
Approach LOS	B		

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		33.5%	ICU Level of Service A
Analysis Period (min)		15	



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	76	4	11	16	16	32
Future Volume (vph)	76	4	11	16	16	32
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				0.909	
Flt Protected				0.980	0.984	
Satd. Flow (prot)	1852	0	0	1825	1666	0
Flt Permitted				0.980	0.984	
Satd. Flow (perm)	1852	0	0	1825	1666	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	58.5			57.6	42.7	
Travel Time (s)	4.2			5.2	3.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	4	12	17	17	35
Shared Lane Traffic (%)						
Lane Group Flow (vph)	87	0	0	29	52	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	18.1%	ICU Level of Service A	
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	76	4	11	16	16	32
Future Volume (Veh/h)	76	4	11	16	16	32
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	4	12	17	17	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			87		126	85
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			87		126	85
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	96
cM capacity (veh/h)			1509		862	974

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	87	29	52
Volume Left	0	12	17
Volume Right	4	0	35
cSH	1700	1509	934
Volume to Capacity	0.05	0.01	0.06
Queue Length 95th (m)	0.0	0.2	1.4
Control Delay (s)	0.0	3.1	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.1	9.1
Approach LOS			A

Intersection Summary			
Average Delay		3.3	
Intersection Capacity Utilization	18.1%	ICU Level of Service	A
Analysis Period (min)		15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	2	6	64	4	27	2	34	40	8	44	5
Future Volume (vph)	12	2	6	64	4	27	2	34	40	8	44	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.957			0.962			0.929			0.989	
Flt Protected		0.971			0.967			0.999			0.993	
Satd. Flow (prot)	0	1766	0	0	1767	0	0	1763	0	0	1866	0
Flt Permitted		0.971			0.967			0.999			0.993	
Satd. Flow (perm)	0	1766	0	0	1767	0	0	1763	0	0	1866	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		76.7			58.5			94.4			96.5	
Travel Time (s)		5.5			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		4	4		7	2		6	6		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	13	2	7	70	4	29	2	37	43	9	48	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	103	0	0	82	0	0	62	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.1%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	2	6	64	4	27	2	34	40	8	44	5
Future Volume (Veh/h)	12	2	6	64	4	27	2	34	40	8	44	5
Sign Control		Stop			Stop			Free			Free	
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)	13	2	7	70	4	29	2	37	43	9	48	5
Pedestrians		2			6			4			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	171	160	56	149	142	72	55			86		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	171	160	56	149	142	72	55			86		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	99	91	99	97	100			99		
cM capacity (veh/h)	756	725	1011	801	743	986	1560			1515		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	103	82	62
Volume Left	13	70	2	9
Volume Right	7	29	43	5
cSH	819	843	1560	1515
Volume to Capacity	0.03	0.12	0.00	0.01
Queue Length 95th (m)	0.7	3.3	0.0	0.1
Control Delay (s)	9.5	9.9	0.2	1.1
Lane LOS	A	A	A	A
Approach Delay (s)	9.5	9.9	0.2	1.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	4.9			
Intersection Capacity Utilization	22.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	22	2613	77	48	2	0	0	0	107
Future Volume (vph)	0	0	0	22	2613	77	48	2	0	0	0	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.996						0.865	
Flt Protected								0.954				
Satd. Flow (prot)	0	0	0	0	6387	0	0	1813	0	0	1644	0
Flt Permitted								0.954				
Satd. Flow (perm)	0	0	0	0	6387	0	0	1813	0	0	1644	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			61.0			102.8			94.4	
Travel Time (s)		8.7			4.4			7.4			6.8	
Confl. Peds. (#/hr)	46		19	19		46			1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	24	2840	84	52	2	0	0	0	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2948	0	0	54	0	0	116	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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	57.5%	ICU Level of Service B		
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	22	2613	77	48	2	0	0	0	107
Future Volume (Veh/h)	0	0	0	22	2613	77	48	2	0	0	0	107
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	24	2840	84	52	2	0	0	0	116
Pedestrians					1			19			46	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			2			4	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.67						0.67	0.67		0.67	0.67	0.67
vC, conflicting volume	2970			19			893	3037	20	2978	2995	798
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1444			19			0	1545	20	1456	1482	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			98			90	97	100	100	100	83
cM capacity (veh/h)	304			1585			532	72	1042	55	78	698

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	497	947	947	557	54	116
Volume Left	24	0	0	0	52	0
Volume Right	0	0	0	84	0	116
cSH	1585	1700	1700	1700	430	698
Volume to Capacity	0.02	0.56	0.56	0.33	0.13	0.17
Queue Length 95th (m)	0.4	0.0	0.0	0.0	3.4	4.7
Control Delay (s)	0.5	0.0	0.0	0.0	14.6	11.2
Lane LOS	A				B	B
Approach Delay (s)	0.1				14.6	11.2
Approach LOS					B	B

Intersection Summary					
Average Delay	0.7				
Intersection Capacity Utilization	57.5%	ICU Level of Service		B	
Analysis Period (min)	15				

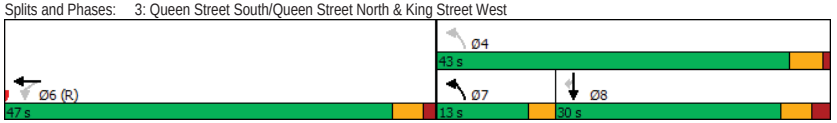
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	2061	0	142	0	0	0	634	520
Future Volume (vph)	0	0	0	169	2061	0	142	0	0	0	634	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00							0.95
Frt												0.850
Flt Protected					0.996		0.950					
Satd. Flow (prot)	0	0	0	0	5968	0	1770	0	0	0	1759	1417
Flt Permitted					0.996		0.140					
Satd. Flow (perm)	0	0	0	0	5950	0	261	0	0	0	1759	1352
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												61
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		52.4			121.6			93.7			66.0	
Travel Time (s)		3.8			8.8			6.7			4.8	
Confl. Peds. (#/hr)	83		27	27		83	31		27	27		31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	10%	9%	2%	2%	2%	2%	2%	8%	14%
Adj. Flow (vph)	0	0	0	184	2240	0	154	0	0	0	689	565
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2424	0	154	0	0	0	689	565
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Minimum Split (s)				29.8	29.8		8.0				29.8	29.8
Total Split (s)				47.0	47.0		13.0				30.0	30.0
Total Split (%)				52.2%	52.2%		14.4%				33.3%	33.3%
Maximum Green (s)				42.2	42.2		10.0				24.5	24.5
Yellow Time (s)				3.3	3.3		3.0				3.3	3.3
All-Red Time (s)				1.5	1.5		0.0				2.2	2.2
Lost Time Adjust (s)					0.0		0.0				0.0	0.0
Total Lost Time (s)					4.8		3.0				5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0							
Flash Dont Walk (s)				8.0	8.0							
Pedestrian Calls (#/hr)				0	0							
Act Effct Green (s)					42.2		40.0				24.5	24.5
Actuated g/C Ratio					0.47		0.44				0.27	0.27
v/c Ratio					0.87		0.54				1.44	1.37

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Minimum Split (s)	25.5
Total Split (s)	43.0
Total Split (%)	48%
Maximum Green (s)	38.5
Yellow Time (s)	3.5
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	10.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					25.8		22.9				238.8	208.8
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					25.8		22.9				238.8	208.8
LOS					C		C				F	F
Approach Delay					25.8			22.9			225.2	
Approach LOS					C			C			F	
Queue Length 50th (m)					110.4		16.5				~171.9	~129.7
Queue Length 95th (m)					128.4		29.2				#239.7	#194.6
Internal Link Dist (m)		28.4			97.6			69.7			42.0	
Turn Bay Length (m)												
Base Capacity (vph)					2789		283				478	412
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					0.87		0.54				1.44	1.37

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Pretimed			
Maximum v/c Ratio: 1.44			
Intersection Signal Delay: 90.9		Intersection LOS: F	
Intersection Capacity Utilization 87.2%		ICU Level of Service E	
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: 3: Queen Street South/Queen Street North & King Street West

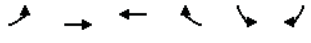


Lane Group	Ø4
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

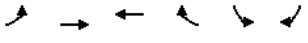
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	2061	0	142	0	0	0	634	520
Future Volume (vph)	0	0	0	169	2061	0	142	0	0	0	634	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.0				5.5	5.5
Lane Util. Factor					0.86		1.00				1.00	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.95
Flpb, ped/bikes					1.00		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					1.00		0.95				1.00	1.00
Satd. Flow (prot)					5951		1770				1759	1352
Flt Permitted					1.00		0.14				1.00	1.00
Satd. Flow (perm)					5951		261				1759	1352
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	184	2240	0	154	0	0	0	689	565
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	44
Lane Group Flow (vph)	0	0	0	0	2424	0	154	0	0	0	689	521
Confl. Peds. (#/hr)	83		27	27		83	31		27	27		31
Heavy Vehicles (%)	2%	2%	2%	10%	9%	2%	2%	2%	2%	2%	8%	14%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Actuated Green, G (s)					42.2		38.5				24.5	24.5
Effective Green, g (s)					42.2		38.5				24.5	24.5
Actuated g/C Ratio					0.47		0.43				0.27	0.27
Clearance Time (s)					4.8		3.0				5.5	5.5
Lane Grp Cap (vph)					2790		279				478	368
v/s Ratio Prot							c0.06				c0.39	
v/s Ratio Perm					0.41		0.17					0.38
v/c Ratio					0.87		0.55				1.44	1.41
Uniform Delay, d1					21.4		19.8				32.8	32.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					4.0		7.7				210.3	202.0
Delay (s)					25.4		27.4				243.0	234.8
Level of Service					C		C				F	F
Approach Delay (s)		0.0			25.4			27.4			239.3	
Approach LOS		A			C			C			F	

Intersection Summary					
HCM 2000 Control Delay	95.5	HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	1.01				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		13.3	
Intersection Capacity Utilization	87.2%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2703	30	0	9
Future Volume (vph)	0	0	2703	30	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	0.86	1.00	1.00
Frt			0.998			0.865
Flt Protected						
Satd. Flow (prot)	0	0	6395	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	6395	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		61.0	48.5		36.7	
Travel Time (s)		4.4	3.5		2.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2938	33	0	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2971	0	0	10
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

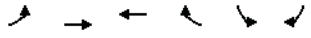
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2703	30	0	9
Future Volume (Veh/h)	0	0	2703	30	0	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2938	33	0	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			101			
pX, platoon unblocked	0.65				0.65	0.65
vC, conflicting volume	2971				2954	751
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1371				1345	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 %	100				100	99
cM capacity (veh/h)	325				93	709

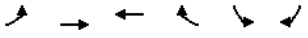
Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	839	839	839	453	10
Volume Left	0	0	0	0	0
Volume Right	0	0	0	33	10
cSH	1700	1700	1700	1700	709
Volume to Capacity	0.49	0.49	0.49	0.27	0.01
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	0.0	0.0	10.1
Lane LOS					B
Approach Delay (s)	0.0				10.1
Approach LOS					B

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		49.7%	ICU Level of Service	A
Analysis Period (min)		15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑↑↑			↱
Traffic Volume (vph)	0	0	2723	0	0	9
Future Volume (vph)	0	0	2723	0	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	0	6408	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	6408	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		48.5	52.4		31.3	
Travel Time (s)		3.5	3.8		2.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2960	0	0	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2960	0	0	10
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑↑↑↑			↱
Traffic Volume (veh/h)	0	0	2723	0	0	9
Future Volume (Veh/h)	0	0	2723	0	0	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2960	0	0	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			52			
pX, platoon unblocked	0.65				0.65	0.65
vC, conflicting volume	2960				2960	740
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1304				1304	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 %	100				100	99
cM capacity (veh/h)	341				98	702

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	740	740	740	740	10
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	10
cSH	1700	1700	1700	1700	702
Volume to Capacity	0.44	0.44	0.44	0.44	0.01
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.3
Control Delay (s)	0.0	0.0	0.0	0.0	10.2
Lane LOS					B
Approach Delay (s)	0.0				10.2
Approach LOS					B

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		49.5%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	45	0	0	1109	47
Future Volume (vph)	0	45	0	0	1109	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.865			0.994	
Flt Protected						
Satd. Flow (prot)	0	1611	0	0	3518	0
Flt Permitted						
Satd. Flow (perm)	0	1611	0	0	3518	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	56.2			66.0	165.6	
Travel Time (s)	4.0			4.8	11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	49	0	0	1205	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	49	0	0	1256	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	45	0	0	1109	47
Future Volume (Veh/h)	0	45	0	0	1109	47
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	0	0	1205	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				66		
pX, platoon unblocked						
vC, conflicting volume	1230	628	1256			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1230	628	1256			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	88	100			
cM capacity (veh/h)	170	426	550			

Direction, Lane #	EB 1	SB 1	SB 2
Volume Total	49	803	453
Volume Left	0	0	0
Volume Right	49	0	51
cSH	426	1700	1700
Volume to Capacity	0.12	0.47	0.27
Queue Length 95th (m)	3.1	0.0	0.0
Control Delay (s)	14.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	14.6	0.0	
Approach LOS	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	52	11	34	169	10	19
Future Volume (vph)	52	11	34	169	10	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
Frt	0.977				0.911	
Flt Protected				0.992	0.983	
Satd. Flow (prot)	1820	0	0	1848	1668	0
Flt Permitted				0.992	0.983	
Satd. Flow (perm)	1820	0	0	1848	1668	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	58.5			81.9	31.8	
Travel Time (s)	4.2			7.4	2.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	12	37	184	11	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	69	0	0	221	32	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
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		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	52	11	34	169	10	19
Future Volume (Veh/h)	52	11	34	169	10	19
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	12	37	184	11	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			69		321	63
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			69		321	63
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		98	98
cM capacity (veh/h)			1532		656	1002

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	69	221	32
Volume Left	0	37	11
Volume Right	12	0	21
cSH	1700	1532	848
Volume to Capacity	0.04	0.02	0.04
Queue Length 95th (m)	0.0	0.6	0.9
Control Delay (s)	0.0	1.4	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	1.4	9.4
Approach LOS			A

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	27.4%	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)	1	7	0	12	2	13	5	38	46	9	14	0
Future Volume (vph)	1	7	0	12	2	13	5	38	46	9	14	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
Ped Bike Factor												
Frt					0.935			0.930				
Flt Protected		0.994			0.978			0.997			0.980	
Satd. Flow (prot)	0	1889	0	0	1735	0	0	1730	0	0	1862	0
Flt Permitted		0.994			0.978			0.997			0.980	
Satd. Flow (perm)	0	1889	0	0	1735	0	0	1730	0	0	1862	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		80.0			58.5			94.4			96.5	
Travel Time (s)		5.8			5.3			8.5			8.7	
Confl. Peds. (#/hr)	3		4	4		3	5		4	5		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%	2%	0%	2%	4%	0%	0%	0%	2%
Adj. Flow (vph)	1	8	0	13	2	14	5	41	50	10	15	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	0	29	0	0	96	0	0	25	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	18.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	7	0	12	2	13	5	38	46	9	14	0
Future Volume (Veh/h)	1	7	0	12	2	13	5	38	46	9	14	0
Sign Control		Stop			Stop			Free			Free	
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)	1	8	0	13	2	14	5	41	50	10	15	0
Pedestrians		5			5			4			3	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	134	146	24	124	121	74	20			96		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	134	146	24	124	121	74	20			96		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	98	100	99	100			99		
cM capacity (veh/h)	812	736	1050	830	755	987	1589			1504		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	29	96	25
Volume Left	1	13	5	10
Volume Right	0	14	50	0
cSH	743	892	1589	1504
Volume to Capacity	0.01	0.03	0.00	0.01
Queue Length 95th (m)	0.3	0.8	0.1	0.2
Control Delay (s)	9.9	9.2	0.4	3.0
Lane LOS	A	A	A	A
Approach Delay (s)	9.9	9.2	0.4	3.0
Approach LOS	A	A		

Intersection Summary				
Average Delay		2.9		
Intersection Capacity Utilization		18.1%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	13	2351	76	47	7	0	0	1	31
Future Volume (vph)	0	0	0	13	2351	76	47	7	0	0	1	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	0.86	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.995						0.869	
Flt Protected								0.959				
Satd. Flow (prot)	0	0	0	0	6377	0	0	1822	0	0	1651	0
Flt Permitted								0.959				
Satd. Flow (perm)	0	0	0	0	6377	0	0	1822	0	0	1651	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			60.5			102.8			94.4	
Travel Time (s)		8.7			4.4			7.4			6.8	
Confl. Peds. (#/hr)	42		21	21		42			4	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 (%)	2%	2%	2%	9%	2%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	14	2555	83	51	8	0	0	1	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2652	0	0	59	0	0	35	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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	13	2351	76	47	7	0	0	1	31
Future Volume (Veh/h)	0	0	0	13	2351	76	47	7	0	0	1	31
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	14	2555	83	51	8	0	0	1	34
Pedestrians					4			21			42	
Lane Width (m)					3.6			3.6			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			2			4	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.70						0.70	0.70		0.70	0.70	0.70
vC, conflicting volume	2680			21			722	2729	25	2674	2688	722
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1260			21			0	1330	25	1252	1271	0
tC, single (s)	4.1			4.3			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			92	92	100	100	99	95
cM capacity (veh/h)	370			1517			640	103	1030	79	111	737

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	440	852	852	509	59	35
Volume Left	14	0	0	0	51	0
Volume Right	0	0	0	83	0	34
cSH	1517	1700	1700	1700	374	635
Volume to Capacity	0.01	0.50	0.50	0.30	0.16	0.06
Queue Length 95th (m)	0.2	0.0	0.0	0.0	4.4	1.4
Control Delay (s)	0.3	0.0	0.0	0.0	16.4	11.0
Lane LOS	A				C	B
Approach Delay (s)	0.1				16.4	11.0
Approach LOS					C	B

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	54.1%	ICU Level of Service		A
Analysis Period (min)	15			

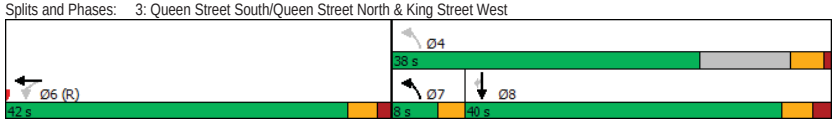
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	1906	0	150	0	0	0	607	389
Future Volume (vph)	0	0	0	214	1906	0	150	0	0	0	607	389
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99							0.97
Frt												0.850
Flt Protected					0.995		0.950					
Satd. Flow (prot)	0	0	0	0	6388	0	1770	0	0	0	1881	1599
Flt Permitted					0.995		0.104					
Satd. Flow (perm)	0	0	0	0	6353	0	194	0	0	0	1881	1552
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												58
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		52.4			121.6			93.7			65.9	
Travel Time (s)		3.8			8.8			6.7			4.7	
Confl. Peds. (#/hr)	43		22	22		43	14		20	20		14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	2%	2%	2%	2%	2%	2%	1%	1%
Adj. Flow (vph)	0	0	0	233	2072	0	163	0	0	0	660	423
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2305	0	163	0	0	0	660	423
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Minimum Split (s)				28.5	28.5		8.0				28.5	28.5
Total Split (s)				42.0	42.0		8.0				40.0	40.0
Total Split (%)				46.7%	46.7%		8.9%				44.4%	44.4%
Maximum Green (s)				37.2	37.2		5.0				34.5	34.5
Yellow Time (s)				3.3	3.3		3.0				3.3	3.3
All-Red Time (s)				1.5	1.5		0.0				2.2	2.2
Lost Time Adjust (s)					-1.3		0.0				-1.8	-1.8
Total Lost Time (s)					3.5		3.0				3.7	3.7
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0						10.0	10.0
Flash Dont Walk (s)				8.0	8.0						11.0	11.0
Pedestrian Calls (#/hr)				0	0						0	0
Act Effct Green (s)					38.5		45.0				36.3	36.3
Actuated g/C Ratio					0.43		0.50				0.40	0.40
v/c Ratio					0.85		0.89				0.87	0.64

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Minimum Split (s)	25.5
Total Split (s)	38.0
Total Split (%)	42%
Maximum Green (s)	33.5
Yellow Time (s)	3.5
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	10.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					26.9		60.4				39.0	23.8
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					26.9		60.4				39.0	23.8
LOS					C		E				D	C
Approach Delay					26.9			60.4			33.1	
Approach LOS					C			E			C	
Queue Length 50th (m)					106.3		15.6				107.9	52.2
Queue Length 95th (m)					123.1		#49.9				#173.9	85.3
Internal Link Dist (m)		28.4			97.6			69.7			41.9	
Turn Bay Length (m)												
Base Capacity (vph)					2717		184				758	660
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					0.85		0.89				0.87	0.64

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 75			
Control Type: Pretimed			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 30.3		Intersection LOS: C	
Intersection Capacity Utilization 82.8%		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: 3: Queen Street South/Queen Street North & King Street West

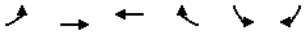


Lane Group	Ø4
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

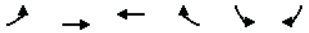
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	1906	0	150	0	0	0	607	389
Future Volume (vph)	0	0	0	214	1906	0	150	0	0	0	607	389
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5		3.0				3.7	3.7
Lane Util. Factor					0.86		1.00				1.00	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.97
Flpb, ped/bikes					0.99		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.99		0.95				1.00	1.00
Satd. Flow (prot)					6353		1770				1881	1552
Flt Permitted					0.99		0.10				1.00	1.00
Satd. Flow (perm)					6353		194				1881	1552
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	233	2072	0	163	0	0	0	660	423
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	35
Lane Group Flow (vph)	0	0	0	0	2305	0	163	0	0	0	660	388
Confl. Peds. (#/hr)	43		22	22		43	14		20	20		14
Heavy Vehicles (%)	2%	2%	2%	0%	2%	2%	2%	2%	2%	2%	1%	1%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Actuated Green, G (s)					37.2		43.5				34.5	34.5
Effective Green, g (s)					38.5		43.5				36.3	36.3
Actuated g/C Ratio					0.43		0.48				0.40	0.40
Clearance Time (s)					4.8		3.0				5.5	5.5
Lane Grp Cap (vph)					2717		181				758	625
v/s Ratio Prot							c0.05				0.35	
v/s Ratio Perm					0.36		c0.39					0.25
v/c Ratio					0.85		0.90				0.87	0.62
Uniform Delay, d1					23.1		19.5				24.7	21.4
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					3.5		44.9				13.1	4.6
Delay (s)					26.7		64.4				37.8	26.0
Level of Service					C		E				D	C
Approach Delay (s)		0.0			26.7			64.4			33.2	
Approach LOS		A			C			E			C	

Intersection Summary				
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.2	
Intersection Capacity Utilization	82.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2429	28	0	12
Future Volume (vph)	0	0	2429	28	0	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	0.86	1.00	1.00
Frt			0.998			0.865
Flt Protected						
Satd. Flow (prot)	0	0	6395	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	6395	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		60.5	49.0		43.5	
Travel Time (s)		4.4	3.5		3.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2640	30	0	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2670	0	0	13
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

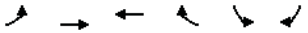
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.7%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2429	28	0	12
Future Volume (Veh/h)	0	0	2429	28	0	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2640	30	0	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			101			
pX, platoon unblocked	0.69				0.69	0.69
vC, conflicting volume	2670				2655	675
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1184				1162	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 %	100				100	98
cM capacity (veh/h)	405				130	750

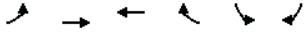
Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	754	754	754	407	13
Volume Left	0	0	0	0	0
Volume Right	0	0	0	30	13
cSH	1700	1700	1700	1700	750
Volume to Capacity	0.44	0.44	0.44	0.24	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.4
Control Delay (s)	0.0	0.0	0.0	0.0	9.9
Lane LOS					A
Approach Delay (s)	0.0				9.9
Approach LOS					A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		45.7%	ICU Level of Service A
Analysis Period (min)		15	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	2445	0	0	12
Future Volume (vph)	0	0	2445	0	0	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.86	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	0	6408	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	6408	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		49.0	52.4		47.7	
Travel Time (s)		3.5	3.8		3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2658	0	0	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	2658	0	0	13
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2445	0	0	12
Future Volume (Veh/h)	0	0	2445	0	0	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2658	0	0	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			52			
pX, platoon unblocked	0.69				0.69	0.69
vC, conflicting volume	2658				2658	664
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1126				1126	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 %	100				100	98
cM capacity (veh/h)	422				136	743

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	664	664	664	664	13
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	13
cSH	1700	1700	1700	1700	743
Volume to Capacity	0.39	0.39	0.39	0.39	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.4
Control Delay (s)	0.0	0.0	0.0	0.0	9.9
Lane LOS					A
Approach Delay (s)	0.0				9.9
Approach LOS					A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		45.4%	ICU Level of Service	A
Analysis Period (min)		15		

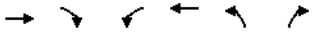
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	49	0	0	947	62
Future Volume (vph)	0	49	0	0	947	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.865			0.991	
Flt Protected						
Satd. Flow (prot)	0	1611	0	0	3507	0
Flt Permitted						
Satd. Flow (perm)	0	1611	0	0	3507	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	53.9			65.9	138.5	
Travel Time (s)	3.9			4.7	10.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	53	0	0	1029	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	53	0	0	1096	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.2%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	49	0	0	947	62
Future Volume (Veh/h)	0	49	0	0	947	62
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	53	0	0	1029	67
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				66		
pX, platoon unblocked						
vC, conflicting volume	1062	548	1096			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1062	548	1096			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	89	100			
cM capacity (veh/h)	218	480	633			

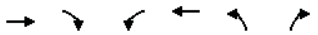
Direction, Lane #	EB 1	SB 1	SB 2
Volume Total	53	686	410
Volume Left	0	0	0
Volume Right	53	0	67
cSH	480	1700	1700
Volume to Capacity	0.11	0.40	0.24
Queue Length 95th (m)	3.0	0.0	0.0
Control Delay (s)	13.4	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.4	0.0	
Approach LOS	B		

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		38.2%	ICU Level of Service A
Analysis Period (min)		15	



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	52	11	32	15	12	23
Future Volume (vph)	52	11	32	15	12	23
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	0.977				0.911	
Flt Protected				0.967	0.983	
Satd. Flow (prot)	1820	0	0	1801	1668	0
Flt Permitted				0.967	0.983	
Satd. Flow (perm)	1820	0	0	1801	1668	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	58.5			77.4	28.6	
Travel Time (s)	4.2			7.0	2.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	12	35	16	13	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	69	0	0	51	38	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.2%			ICU Level of Service A
Analysis Period (min) 15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	52	11	32	15	12	23
Future Volume (Veh/h)	52	11	32	15	12	23
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	12	35	16	13	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)						
pX, platoon unblocked						
vC, conflicting volume			69		149	63
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			69		149	63
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		98	98
cM capacity (veh/h)			1532		824	1002

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	69	51	38
Volume Left	0	35	13
Volume Right	12	0	25
cSH	1700	1532	933
Volume to Capacity	0.04	0.02	0.04
Queue Length 95th (m)	0.0	0.6	1.0
Control Delay (s)	0.0	5.1	9.0
Lane LOS		A	A
Approach Delay (s)	0.0	5.1	9.0
Approach LOS			A

Intersection Summary				
Average Delay		3.8		
Intersection Capacity Utilization		19.2%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	1	14	8	10	14	28	49	28	13	8
Future Volume (vph)	2	4	1	14	8	10	14	28	49	28	13	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.981			0.958			0.927			0.977	
Flt Protected		0.986			0.979			0.992			0.972	
Satd. Flow (prot)	0	1838	0	0	1782	0	0	1685	0	0	1758	0
Flt Permitted		0.986			0.979			0.992			0.972	
Satd. Flow (perm)	0	1838	0	0	1782	0	0	1685	0	0	1758	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			58.5			94.4			96.5	
Travel Time (s)		6.0			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		10	10		7	13		6	6		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	10%	0%
Adj. Flow (vph)	2	4	1	15	9	11	15	30	53	30	14	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	7	0	0	35	0	0	98	0	0	53	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.6%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	4	1	14	8	10	14	28	49	28	13	8
Future Volume (Veh/h)	2	4	1	14	8	10	14	28	49	28	13	8
Sign Control		Stop			Stop			Free			Free	
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)	2	4	1	15	9	11	15	30	53	30	14	9
Pedestrians		13			6			10			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	200	210	42	184	188	70	36			89		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	200	210	42	184	188	70	36			89		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	98	99	99	99			98		
cM capacity (veh/h)	709	659	1015	741	678	988	1571			1512		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	7	35	98	53
Volume Left	2	15	15	30
Volume Right	1	11	53	9
cSH	709	784	1571	1512
Volume to Capacity	0.01	0.04	0.01	0.02
Queue Length 95th (m)	0.2	1.1	0.2	0.5
Control Delay (s)	10.1	9.8	1.2	4.3
Lane LOS	B	A	A	A
Approach Delay (s)	10.1	9.8	1.2	4.3
Approach LOS	B	A		

Intersection Summary				
Average Delay	3.9			
Intersection Capacity Utilization	22.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	360	0	1216	75	0	0	0	0	0	35
Future Volume (vph)	0	0	360	0	1216	75	0	0	0	0	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.865		0.992							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1611	0	1816	0	0	0	0	0	0	1508
Flt Permitted												
Satd. Flow (perm)	0	0	1611	0	1816	0	0	0	0	0	0	1508
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			59.8			102.8			94.4	
Travel Time (s)		8.7			4.3			7.4			6.8	
Confl. Peds. (#/hr)	26		13	13		26	1		5	5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	4%	0%	2%	20%	2%	2%	0%	9%
Adj. Flow (vph)	0	0	391	0	1322	82	0	0	0	0	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	391	0	1404	0	0	0	0	0	0	38
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	Yes
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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary				
Area Type:	Other			
Control Type: Unsignalized				
Intersection Capacity Utilization	79.0%	ICU Level of Service D		
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	360	0	1216	75	0	0	0	0	0	35
Future Volume (Veh/h)	0	0	360	0	1216	75	0	0	0	0	0	35
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	391	0	1322	82	0	0	0	0	0	38
Pedestrians		1			5			13			26	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.73						0.73	0.73		0.73	0.73	0.73
vC, conflicting volume	1430			404			1415	1443	18	1590	1793	1390
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1404			404			1383	1422	18	1623	1903	1349
tC, single (s)	4.1			4.2			7.1	6.7	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.5	4.0	3.4
p0 queue free %	100			100			100	100	100	100	100	70
cM capacity (veh/h)	346			1123			60	89	1056	57	49	126

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	391	1404	38
Volume Left	0	0	0
Volume Right	391	82	38
cSH	1700	1700	126
Volume to Capacity	0.23	0.83	0.30
Queue Length 95th (m)	0.0	0.0	9.3
Control Delay (s)	0.0	0.0	45.3
Lane LOS			E
Approach Delay (s)	0.0	0.0	45.3
Approach LOS			E

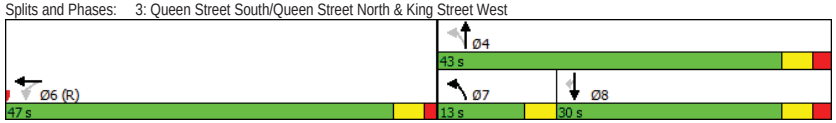
Intersection Summary					
Average Delay	0.9				
Intersection Capacity Utilization	79.0%	ICU Level of Service		D	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	335	0	293	0	0	0	630	640
Future Volume (vph)	0	0	0	82	335	0	293	0	0	0	630	640
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	0.95	1.00
Ped Bike Factor					0.99		0.97					0.87
Frt												0.850
Flt Protected					0.990		0.950					
Satd. Flow (prot)	0	0	0	0	1729	0	1770	1863	0	0	3139	1369
Flt Permitted					0.990		0.190					
Satd. Flow (perm)	0	0	0	0	1717	0	345	1863	0	0	3139	1194
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												288
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	89	364	0	318	0	0	0	685	696
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	453	0	318	0	0	0	685	696
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		9.5	28.5			28.5	28.5
Total Split (s)				47.0	47.0		13.0	43.0			30.0	30.0
Total Split (%)				52.2%	52.2%		14.4%	47.8%			33.3%	33.3%
Maximum Green (s)				42.2	42.2		9.5	37.5			24.5	24.5
Yellow Time (s)				3.3	3.3		3.5	3.3			3.3	3.3
All-Red Time (s)				1.5	1.5		0.0	2.2			2.2	2.2
Lost Time Adjust (s)					0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)					4.8		3.5	5.5			5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0			10.0			10.0	10.0
Flash Dont Walk (s)				8.0	8.0			8.0			8.0	8.0
Pedestrian Calls (#/hr)				0	0			0			0	0
Act Effct Green (s)					42.2		39.5				24.5	24.5
Actuated g/C Ratio					0.47		0.44				0.27	0.27
v/c Ratio					0.56		1.06				0.80	1.30

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					20.6		90.3				39.0	169.5
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					20.6		90.3				39.0	169.5
LOS					C		F				D	F
Approach Delay					20.6			90.3			104.8	
Approach LOS					C			F			F	
Queue Length 50th (m)					57.2		~41.0				60.9	~123.5
Queue Length 95th (m)					87.2		#94.3				#83.5	#192.7
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					805		301				854	534
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					0.56		1.06				0.80	1.30

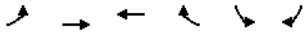
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Pretimed			
Maximum v/c Ratio: 1.30			
Intersection Signal Delay: 84.9		Intersection LOS: F	
Intersection Capacity Utilization 93.6%		ICU Level of Service F	
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: 3: Queen Street South/Queen Street North & King Street West



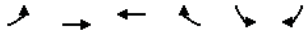
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	335	0	293	0	0	0	630	640
Future Volume (vph)	0	0	0	82	335	0	293	0	0	0	630	640
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.5				5.5	5.5
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.87
Flpb, ped/bikes					0.99		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.99		0.95				1.00	1.00
Satd. Flow (prot)					1717		1763				3139	1194
Flt Permitted					0.99		0.19				1.00	1.00
Satd. Flow (perm)					1717		352				3139	1194
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	364	0	318	0	0	0	685	696
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	210
Lane Group Flow (vph)	0	0	0	0	453	0	318	0	0	0	685	486
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Actuated Green, G (s)					42.2		37.5				24.5	24.5
Effective Green, g (s)					42.2		37.5				24.5	24.5
Actuated g/C Ratio					0.47		0.42				0.27	0.27
Clearance Time (s)					4.8		3.5				5.5	5.5
Lane Grp Cap (vph)					805		295				854	325
v/s Ratio Prot							c0.11				0.22	
v/s Ratio Perm					0.26		0.33					c0.41
v/c Ratio					0.56		1.08				0.80	1.50
Uniform Delay, d1					17.2		21.8				30.5	32.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					2.8		74.7				7.9	239.1
Delay (s)					20.1		96.5				38.3	271.8
Level of Service					C		F				D	F
Approach Delay (s)		0.0			20.1			96.5			156.0	
Approach LOS		A			C			F			F	

Intersection Summary					
HCM 2000 Control Delay	118.6	HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	0.93				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		13.8	
Intersection Capacity Utilization	93.6%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	1276	10	0	16
Future Volume (vph)	0	0	1276	10	0	16
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			0.999			0.865
Flt Protected						
Satd. Flow (prot)	0	0	1861	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	1861	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		59.8	48.5		28.1	
Travel Time (s)		4.3	3.5		2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1387	11	0	17
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1398	0	0	17
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

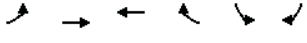
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	1276	10	0	16
Future Volume (Veh/h)	0	0	1276	10	0	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1387	11	0	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			103			
pX, platoon unblocked	0.71				0.71	0.71
vC, conflicting volume	1398				1392	1392
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1356				1348	1348
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	87
cM capacity (veh/h)	360				118	131

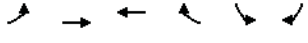
Direction, Lane #	WB 1	SB 1
Volume Total	1398	17
Volume Left	0	0
Volume Right	11	17
cSH	1700	131
Volume to Capacity	0.82	0.13
Queue Length 95th (m)	0.0	3.5
Control Delay (s)	0.0	36.6
Lane LOS		E
Approach Delay (s)	0.0	36.6
Approach LOS		E

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	77.8%	ICU Level of Service	D	
Analysis Period (min)	15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑			↱
Traffic Volume (vph)	0	0	1268	0	0	17
Future Volume (vph)	0	0	1268	0	0	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	0	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	1863	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		48.5	54.2		30.3	
Travel Time (s)		3.5	3.9		2.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1378	0	0	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1378	0	0	18
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑			↱
Traffic Volume (veh/h)	0	0	1268	0	0	17
Future Volume (Veh/h)	0	0	1268	0	0	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1378	0	0	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			54			
pX, platoon unblocked	0.70				0.70	0.70
vC, conflicting volume	1378				1378	1378
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1325				1325	1325
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	86
cM capacity (veh/h)	364				120	133

Direction, Lane #	WB 1	SB 1
Volume Total	1378	18
Volume Left	0	0
Volume Right	0	18
cSH	1700	133
Volume to Capacity	0.81	0.14
Queue Length 95th (m)	0.0	3.6
Control Delay (s)	0.0	36.3
Lane LOS		E
Approach Delay (s)	0.0	36.3
Approach LOS		E

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

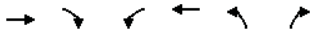
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	30	0	0	1240	42
Future Volume (vph)	0	30	0	0	1240	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91
Frt		0.865			0.995	
Flt Protected						
Satd. Flow (prot)	0	1611	0	0	5060	0
Flt Permitted						
Satd. Flow (perm)	0	1611	0	0	5060	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	61.4			67.5	263.6	
Travel Time (s)	4.4			4.9	19.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	33	0	0	1348	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	33	0	0	1394	0
Enter Blocked Intersection	No	Yes	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	30	0	0	1240	42
Future Volume (Veh/h)	0	30	0	0	1240	42
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	33	0	0	1348	46
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				67		
pX, platoon unblocked						
vC, conflicting volume	1371	472	1394			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1371	472	1394			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	94	100			
cM capacity (veh/h)	137	538	487			

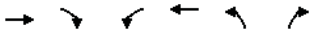
Direction, Lane #	EB 1	SB 1	SB 2	SB 3
Volume Total	33	539	539	316
Volume Left	0	0	0	0
Volume Right	33	0	0	46
cSH	538	1700	1700	1700
Volume to Capacity	0.06	0.32	0.32	0.19
Queue Length 95th (m)	1.6	0.0	0.0	0.0
Control Delay (s)	12.1	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	12.1	0.0		
Approach LOS	B			

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		34.9%	ICU Level of Service	A
Analysis Period (min)		15		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	76	4	11	16	16	32
Future Volume (vph)	76	4	11	16	16	32
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				0.909	
Flt Protected				0.980	0.984	
Satd. Flow (prot)	1852	0	0	1825	1666	0
Flt Permitted				0.980	0.984	
Satd. Flow (perm)	1852	0	0	1825	1666	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	58.5			57.6	42.7	
Travel Time (s)	4.2			5.2	3.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	4	12	17	17	35
Shared Lane Traffic (%)						
Lane Group Flow (vph)	87	0	0	29	52	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	18.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	76	4	11	16	16	32
Future Volume (Veh/h)	76	4	11	16	16	32
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	4	12	17	17	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			87		126	85
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			87		126	85
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	96
cM capacity (veh/h)			1509		862	974

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	87	29	52
Volume Left	0	12	17
Volume Right	4	0	35
cSH	1700	1509	934
Volume to Capacity	0.05	0.01	0.06
Queue Length 95th (m)	0.0	0.2	1.4
Control Delay (s)	0.0	3.1	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.1	9.1
Approach LOS			A

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	18.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	2	6	64	4	27	2	34	40	8	44	5
Future Volume (vph)	12	2	6	64	4	27	2	34	40	8	44	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.957			0.962			0.929			0.989	
Flt Protected		0.971			0.967			0.999			0.993	
Satd. Flow (prot)	0	1766	0	0	1767	0	0	1673	0	0	1732	0
Flt Permitted		0.971			0.967			0.999			0.993	
Satd. Flow (perm)	0	1766	0	0	1767	0	0	1673	0	0	1732	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			58.5			94.4			96.5	
Travel Time (s)		6.0			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		10	10		7	13		6	6		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	10%	0%
Adj. Flow (vph)	13	2	7	70	4	29	2	37	43	9	48	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	103	0	0	82	0	0	62	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	2	6	64	4	27	2	34	40	8	44	5
Future Volume (Veh/h)	12	2	6	64	4	27	2	34	40	8	44	5
Sign Control		Stop			Stop			Free			Free	
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)	13	2	7	70	4	29	2	37	43	9	48	5
Pedestrians		13			6			10			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	182	172	74	155	152	72	66			86		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	182	172	74	155	152	72	66			86		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	99	91	99	97	100			99		
cM capacity (veh/h)	732	709	975	784	726	986	1532			1515		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	103	82	62
Volume Left	13	70	2	9
Volume Right	7	29	43	5
cSH	792	829	1532	1515
Volume to Capacity	0.03	0.12	0.00	0.01
Queue Length 95th (m)	0.7	3.4	0.0	0.1
Control Delay (s)	9.7	10.0	0.2	1.1
Lane LOS	A	A	A	A
Approach Delay (s)	9.7	10.0	0.2	1.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	4.9			
Intersection Capacity Utilization	24.1%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	221	0	1077	77	0	0	0	0	0	107
Future Volume (vph)	0	0	221	0	1077	77	0	0	0	0	0	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt			0.865		0.991							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1611	0	1815	0	0	0	0	0	0	1508
Flt Permitted												
Satd. Flow (perm)	0	0	1611	0	1815	0	0	0	0	0	0	1508
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			59.8			102.8			94.4	
Travel Time (s)		8.7			4.3			7.4			6.8	
Confl. Peds. (#/hr)	26		13	13		26	1		5	5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	4%	0%	2%	20%	2%	2%	0%	9%
Adj. Flow (vph)	0	0	240	0	1171	84	0	0	0	0	0	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	240	0	1255	0	0	0	0	0	0	116
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	Yes
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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	221	0	1077	77	0	0	0	0	0	107
Future Volume (Veh/h)	0	0	221	0	1077	77	0	0	0	0	0	107
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	240	0	1171	84	0	0	0	0	0	116
Pedestrians		1			5			13			26	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	1281			253			1343	1294	18	1364	1492	1240
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1266			253			1332	1280	18	1355	1491	1222
tC, single (s)	4.1			4.2			7.1	6.7	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.5	4.0	3.4
p0 queue free %	100			100			100	100	100	100	100	40
cM capacity (veh/h)	503			1278			48	140	1056	114	114	194

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	240	1255	116
Volume Left	0	0	0
Volume Right	240	84	116
cSH	1700	1700	194
Volume to Capacity	0.14	0.74	0.60
Queue Length 95th (m)	0.0	0.0	26.7
Control Delay (s)	0.0	0.0	48.1
Lane LOS			E
Approach Delay (s)	0.0	0.0	48.1
Approach LOS			E

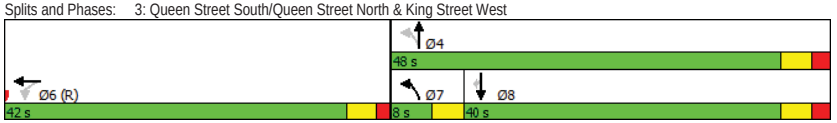
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	219	295	0	216	0	0	0	812	654
Future Volume (vph)	0	0	0	219	295	0	216	0	0	0	812	654
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	0.95	1.00
Ped Bike Factor					0.98		0.98					0.87
Frt												0.850
Flt Protected					0.979		0.950					
Satd. Flow (prot)	0	0	0	0	1713	0	1770	1863	0	0	3139	1369
Flt Permitted					0.979		0.175					
Satd. Flow (perm)	0	0	0	0	1687	0	321	1863	0	0	3139	1194
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												300
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	238	321	0	235	0	0	0	883	711
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	559	0	235	0	0	0	883	711
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		8.0	28.5			28.5	28.5
Total Split (s)				42.0	42.0		8.0	48.0			40.0	40.0
Total Split (%)				46.7%	46.7%		8.9%	53.3%			44.4%	44.4%
Maximum Green (s)				37.2	37.2		4.5	42.5			34.5	34.5
Yellow Time (s)				3.3	3.3		3.5	3.3			3.3	3.3
All-Red Time (s)				1.5	1.5		0.0	2.2			2.2	2.2
Lost Time Adjust (s)					0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)					4.8		3.5	5.5			5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0			10.0			10.0	10.0
Flash Dont Walk (s)				8.0	8.0			8.0			8.0	8.0
Pedestrian Calls (#/hr)				0	0			0			0	0
Act Effct Green (s)					37.2		44.5				34.5	34.5
Actuated g/C Ratio					0.41		0.49				0.38	0.38
v/c Ratio					0.80		1.02				0.73	1.11

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					33.8		85.8				28.2	87.0
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					33.8		85.8				28.2	87.0
LOS					C		F				C	F
Approach Delay					33.8			85.8			54.4	
Approach LOS					C			F			D	
Queue Length 50th (m)					86.9		~24.6				71.2	~112.6
Queue Length 95th (m)					#143.9		#65.9				94.4	#182.3
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					697		231				1203	642
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					0.80		1.02				0.73	1.11

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Pretimed			
Maximum v/c Ratio: 1.11			
Intersection Signal Delay: 52.7		Intersection LOS: D	
Intersection Capacity Utilization 95.6%		ICU Level of Service F	
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: 3: Queen Street South/Queen Street North & King Street West

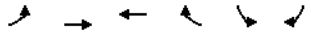


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	219	295	0	216	0	0	0	812	654
Future Volume (vph)	0	0	0	219	295	0	216	0	0	0	812	654
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.5				5.5	5.5
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.87
Flpb, ped/bikes					0.98		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.98		0.95				1.00	1.00
Satd. Flow (prot)					1687		1766				3139	1194
Flt Permitted					0.98		0.18				1.00	1.00
Satd. Flow (perm)					1687		326				3139	1194
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	238	321	0	235	0	0	0	883	711
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	185
Lane Group Flow (vph)	0	0	0	0	559	0	235	0	0	0	883	526
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Actuated Green, G (s)					37.2		42.5				34.5	34.5
Effective Green, g (s)					37.2		42.5				34.5	34.5
Actuated g/C Ratio					0.41		0.47				0.38	0.38
Clearance Time (s)					4.8		3.5				5.5	5.5
Lane Grp Cap (vph)					697		225				1203	457
v/s Ratio Prot							c0.05				0.28	
v/s Ratio Perm					0.33		0.44					c0.44
v/c Ratio					0.80		1.04				0.73	1.15
Uniform Delay, d1					23.2		22.9				23.8	27.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					9.5		72.1				4.0	90.5
Delay (s)					32.6		95.0				27.8	118.2
Level of Service					C		F				C	F
Approach Delay (s)		0.0			32.6			95.0			68.1	
Approach LOS		A			C			F			E	

Intersection Summary				
HCM 2000 Control Delay	62.5	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	95.6%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	1145	30	0	9
Future Volume (vph)	0	0	1145	30	0	9
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			0.865
Flt Protected						
Satd. Flow (prot)	0	0	1857	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	1857	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		59.8	48.5		28.1	
Travel Time (s)		4.3	3.5		2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1245	33	0	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1278	0	0	10
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

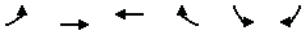
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 72.1%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	1145	30	0	9
Future Volume (Veh/h)	0	0	1145	30	0	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1245	33	0	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			103			
pX, platoon unblocked	0.93				0.93	0.93
vC, conflicting volume	1278				1262	1262
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1260				1242	1242
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	95
cM capacity (veh/h)	511				178	197

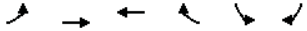
Direction, Lane #	WB 1	SB 1
Volume Total	1278	10
Volume Left	0	0
Volume Right	33	10
cSH	1700	197
Volume to Capacity	0.75	0.05
Queue Length 95th (m)	0.0	1.3
Control Delay (s)	0.0	24.2
Lane LOS		C
Approach Delay (s)	0.0	24.2
Approach LOS		C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	1165	0	0	9
Future Volume (vph)	0	0	1165	0	0	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	0	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	1863	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		48.5	54.2		30.3	
Travel Time (s)		3.5	3.9		2.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1266	0	0	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1266	0	0	10
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		



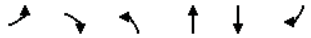
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑			↱
Traffic Volume (veh/h)	0	0	1165	0	0	9
Future Volume (Veh/h)	0	0	1165	0	0	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1266	0	0	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			54			
pX, platoon unblocked	0.92				0.92	0.92
vC, conflicting volume	1266				1266	1266
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1246				1246	1246
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	95
cM capacity (veh/h)	515				177	195

Direction, Lane #	WB 1	SB 1
Volume Total	1266	10
Volume Left	0	0
Volume Right	0	10
cSH	1700	195
Volume to Capacity	0.74	0.05
Queue Length 95th (m)	0.0	1.3
Control Delay (s)	0.0	24.4
Lane LOS		C
Approach Delay (s)	0.0	24.4
Approach LOS		C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱			↑↑↑↱	
Traffic Volume (vph)	0	45	0	0	1421	47
Future Volume (vph)	0	45	0	0	1421	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91
Frt		0.865			0.995	
Flt Protected						
Satd. Flow (prot)	0	1611	0	0	5060	0
Flt Permitted						
Satd. Flow (perm)	0	1611	0	0	5060	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	61.4			67.5	263.6	
Travel Time (s)	4.4			4.9	19.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	49	0	0	1545	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	49	0	0	1596	0
Enter Blocked Intersection	No	Yes	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

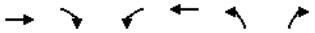
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	45	0	0	1421	47
Future Volume (Veh/h)	0	45	0	0	1421	47
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	0	0	1545	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				67		
pX, platoon unblocked						
vC, conflicting volume	1570	540	1596			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1570	540	1596			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	101	486	407			

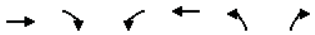
Direction, Lane #	EB 1	SB 1	SB 2	SB 3
Volume Total	49	618	618	360
Volume Left	0	0	0	0
Volume Right	49	0	0	51
cSH	486	1700	1700	1700
Volume to Capacity	0.10	0.36	0.36	0.21
Queue Length 95th (m)	2.7	0.0	0.0	0.0
Control Delay (s)	13.2	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	13.2	0.0		
Approach LOS	B			

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	52	11	34	169	10	19
Future Volume (vph)	52	11	34	169	10	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
Frt	0.977				0.911	
Flt Protected				0.992	0.983	
Satd. Flow (prot)	1820	0	0	1848	1668	0
Flt Permitted				0.992	0.983	
Satd. Flow (perm)	1820	0	0	1848	1668	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	58.5			57.6	42.7	
Travel Time (s)	4.2			5.2	3.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	12	37	184	11	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	69	0	0	221	32	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
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		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	52	11	34	169	10	19
Future Volume (Veh/h)	52	11	34	169	10	19
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	12	37	184	11	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			69		321	63
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			69		321	63
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		98	98
cM capacity (veh/h)			1532		656	1002

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	69	221	32
Volume Left	0	37	11
Volume Right	12	0	21
cSH	1700	1532	848
Volume to Capacity	0.04	0.02	0.04
Queue Length 95th (m)	0.0	0.6	0.9
Control Delay (s)	0.0	1.4	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	1.4	9.4
Approach LOS			A

Intersection Summary			
Average Delay		1.9	
Intersection Capacity Utilization	27.4%	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)	1	7	0	12	2	13	5	38	46	9	13	0
Future Volume (vph)	1	7	0	12	2	13	5	38	46	9	13	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
Ped Bike Factor												
Frt					0.935			0.930				
Flt Protected		0.994			0.978			0.997			0.980	
Satd. Flow (prot)	0	1889	0	0	1737	0	0	1676	0	0	1759	0
Flt Permitted		0.994			0.978			0.997			0.980	
Satd. Flow (perm)	0	1889	0	0	1737	0	0	1676	0	0	1759	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			58.5			94.4			96.5	
Travel Time (s)		6.0			5.3			8.5			8.7	
Confl. Peds. (#/hr)	7		10	10		7	13		6	6		13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	10%	0%
Adj. Flow (vph)	1	8	0	13	2	14	5	41	50	10	14	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	0	29	0	0	96	0	0	24	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.5%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	1	7	0	12	2	13	5	38	46	9	13	0
Future Volume (Veh/h)	1	7	0	12	2	13	5	38	46	9	13	0
Sign Control		Stop			Stop			Free			Free	
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)	1	8	0	13	2	14	5	41	50	10	14	0
Pedestrians		13			6			10			7	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	145	154	37	130	129	79	27			97		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	145	154	37	130	129	79	27			97		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	98	100	99	100			99		
cM capacity (veh/h)	786	723	1021	813	746	976	1583			1502		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	29	96	24
Volume Left	1	13	5	10
Volume Right	0	14	50	0
cSH	729	878	1583	1502
Volume to Capacity	0.01	0.03	0.00	0.01
Queue Length 95th (m)	0.3	0.8	0.1	0.2
Control Delay (s)	10.0	9.2	0.4	3.1
Lane LOS	A	A	A	A
Approach Delay (s)	10.0	9.2	0.4	3.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	20.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↱		↱							↱
Traffic Volume (vph)	0	0	221	0	811	76	0	0	0	0	0	31
Future Volume (vph)	0	0	221	0	811	76	0	0	0	0	0	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												
Frt			0.865		0.988							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1611	0	1811	0	0	0	0	0	0	1508
Flt Permitted												
Satd. Flow (perm)	0	0	1611	0	1811	0	0	0	0	0	0	1508
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		120.8			59.8			102.8			94.4	
Travel Time (s)		8.7			4.3			7.4			6.8	
Confl. Peds. (#/hr)	26		13	13		26	1		5	5		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	4%	0%	2%	20%	2%	2%	0%	9%
Adj. Flow (vph)	0	0	240	0	882	83	0	0	0	0	0	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	240	0	965	0	0	0	0	0	0	34
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	Yes
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			20.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	221	0	811	76	0	0	0	0	0	31
Future Volume (Veh/h)	0	0	221	0	811	76	0	0	0	0	0	31
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	240	0	882	83	0	0	0	0	0	34
Pedestrians		1			5			13			26	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		0			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.96						0.96	0.96		0.96	0.96	0.96
vC, conflicting volume	991			253			972	1004	18	1074	1202	950
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	971			253			950	984	18	1057	1191	928
tC, single (s)	4.1			4.2			7.1	6.7	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.2	3.3	3.5	4.0	3.4
p0 queue free %	100			100			100	100	100	100	100	89
cM capacity (veh/h)	668			1278			201	218	1056	187	178	296

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	240	965	34
Volume Left	0	0	0
Volume Right	240	83	34
cSH	1700	1700	296
Volume to Capacity	0.14	0.57	0.11
Queue Length 95th (m)	0.0	0.0	3.1
Control Delay (s)	0.0	0.0	18.7
Lane LOS			C
Approach Delay (s)	0.0	0.0	18.7
Approach LOS			C

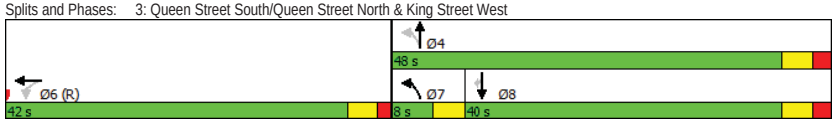
Intersection Summary					
Average Delay	0.5				
Intersection Capacity Utilization	57.8%	ICU Level of Service		B	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	229	0	171	0	0	0	763	492
Future Volume (vph)	0	0	0	214	229	0	171	0	0	0	763	492
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	0.95	1.00
Ped Bike Factor					0.98		0.98					0.87
Frt												0.850
Flt Protected					0.976		0.950					
Satd. Flow (prot)	0	0	0	0	1709	0	1770	1863	0	0	3139	1369
Flt Permitted					0.976		0.199					
Satd. Flow (perm)	0	0	0	0	1679	0	363	1863	0	0	3139	1194
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												384
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	233	249	0	186	0	0	0	829	535
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	482	0	186	0	0	0	829	535
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		8.0	28.5			28.5	28.5
Total Split (s)				42.0	42.0		8.0	48.0			40.0	40.0
Total Split (%)				46.7%	46.7%		8.9%	53.3%			44.4%	44.4%
Maximum Green (s)				37.2	37.2		4.5	42.5			34.5	34.5
Yellow Time (s)				3.3	3.3		3.5	3.3			3.3	3.3
All-Red Time (s)				1.5	1.5		0.0	2.2			2.2	2.2
Lost Time Adjust (s)					0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)					4.8		3.5	5.5			5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0			10.0			10.0	10.0
Flash Dont Walk (s)				8.0	8.0			8.0			8.0	8.0
Pedestrian Calls (#/hr)				0	0			0			0	0
Act Effct Green (s)					37.2		44.5				34.5	34.5
Actuated g/C Ratio					0.41		0.49				0.38	0.38
v/c Ratio					0.70		0.75				0.69	0.77

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					28.2		35.3				26.9	15.7
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					28.2		35.3				26.9	15.7
LOS					C		D				C	B
Approach Delay					28.2			35.3			22.5	
Approach LOS					C			D			C	
Queue Length 50th (m)					70.3		18.3				65.3	20.8
Queue Length 95th (m)					107.3		#40.5				87.0	#72.7
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					693		249				1203	694
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					0.70		0.75				0.69	0.77

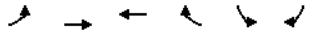
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Pretimed			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 25.0		Intersection LOS: C	
Intersection Capacity Utilization 79.4%		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: 3: Queen Street South/Queen Street North & King Street West



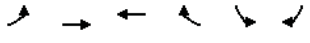
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	229	0	171	0	0	0	763	492
Future Volume (vph)	0	0	0	214	229	0	171	0	0	0	763	492
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.5				5.5	5.5
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.87
Flpb, ped/bikes					0.98		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.98		0.95				1.00	1.00
Satd. Flow (prot)					1680		1764				3139	1194
Flt Permitted					0.98		0.20				1.00	1.00
Satd. Flow (perm)					1680		369				3139	1194
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	233	249	0	186	0	0	0	829	535
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	237
Lane Group Flow (vph)	0	0	0	0	482	0	186	0	0	0	829	298
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Actuated Green, G (s)					37.2		42.5				34.5	34.5
Effective Green, g (s)					37.2		42.5				34.5	34.5
Actuated g/C Ratio					0.41		0.47				0.38	0.38
Clearance Time (s)					4.8		3.5				5.5	5.5
Lane Grp Cap (vph)					694		244				1203	457
v/s Ratio Prot							c0.04				0.26	
v/s Ratio Perm					0.29		c0.32					0.25
v/c Ratio					0.69		0.76				0.69	0.65
Uniform Delay, d1					21.7		18.4				23.3	22.8
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					5.7		19.9				3.2	7.1
Delay (s)					27.4		38.4				26.5	29.9
Level of Service					C		D				C	C
Approach Delay (s)		0.0			27.4			38.4			27.8	
Approach LOS		A			C			D			C	

Intersection Summary					
HCM 2000 Control Delay		28.7	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.76			
Actuated Cycle Length (s)		90.0	Sum of lost time (s)		13.8
Intersection Capacity Utilization		79.4%	ICU Level of Service		D
Analysis Period (min)		15			
c Critical Lane Group					



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	876	28	0	12
Future Volume (vph)	0	0	876	28	0	12
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			0.996			0.865
Flt Protected						
Satd. Flow (prot)	0	0	1855	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	1855	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		59.8	48.5		28.1	
Travel Time (s)		4.3	3.5		2.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	952	30	0	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	982	0	0	13
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

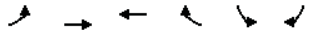
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	876	28	0	12
Future Volume (Veh/h)	0	0	876	28	0	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	952	30	0	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			103			
pX, platoon unblocked	0.95				0.95	0.95
vC, conflicting volume	982				967	967
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	953				937	937
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	96
cM capacity (veh/h)	683				278	304

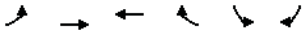
Direction, Lane #	WB 1	SB 1
Volume Total	982	13
Volume Left	0	0
Volume Right	30	13
cSH	1700	304
Volume to Capacity	0.58	0.04
Queue Length 95th (m)	0.0	1.1
Control Delay (s)	0.0	17.4
Lane LOS		C
Approach Delay (s)	0.0	17.4
Approach LOS		C

Intersection Summary					
Average Delay		0.2			
Intersection Capacity Utilization		57.8%	ICU Level of Service		B
Analysis Period (min)		15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑			↱
Traffic Volume (vph)	0	0	892	0	0	12
Future Volume (vph)	0	0	892	0	0	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	0	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	1863	0	0	1611
Link Speed (k/h)		50	50		50	
Link Distance (m)		48.5	54.2		30.3	
Travel Time (s)		3.5	3.9		2.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	970	0	0	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	970	0	0	13
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑			↱
Traffic Volume (veh/h)	0	0	892	0	0	12
Future Volume (Veh/h)	0	0	892	0	0	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	970	0	0	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			54			
pX, platoon unblocked	0.94				0.94	0.94
vC, conflicting volume	970				970	970
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	937				937	937
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	96
cM capacity (veh/h)	688				277	302

Direction, Lane #	WB 1	SB 1
Volume Total	970	13
Volume Left	0	0
Volume Right	0	13
cSH	1700	302
Volume to Capacity	0.57	0.04
Queue Length 95th (m)	0.0	1.1
Control Delay (s)	0.0	17.4
Lane LOS		C
Approach Delay (s)	0.0	17.4
Approach LOS		C

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	56.9%	ICU Level of Service		B
Analysis Period (min)	15			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	49	0	0	1206	62
Future Volume (vph)	0	49	0	0	1206	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91
Frt		0.865			0.993	
Flt Protected						
Satd. Flow (prot)	0	1611	0	0	5050	0
Flt Permitted						
Satd. Flow (perm)	0	1611	0	0	5050	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	61.4			67.5	263.6	
Travel Time (s)	4.4			4.9	19.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	53	0	0	1311	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	53	0	0	1378	0
Enter Blocked Intersection	No	Yes	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	49	0	0	1206	62
Future Volume (Veh/h)	0	49	0	0	1206	62
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	53	0	0	1311	67
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				67		
pX, platoon unblocked						
vC, conflicting volume	1344	470	1378			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1344	470	1378			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	143	540	493			

Direction, Lane #	EB 1	SB 1	SB 2	SB 3
Volume Total	53	524	524	329
Volume Left	0	0	0	0
Volume Right	53	0	0	67
cSH	540	1700	1700	1700
Volume to Capacity	0.10	0.31	0.31	0.19
Queue Length 95th (m)	2.6	0.0	0.0	0.0
Control Delay (s)	12.4	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	12.4	0.0		
Approach LOS	B			

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		34.7%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	52	11	32	15	12	23
Future Volume (vph)	52	11	32	15	12	23
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	0.977				0.911	
Flt Protected				0.967	0.983	
Satd. Flow (prot)	1820	0	0	1801	1668	0
Flt Permitted				0.967	0.983	
Satd. Flow (perm)	1820	0	0	1801	1668	0
Link Speed (k/h)	50			40	50	
Link Distance (m)	58.5			57.6	42.7	
Travel Time (s)	4.2			5.2	3.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	12	35	16	13	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	69	0	0	51	38	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	52	11	32	15	12	23
Future Volume (Veh/h)	52	11	32	15	12	23
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	12	35	16	13	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)						
pX, platoon unblocked						
vC, conflicting volume			69		149	63
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			69		149	63
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		98	98
cM capacity (veh/h)			1532		824	1002

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	69	51	38
Volume Left	0	35	13
Volume Right	12	0	25
cSH	1700	1532	933
Volume to Capacity	0.04	0.02	0.04
Queue Length 95th (m)	0.0	0.6	1.0
Control Delay (s)	0.0	5.1	9.0
Lane LOS		A	A
Approach Delay (s)	0.0	5.1	9.0
Approach LOS			A

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix G

SimTraffic Results

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	3887	3829	3801	3841	3812	3770	3904
Vehs Exited	3906	3843	3810	3837	3783	3760	3863
Starting Vehs	66	65	56	56	47	48	46
Ending Vehs	47	51	47	60	76	58	87
Travel Distance (km)	1416	1397	1393	1417	1408	1380	1442
Travel Time (hr)	78.0	73.9	66.2	79.9	102.7	84.5	93.7
Total Delay (hr)	47.8	43.9	36.5	49.5	72.6	54.9	62.9
Total Stops	2860	2854	2700	2887	2942	2750	3094
Fuel Used (l)	172.9	168.2	162.9	172.3	183.0	170.8	184.5

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	3831	3806	3846	3834
Vehs Exited	3821	3784	3855	3825
Starting Vehs	57	40	63	50
Ending Vehs	67	62	54	58
Travel Distance (km)	1399	1396	1407	1405
Travel Time (hr)	69.9	85.8	67.0	80.2
Total Delay (hr)	39.8	55.9	36.9	50.0
Total Stops	2876	2849	2775	2859
Fuel Used (l)	165.4	174.6	164.5	171.9

Interval #0 Information Seeding

Start Time	6:57
End Time	7:12
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	3887	3829	3801	3841	3812	3770	3904
Vehs Exited	3906	3843	3810	3837	3783	3760	3863
Starting Vehs	66	65	56	56	47	48	46
Ending Vehs	47	51	47	60	76	58	87
Travel Distance (km)	1416	1397	1393	1417	1408	1380	1442
Travel Time (hr)	78.0	73.9	66.2	79.9	102.7	84.5	93.7
Total Delay (hr)	47.8	43.9	36.5	49.5	72.6	54.9	62.9
Total Stops	2860	2854	2700	2887	2942	2750	3094
Fuel Used (l)	172.9	168.2	162.9	172.3	183.0	170.8	184.5

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	3831	3806	3846	3834
Vehs Exited	3821	3784	3855	3825
Starting Vehs	57	40	63	50
Ending Vehs	67	62	54	58
Travel Distance (km)	1399	1396	1407	1405
Travel Time (hr)	69.9	85.8	67.0	80.2
Total Delay (hr)	39.8	55.9	36.9	50.0
Total Stops	2876	2849	2775	2859
Fuel Used (l)	165.4	174.6	164.5	171.9

Intersection: 1: Ray Street North & Market Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.9	10.6	5.1	8.7
Average Queue (m)	2.0	5.5	0.3	0.7
95th Queue (m)	8.0	12.4	3.1	4.7
Link Distance (m)	74.6	39.7	65.6	87.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Ray Street South/Ray Street North & King Street West

Movement	WB	WB	WB	WB	NB	SB
Directions Served	LT	T	T	TR	LT	TR
Maximum Queue (m)	19.7	15.9	14.2	8.6	27.8	20.8
Average Queue (m)	3.2	1.4	1.1	0.4	11.0	7.7
95th Queue (m)	12.8	8.2	7.1	4.2	21.7	17.2
Link Distance (m)	19.8	19.8	19.8	19.8	96.8	65.6
Upstream Blk Time (%)	0	0	0	0		
Queuing Penalty (veh)	1	0	0	0		
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Queen Street South/Queen Street North & King Street West

Movement	WB	WB	WB	WB	NB	SB	SB
Directions Served	LT	T	T	T	L	T	R
Maximum Queue (m)	128.3	123.0	92.8	64.5	64.9	54.1	50.5
Average Queue (m)	118.0	98.3	59.9	27.0	32.5	42.9	35.7
95th Queue (m)	131.9	125.8	89.9	52.8	56.2	50.5	50.2
Link Distance (m)	114.4	114.4	114.4	114.4	88.1	36.6	36.6
Upstream Blk Time (%)	17	2	0		0	59	11
Queuing Penalty (veh)	0	0	0		0	245	47
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: King Street West & Driveway A

Movement	WB	WB	WB	WB	SB
Directions Served	T	T	T	TR	R
Maximum Queue (m)	9.4	9.9	5.0	3.3	10.7
Average Queue (m)	0.4	0.5	0.2	0.1	3.7
95th Queue (m)	4.4	4.8	3.1	2.5	11.1
Link Distance (m)	31.4	31.4	31.4	31.4	8.9
Upstream Blk Time (%)					3
Queuing Penalty (veh)					0
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: King Street West & Driveway B

Movement	WB	WB	WB	WB	SB
Directions Served	T	T	T	T	R
Maximum Queue (m)	11.4	16.7	12.9	8.1	11.0
Average Queue (m)	0.6	1.1	0.6	0.5	3.8
95th Queue (m)	5.5	8.5	5.7	4.5	11.0
Link Distance (m)	30.5	30.5	30.5	30.5	10.3
Upstream Blk Time (%)		0			3
Queuing Penalty (veh)		0			0
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Queen Street North & Driveway C

Movement	EB	SB	SB
Directions Served	R	T	TR
Maximum Queue (m)	19.1	119.4	108.1
Average Queue (m)	6.8	63.3	34.8
95th Queue (m)	15.8	110.9	88.0
Link Distance (m)	48.6	254.2	254.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Driveway D & Market Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	4.5	18.6
Average Queue (m)	0.2	7.2
95th Queue (m)	2.1	15.1
Link Distance (m)	49.8	33.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 294

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	3993	4034	4016	3953	3853	3886	3973
Vehs Exited	3988	4037	4006	3945	3868	3888	3950
Starting Vehs	84	87	72	89	88	83	73
Ending Vehs	89	84	82	97	73	81	96
Travel Distance (km)	1397	1383	1399	1372	1335	1365	1378
Travel Time (hr)	336.9	240.5	260.6	267.1	322.0	287.4	289.5
Total Delay (hr)	306.9	210.5	230.4	237.4	293.3	257.9	259.8
Total Stops	3763	3713	3759	3710	3524	3675	3695
Fuel Used (l)	388.5	307.3	320.4	326.1	371.8	335.1	344.5

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	4053	3828	3980	3956
Vehs Exited	4059	3850	3991	3958
Starting Vehs	83	90	84	83
Ending Vehs	77	68	73	78
Travel Distance (km)	1411	1336	1393	1377
Travel Time (hr)	294.4	320.5	265.9	288.5
Total Delay (hr)	264.0	291.7	235.8	258.8
Total Stops	3711	3464	3749	3676
Fuel Used (l)	357.2	361.3	325.2	343.7

Interval #0 Information Seeding

Start Time	6:57
End Time	7:12
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	3993	4034	4016	3953	3853	3886	3973
Vehs Exited	3988	4037	4006	3945	3868	3888	3950
Starting Vehs	84	87	72	89	88	83	73
Ending Vehs	89	84	82	97	73	81	96
Travel Distance (km)	1397	1383	1399	1372	1335	1365	1378
Travel Time (hr)	336.9	240.5	260.6	267.1	322.0	287.4	289.5
Total Delay (hr)	306.9	210.5	230.4	237.4	293.3	257.9	259.8
Total Stops	3763	3713	3759	3710	3524	3675	3695
Fuel Used (l)	388.5	307.3	320.4	326.1	371.8	335.1	344.5

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	4053	3828	3980	3956
Vehs Exited	4059	3850	3991	3958
Starting Vehs	83	90	84	83
Ending Vehs	77	68	73	78
Travel Distance (km)	1411	1336	1393	1377
Travel Time (hr)	294.4	320.5	265.9	288.5
Total Delay (hr)	264.0	291.7	235.8	258.8
Total Stops	3711	3464	3749	3676
Fuel Used (l)	357.2	361.3	325.2	343.7

Intersection: 1: Ray Street North & Market Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	10.5	17.1	0.9	4.4
Average Queue (m)	4.2	8.8	0.0	0.3
95th Queue (m)	11.4	13.7	0.9	2.7
Link Distance (m)	67.7	39.7	65.5	87.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Ray Street South/Ray Street North & King Street West

Movement	WB	WB	WB	WB	NB	SB
Directions Served	LT	T	T	TR	LT	TR
Maximum Queue (m)	7.2	2.2	8.1	5.5	24.2	29.1
Average Queue (m)	0.3	0.1	0.5	0.2	9.7	12.9
95th Queue (m)	3.6	1.4	3.8	2.7	19.9	22.8
Link Distance (m)	19.8	19.8	19.8	19.8	96.8	65.5
Upstream Blk Time (%)	0		0	0		
Queuing Penalty (veh)	0		0	0		
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Queen Street South/Queen Street North & King Street West

Movement	WB	WB	WB	WB	NB	SB	SB
Directions Served	LT	T	T	T	L	T	R
Maximum Queue (m)	130.5	127.4	99.8	66.0	40.8	49.2	48.2
Average Queue (m)	120.1	104.5	63.6	30.8	20.0	42.1	38.9
95th Queue (m)	130.3	130.6	91.8	57.0	36.2	45.3	49.5
Link Distance (m)	114.4	114.4	114.4	114.4	88.1	37.8	37.8
Upstream Blk Time (%)	23	4	0			68	17
Queuing Penalty (veh)	0	0	0			391	96
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: King Street West & Driveway A

Movement	WB	WB	WB	WB	SB
Directions Served	T	T	T	TR	R
Maximum Queue (m)	3.1	3.3	6.1	1.4	11.2
Average Queue (m)	0.1	0.1	0.2	0.0	2.4
95th Queue (m)	2.2	2.0	3.1	1.4	9.1
Link Distance (m)	30.3	30.3	30.3	30.3	17.2
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: King Street West & Driveway B

Movement	WB	WB	WB	WB	SB
Directions Served	T	T	T	T	R
Maximum Queue (m)	8.2	10.2	9.2	4.1	9.1
Average Queue (m)	0.5	0.5	0.4	0.1	2.3
95th Queue (m)	4.8	4.9	4.5	2.0	8.5
Link Distance (m)	32.2	32.2	32.2	32.2	10.8
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Queen Street North & Driveway C

Movement	EB	SB	SB
Directions Served	R	T	TR
Maximum Queue (m)	46.0	171.2	170.6
Average Queue (m)	42.2	161.6	161.3
95th Queue (m)	45.5	166.2	165.6
Link Distance (m)	43.2	156.0	156.0
Upstream Blk Time (%)	98	77	63
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Driveway D & Market Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	10.4	11.7
Average Queue (m)	0.7	5.4
95th Queue (m)	4.8	12.6
Link Distance (m)	73.8	21.9
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 487

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	3563	3534	3552	3525	3508	3469	3632
Vehs Exited	3563	3536	3566	3523	3507	3447	3634
Starting Vehs	54	50	64	53	55	46	60
Ending Vehs	54	48	50	55	56	68	58
Travel Distance (km)	1287	1274	1285	1276	1266	1251	1326
Travel Time (hr)	61.0	60.0	62.2	57.7	58.5	59.6	63.8
Total Delay (hr)	33.1	32.6	34.5	30.2	31.2	32.6	35.1
Total Stops	2762	2711	2812	2620	2675	2748	2867
Fuel Used (l)	153.7	152.6	155.7	150.4	150.9	149.1	160.0

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	3545	3584	3541	3545
Vehs Exited	3540	3580	3543	3545
Starting Vehs	46	62	56	51
Ending Vehs	51	66	54	52
Travel Distance (km)	1276	1302	1285	1283
Travel Time (hr)	63.9	60.7	59.5	60.7
Total Delay (hr)	36.2	32.6	31.7	33.0
Total Stops	2803	2738	2787	2751
Fuel Used (l)	156.3	155.5	152.8	153.7

Interval #0 Information Seeding

Start Time	6:57
End Time	7:12
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	3563	3534	3552	3525	3508	3469	3632
Vehs Exited	3563	3536	3566	3523	3507	3447	3634
Starting Vehs	54	50	64	53	55	46	60
Ending Vehs	54	48	50	55	56	68	58
Travel Distance (km)	1287	1274	1285	1276	1266	1251	1326
Travel Time (hr)	61.0	60.0	62.2	57.7	58.5	59.6	63.8
Total Delay (hr)	33.1	32.6	34.5	30.2	31.2	32.6	35.1
Total Stops	2762	2711	2812	2620	2675	2748	2867
Fuel Used (l)	153.7	152.6	155.7	150.4	150.9	149.1	160.0

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	3545	3584	3541	3545
Vehs Exited	3540	3580	3543	3545
Starting Vehs	46	62	56	51
Ending Vehs	51	66	54	52
Travel Distance (km)	1276	1302	1285	1283
Travel Time (hr)	63.9	60.7	59.5	60.7
Total Delay (hr)	36.2	32.6	31.7	33.0
Total Stops	2803	2738	2787	2751
Fuel Used (l)	156.3	155.5	152.8	153.7

Intersection: 1: Ray Street North & Market Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.5	10.8	0.9	4.4
Average Queue (m)	1.9	5.2	0.0	0.2
95th Queue (m)	7.7	12.2	0.9	2.2
Link Distance (m)	71.0	39.8	65.5	87.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Ray Street South/Ray Street North & King Street West

Movement	WB	WB	WB	WB	NB	SB
Directions Served	LT	T	T	TR	LT	TR
Maximum Queue (m)	14.0	10.3	7.0	9.4	23.3	13.7
Average Queue (m)	1.0	0.6	0.4	0.4	9.6	6.3
95th Queue (m)	7.3	5.2	3.5	4.2	18.5	14.4
Link Distance (m)	19.8	19.8	19.8	19.8	96.8	65.5
Upstream Blk Time (%)	0	0	0	0		
Queuing Penalty (veh)	0	0	0	0		
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Queen Street South/Queen Street North & King Street West

Movement	WB	WB	WB	WB	NB	SB	SB
Directions Served	LT	T	T	T	L	T	R
Maximum Queue (m)	126.9	121.0	104.4	63.8	54.9	42.6	41.7
Average Queue (m)	118.9	104.7	65.4	29.2	24.6	40.2	30.1
95th Queue (m)	125.8	129.0	92.6	53.5	44.8	43.4	45.4
Link Distance (m)	114.4	114.4	114.4	114.4	88.1	37.7	37.7
Upstream Blk Time (%)	25	4	0			36	4
Queuing Penalty (veh)	0	0	0			180	19
Storage Bay Dist (m)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: King Street West & Driveway A

Movement	WB	WB	WB	WB	SB
Directions Served	T	T	T	TR	R
Maximum Queue (m)	6.7	4.6	6.0	1.9	10.2
Average Queue (m)	0.3	0.2	0.2	0.1	2.6
95th Queue (m)	3.4	3.0	3.1	1.4	9.3
Link Distance (m)	30.9	30.9	30.9	30.9	24.1
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: King Street West & Driveway B

Movement	WB	WB	WB	SB
Directions Served	T	T	T	R
Maximum Queue (m)	2.4	6.7	7.3	8.4
Average Queue (m)	0.1	0.2	0.2	3.1
95th Queue (m)	1.8	3.9	3.2	9.7
Link Distance (m)	31.9	31.9	31.9	26.9
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Queen Street North & Driveway C

Movement	EB	SB	SB
Directions Served	R	T	TR
Maximum Queue (m)	43.5	126.5	95.6
Average Queue (m)	16.4	55.2	10.6
95th Queue (m)	38.2	109.7	55.0
Link Distance (m)	41.2	129.1	129.1
Upstream Blk Time (%)	10	1	0
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Driveway D & Market Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	8.3	13.0
Average Queue (m)	0.9	6.2
95th Queue (m)	5.4	12.9
Link Distance (m)	69.4	18.8
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 200

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	2717	2703	2612	2760	2743	2817	2733
Vehs Exited	2708	2676	2595	2756	2750	2820	2734
Starting Vehs	44	61	57	53	60	62	45
Ending Vehs	53	88	74	57	53	59	44
Travel Distance (km)	992	1000	973	1026	1028	1039	999
Travel Time (hr)	106.5	198.8	266.2	151.9	160.9	157.3	174.7
Total Delay (hr)	83.7	175.8	243.8	128.4	137.3	133.5	151.8
Total Stops	2251	2543	2636	2633	2348	2517	2331
Fuel Used (l)	147.2	213.5	270.1	177.5	178.5	184.4	186.0

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	2799	2807	2846	2757
Vehs Exited	2792	2798	2827	2745
Starting Vehs	67	49	47	55
Ending Vehs	74	58	66	60
Travel Distance (km)	1031	1027	1047	1016
Travel Time (hr)	188.9	130.6	128.0	166.4
Total Delay (hr)	165.1	107.0	103.9	143.0
Total Stops	2627	2280	2427	2461
Fuel Used (l)	209.8	167.1	164.6	189.9

Interval #0 Information Seeding

Start Time	6:57
End Time	7:12
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	2717	2703	2612	2760	2743	2817	2733
Vehs Exited	2708	2676	2595	2756	2750	2820	2734
Starting Vehs	44	61	57	53	60	62	45
Ending Vehs	53	88	74	57	53	59	44
Travel Distance (km)	992	1000	973	1026	1028	1039	999
Travel Time (hr)	106.5	198.8	266.2	151.9	160.9	157.3	174.7
Total Delay (hr)	83.7	175.8	243.8	128.4	137.3	133.5	151.8
Total Stops	2251	2543	2636	2633	2348	2517	2331
Fuel Used (l)	147.2	213.5	270.1	177.5	178.5	184.4	186.0

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	2799	2807	2846	2757
Vehs Exited	2792	2798	2827	2745
Starting Vehs	67	49	47	55
Ending Vehs	74	58	66	60
Travel Distance (km)	1031	1027	1047	1016
Travel Time (hr)	188.9	130.6	128.0	166.4
Total Delay (hr)	165.1	107.0	103.9	143.0
Total Stops	2627	2280	2427	2461
Fuel Used (l)	209.8	167.1	164.6	189.9

Intersection: 1: Ray Street North & Market Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.9	10.0	7.6	10.2
Average Queue (m)	1.6	5.7	0.4	0.9
95th Queue (m)	7.2	12.4	3.6	5.5
Link Distance (m)	74.6	39.7	76.4	87.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Ray Street South/Ray Street North & King Street West

Movement	EB	WB	SB
Directions Served	R	TR	R
Maximum Queue (m)	15.6	21.8	29.5
Average Queue (m)	1.2	4.7	10.3
95th Queue (m)	8.2	16.4	23.6
Link Distance (m)	111.0	9.4	76.4
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		7	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Queen Street South/Queen Street North & King Street West

Movement	WB	NB	SB	SB	SB
Directions Served	LT	L	T	T	R
Maximum Queue (m)	91.0	94.0	55.0	58.2	64.2
Average Queue (m)	50.9	63.2	46.0	40.5	53.2
95th Queue (m)	83.6	106.3	60.4	59.3	59.5
Link Distance (m)	114.3	88.1	49.5	49.5	49.5
Upstream Blk Time (%)		22	8	4	37
Queuing Penalty (veh)		0	35	15	155
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: King Street West & Driveway A

Movement	WB	SB
Directions Served	TR	R
Maximum Queue (m)	32.8	22.6
Average Queue (m)	8.9	6.8
95th Queue (m)	26.3	18.4
Link Distance (m)	31.3	19.7
Upstream Blk Time (%)	0	6
Queuing Penalty (veh)	3	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: King Street West & Driveway B

Movement	WB	SB
Directions Served	T	R
Maximum Queue (m)	60.5	16.0
Average Queue (m)	17.0	4.8
95th Queue (m)	55.5	13.4
Link Distance (m)	30.3	21.1
Upstream Blk Time (%)	6	0
Queuing Penalty (veh)	78	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Queen Street North & Driveway C

Movement	EB	SB	SB	SB
Directions Served	R	T	T	TR
Maximum Queue (m)	16.5	189.8	236.5	251.5
Average Queue (m)	5.4	61.5	111.5	143.1
95th Queue (m)	13.0	207.2	288.9	293.2
Link Distance (m)	45.0	253.9	253.9	253.9
Upstream Blk Time (%)		2	14	16
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Driveway D & Market Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	5.5	15.4
Average Queue (m)	0.3	7.2
95th Queue (m)	2.8	14.1
Link Distance (m)	49.8	33.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 294

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	3052	3083	2998	3090	3110	3016	2989
Vehs Exited	3067	3095	2965	3091	3089	3018	2990
Starting Vehs	51	63	31	55	35	45	59
Ending Vehs	36	51	64	54	56	43	58
Travel Distance (km)	1076	1116	1082	1098	1107	1074	1070
Travel Time (hr)	123.0	211.6	167.1	142.2	160.4	151.3	120.2
Total Delay (hr)	98.5	186.1	142.5	117.2	135.1	126.7	95.9
Total Stops	2495	3035	2764	2615	2751	2506	2466
Fuel Used (l)	163.3	226.4	195.2	174.7	186.2	178.4	160.2

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	3052	3037	3122	3053
Vehs Exited	3048	3038	3118	3053
Starting Vehs	43	54	49	46
Ending Vehs	47	53	53	47
Travel Distance (km)	1099	1056	1114	1089
Travel Time (hr)	150.5	144.7	118.0	148.9
Total Delay (hr)	125.4	120.6	92.7	124.1
Total Stops	2690	2387	2801	2649
Fuel Used (l)	180.4	171.2	167.8	180.4

Interval #0 Information Seeding

Start Time	6:57
End Time	7:12
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	3052	3083	2998	3090	3110	3016	2989
Vehs Exited	3067	3095	2965	3091	3089	3018	2990
Starting Vehs	51	63	31	55	35	45	59
Ending Vehs	36	51	64	54	56	43	58
Travel Distance (km)	1076	1116	1082	1098	1107	1074	1070
Travel Time (hr)	123.0	211.6	167.1	142.2	160.4	151.3	120.2
Total Delay (hr)	98.5	186.1	142.5	117.2	135.1	126.7	95.9
Total Stops	2495	3035	2764	2615	2751	2506	2466
Fuel Used (l)	163.3	226.4	195.2	174.7	186.2	178.4	160.2

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	3052	3037	3122	3053
Vehs Exited	3048	3038	3118	3053
Starting Vehs	43	54	49	46
Ending Vehs	47	53	53	47
Travel Distance (km)	1099	1056	1114	1089
Travel Time (hr)	150.5	144.7	118.0	148.9
Total Delay (hr)	125.4	120.6	92.7	124.1
Total Stops	2690	2387	2801	2649
Fuel Used (l)	180.4	171.2	167.8	180.4

Intersection: 1: Ray Street North & Market Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	10.4	17.5	1.8	5.0
Average Queue (m)	4.3	8.9	0.1	0.2
95th Queue (m)	11.7	14.7	1.3	3.0
Link Distance (m)	74.6	39.7	76.4	87.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Ray Street South/Ray Street North & King Street West

Movement	EB	WB	SB
Directions Served	R	TR	R
Maximum Queue (m)	8.7	20.2	64.0
Average Queue (m)	0.4	3.3	25.1
95th Queue (m)	3.8	13.1	49.7
Link Distance (m)	111.0	9.4	76.4
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		5	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Queen Street South/Queen Street North & King Street West

Movement	WB	NB	SB	SB	SB
Directions Served	LT	L	T	T	R
Maximum Queue (m)	120.7	76.7	57.1	59.4	65.2
Average Queue (m)	73.0	39.8	48.0	44.2	53.8
95th Queue (m)	116.7	75.3	59.9	59.4	61.7
Link Distance (m)	114.3	88.1	49.5	49.5	49.5
Upstream Blk Time (%)	2	5	10	5	35
Queuing Penalty (veh)	0	0	48	25	172
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: King Street West & Driveway A

Movement	WB	SB
Directions Served	TR	R
Maximum Queue (m)	32.6	14.2
Average Queue (m)	7.5	2.7
95th Queue (m)	24.1	10.2
Link Distance (m)	31.3	19.7
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	2	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: King Street West & Driveway B

Movement	WB	SB
Directions Served	T	R
Maximum Queue (m)	56.8	11.9
Average Queue (m)	11.5	2.5
95th Queue (m)	45.5	9.2
Link Distance (m)	30.3	21.1
Upstream Blk Time (%)	4	0
Queuing Penalty (veh)	43	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Queen Street North & Driveway C

Movement	EB	SB	SB	SB
Directions Served	R	T	T	TR
Maximum Queue (m)	19.7	146.1	198.4	213.3
Average Queue (m)	7.2	33.6	70.0	112.0
95th Queue (m)	15.6	122.3	209.3	229.1
Link Distance (m)	45.0	253.9	253.9	253.9
Upstream Blk Time (%)		0	3	3
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Driveway D & Market Street

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (m)	0.8	6.9	12.4
Average Queue (m)	0.0	0.4	5.6
95th Queue (m)	0.8	3.8	12.7
Link Distance (m)	39.7	49.8	33.1
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 296

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	2629	2530	2622	2502	2631	2532	2569
Vehs Exited	2622	2542	2617	2516	2617	2527	2570
Starting Vehs	23	36	33	37	20	30	34
Ending Vehs	30	24	38	23	34	35	33
Travel Distance (km)	924	882	926	876	908	885	881
Travel Time (hr)	41.3	44.0	38.0	35.2	35.6	35.4	36.4
Total Delay (hr)	20.2	23.7	16.9	15.1	14.9	15.0	16.1
Total Stops	1718	1742	1669	1604	1552	1576	1640
Fuel Used (l)	102.4	100.6	100.4	94.5	96.8	94.5	95.9

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:12	8:12	8:12	8:12
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	2596	2645	2512	2576
Vehs Exited	2602	2652	2520	2576
Starting Vehs	33	40	37	28
Ending Vehs	27	33	29	28
Travel Distance (km)	905	920	872	898
Travel Time (hr)	39.6	42.6	36.0	38.4
Total Delay (hr)	19.0	21.6	15.9	17.9
Total Stops	1740	1771	1594	1661
Fuel Used (l)	101.2	102.9	95.5	98.5

Interval #0 Information Seeding

Start Time	6:57
End Time	7:12
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	2629	2530	2622	2502	2631	2532	2569
Vehs Exited	2622	2542	2617	2516	2617	2527	2570
Starting Vehs	23	36	33	37	20	30	34
Ending Vehs	30	24	38	23	34	35	33
Travel Distance (km)	924	882	926	876	908	885	881
Travel Time (hr)	41.3	44.0	38.0	35.2	35.6	35.4	36.4
Total Delay (hr)	20.2	23.7	16.9	15.1	14.9	15.0	16.1
Total Stops	1718	1742	1669	1604	1552	1576	1640
Fuel Used (l)	102.4	100.6	100.4	94.5	96.8	94.5	95.9

Interval #1 Information Recording

Start Time	7:12
End Time	8:12
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	2596	2645	2512	2576
Vehs Exited	2602	2652	2520	2576
Starting Vehs	33	40	37	28
Ending Vehs	27	33	29	28
Travel Distance (km)	905	920	872	898
Travel Time (hr)	39.6	42.6	36.0	38.4
Total Delay (hr)	19.0	21.6	15.9	17.9
Total Stops	1740	1771	1594	1661
Fuel Used (l)	101.2	102.9	95.5	98.5

Intersection: 1: Ray Street North & Market Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.9	10.0	2.4	5.4
Average Queue (m)	1.9	5.2	0.1	0.4
95th Queue (m)	7.9	12.2	1.9	3.4
Link Distance (m)	74.6	39.7	76.4	87.8
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Ray Street South/Ray Street North & King Street West

Movement	EB	WB	SB
Directions Served	R	TR	R
Maximum Queue (m)	7.2	14.9	19.6
Average Queue (m)	0.4	1.4	7.0
95th Queue (m)	4.6	7.6	16.3
Link Distance (m)	111.0	9.4	76.4
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		2	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Queen Street South/Queen Street North & King Street West

Movement	WB	NB	SB	SB	SB
Directions Served	LT	L	T	T	R
Maximum Queue (m)	110.5	53.7	57.4	62.1	62.4
Average Queue (m)	61.3	26.2	47.9	44.6	35.0
95th Queue (m)	99.1	46.2	60.0	61.3	72.9
Link Distance (m)	114.3	88.1	49.5	49.5	49.5
Upstream Blk Time (%)	0		10	5	9
Queuing Penalty (veh)	0		43	22	37
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: King Street West & Driveway A

Movement	WB	SB
Directions Served	TR	R
Maximum Queue (m)	20.8	12.2
Average Queue (m)	2.7	3.1
95th Queue (m)	13.2	10.4
Link Distance (m)	31.3	19.7
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	0	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: King Street West & Driveway B

Movement	WB	SB
Directions Served	T	R
Maximum Queue (m)	55.4	11.4
Average Queue (m)	6.8	3.2
95th Queue (m)	34.8	10.1
Link Distance (m)	30.3	21.1
Upstream Blk Time (%)	1	0
Queuing Penalty (veh)	8	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Queen Street North & Driveway C

Movement	EB	SB	SB	SB
Directions Served	R	T	T	TR
Maximum Queue (m)	23.9	55.6	50.1	65.2
Average Queue (m)	7.9	13.6	6.5	12.7
95th Queue (m)	16.9	39.1	30.2	48.0
Link Distance (m)	45.0	253.9	253.9	253.9
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Driveway D & Market Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	9.0	12.5
Average Queue (m)	0.8	6.0
95th Queue (m)	5.4	13.0
Link Distance (m)	49.8	33.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 111

Appendix H

Sensitivity Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00		0.98					0.96
Frt												0.850
Flt Protected					0.998		0.950					
Satd. Flow (prot)	0	0	0	0	5986	0	1770	0	0	0	1652	1369
Flt Permitted					0.998		0.364					
Satd. Flow (perm)	0	0	0	0	5978	0	661	0	0	0	1652	1312
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												22
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Lane Group Flow (vph)	0	0	0	0	2339	0	227	0	0	0	447	459
v/c Ratio					0.88		0.78				0.61	0.78
Control Delay					28.0		42.3				23.7	31.2
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					28.0		42.3				23.7	31.2
Queue Length 50th (m)					109.6		34.0				60.3	65.7
Queue Length 95th (m)					127.5		#76.4				92.6	#119.3
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					2650		292				730	592
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					0.88		0.78				0.61	0.78

Intersection Summary	
Area Type:	Other

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	2070	0	209	0	0	0	411	422
Future Volume (vph)	0	0	0	82	2070	0	209	0	0	0	411	422
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		5.5				5.5	5.5
Lane Util. Factor					0.86		1.00				1.00	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.96
Flpb, ped/bikes					1.00		0.98				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					1.00		0.95				1.00	1.00
Satd. Flow (prot)					5979		1726				1652	1312
Flt Permitted					1.00		0.36				1.00	1.00
Satd. Flow (perm)					5979		661				1652	1312
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	2250	0	227	0	0	0	447	459
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	12
Lane Group Flow (vph)	0	0	0	0	2339	0	227	0	0	0	447	447
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		Perm				NA	Perm
Protected Phases					6						8	
Permitted Phases				6			4					8
Actuated Green, G (s)					39.9		39.8				39.8	39.8
Effective Green, g (s)					39.9		39.8				39.8	39.8
Actuated g/C Ratio					0.44		0.44				0.44	0.44
Clearance Time (s)					4.8		5.5				5.5	5.5
Lane Grp Cap (vph)					2650		292				730	580
v/s Ratio Prot											0.27	
v/s Ratio Perm					0.39		c0.34					0.34
v/c Ratio					0.88		0.78				0.61	0.77
Uniform Delay, d1					22.9		21.3				19.2	21.2
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					4.7		18.2				3.8	9.5
Delay (s)					27.6		39.6				23.0	30.8
Level of Service					C		D				C	C
Approach Delay (s)		0.0			27.6			39.6			26.9	
Approach LOS		A			C			D			C	

Intersection Summary					
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.83				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		10.3	
Intersection Capacity Utilization	85.7%	ICU Level of Service		E	
Analysis Period (min)	15				

c Critical Lane Group

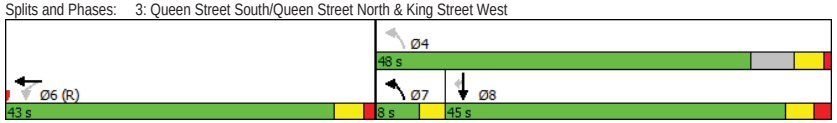
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	2061	0	142	0	0	0	634	520
Future Volume (vph)	0	0	0	169	2061	0	142	0	0	0	634	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00							0.97
Frt												0.850
Flt Protected					0.996		0.950					
Satd. Flow (prot)	0	0	0	0	5968	0	1770	0	0	0	1759	1417
Flt Permitted					0.996		0.102					
Satd. Flow (perm)	0	0	0	0	5949	0	190	0	0	0	1759	1368
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												55
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		52.4			121.6			93.7			66.0	
Travel Time (s)		3.8			8.8			6.7			4.8	
Confl. Peds. (#/hr)	83		27	27		83	31		27	27		31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	10%	9%	2%	2%	2%	2%	2%	8%	14%
Adj. Flow (vph)	0	0	0	184	2240	0	154	0	0	0	689	565
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2424	0	154	0	0	0	689	565
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Minimum Split (s)				29.8	29.8		8.0				29.8	29.8
Total Split (s)				43.0	43.0		8.0				45.0	45.0
Total Split (%)				44.8%	44.8%		8.3%				46.9%	46.9%
Maximum Green (s)				38.2	38.2		5.0				39.5	39.5
Yellow Time (s)				3.3	3.3		3.0				3.3	3.3
All-Red Time (s)				1.5	1.5		0.0				2.2	2.2
Lost Time Adjust (s)					0.0		0.0				0.0	0.0
Total Lost Time (s)					4.8		3.0				5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0							
Flash Dont Walk (s)				8.0	8.0							
Pedestrian Calls (#/hr)				0	0							
Act Effct Green (s)					38.2		50.0				39.5	39.5
Actuated g/C Ratio					0.40		0.52				0.41	0.41
v/c Ratio					1.02		0.85				0.95	0.95

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Minimum Split (s)	25.5
Total Split (s)	48.0
Total Split (%)	50%
Maximum Green (s)	43.5
Yellow Time (s)	3.5
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	10.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					54.4		54.1				52.6	52.7
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					54.4		54.1				52.6	52.7
LOS					D		D				D	D
Approach Delay					54.4			54.1			52.6	
Approach LOS					D			D			D	
Queue Length 50th (m)					~147.5		15.0				127.2	96.2
Queue Length 95th (m)					#171.7		#41.1				#203.0	#168.7
Internal Link Dist (m)		28.4			97.6			69.7			42.0	
Turn Bay Length (m)												
Base Capacity (vph)					2367		181				723	595
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					1.02		0.85				0.95	0.95

Intersection Summary			
Area Type:	Other		
Cycle Length: 96			
Actuated Cycle Length: 96			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 100			
Control Type: Pretimed			
Maximum v/c Ratio: 1.02			
Intersection Signal Delay: 53.8		Intersection LOS: D	
Intersection Capacity Utilization 87.2%		ICU Level of Service E	
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: 3: Queen Street South/Queen Street North & King Street West



Lane Group	Ø4
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	2061	0	142	0	0	0	634	520
Future Volume (vph)	0	0	0	169	2061	0	142	0	0	0	634	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.0				5.5	5.5
Lane Util. Factor					0.86		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					1.00		1.00				1.00	0.85
Flt Protected					1.00		0.95				1.00	1.00
Satd. Flow (prot)					5950		1770				1759	1368
Flt Permitted					1.00		0.10				1.00	1.00
Satd. Flow (perm)					5950		189				1759	1368
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	184	2240	0	154	0	0	0	689	565
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	32
Lane Group Flow (vph)	0	0	0	0	2424	0	154	0	0	0	689	533
Confl. Peds. (#/hr)	83		27	27		83	31		27	27		31
Heavy Vehicles (%)	2%	2%	2%	10%	9%	2%	2%	2%	2%	2%	8%	14%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Actuated Green, G (s)					38.2		48.5				39.5	39.5
Effective Green, g (s)					38.2		48.5				39.5	39.5
Actuated g/C Ratio					0.40		0.51				0.41	0.41
Clearance Time (s)					4.8		3.0				5.5	5.5
Lane Grp Cap (vph)					2367		177				723	562
v/s Ratio Prot							c0.05				c0.39	
v/s Ratio Perm					0.41		0.39					0.39
v/c Ratio					1.02		0.87				0.95	0.95
Uniform Delay, d1					28.9		19.8				27.4	27.3
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					24.9		40.3				23.8	27.0
Delay (s)					53.8		60.1				51.1	54.3
Level of Service					D		E				D	D
Approach Delay (s)		0.0			53.8			60.1			52.5	
Approach LOS		A			D			E			D	

Intersection Summary				
HCM 2000 Control Delay	53.6	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	96.0	Sum of lost time (s)	13.3	
Intersection Capacity Utilization	87.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	1906	0	150	0	0	0	607	389
Future Volume (vph)	0	0	0	214	1906	0	150	0	0	0	607	389
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99							0.97
Frt												0.850
Flt Protected					0.995		0.950					
Satd. Flow (prot)	0	0	0	0	6388	0	1770	0	0	0	1881	1599
Flt Permitted					0.995		0.102					
Satd. Flow (perm)	0	0	0	0	6353	0	190	0	0	0	1881	1552
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												58
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		52.4			121.6			93.7			65.9	
Travel Time (s)		3.8			8.8			6.7			4.7	
Confl. Peds. (#/hr)	43		22	22		43	14		20	20		14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	2%	2%	2%	2%	2%	2%	1%	1%
Adj. Flow (vph)	0	0	0	233	2072	0	163	0	0	0	660	423
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2305	0	163	0	0	0	660	423
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Minimum Split (s)				28.5	28.5		8.0				28.5	28.5
Total Split (s)				40.0	40.0		9.0				41.0	41.0
Total Split (%)				44.4%	44.4%		10.0%				45.6%	45.6%
Maximum Green (s)				35.2	35.2		6.0				35.5	35.5
Yellow Time (s)				3.3	3.3		3.0				3.3	3.3
All-Red Time (s)				1.5	1.5		0.0				2.2	2.2
Lost Time Adjust (s)					-1.3		0.0				-1.8	-1.8
Total Lost Time (s)					3.5		3.0				3.7	3.7
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0						10.0	10.0
Flash Dont Walk (s)				8.0	8.0						11.0	11.0
Pedestrian Calls (#/hr)				0	0						0	0
Act Effct Green (s)					36.5		47.0				37.3	37.3
Actuated g/C Ratio					0.41		0.52				0.41	0.41
v/c Ratio					0.89		0.80				0.85	0.62

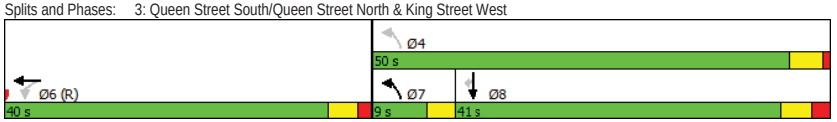
Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	4
Permitted Phases	
Minimum Split (s)	25.5
Total Split (s)	50.0
Total Split (%)	56%
Maximum Green (s)	45.5
Yellow Time (s)	3.5
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	10.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lanes, Volumes, Timings
3: Queen Street South/Queen Street North & King Street West
2027 Total Sat (Sensitivity)
10-21-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					30.7		43.3				36.0	22.7
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					30.7		43.3				36.0	22.7
LOS					C		D				D	C
Approach Delay					30.7			43.3			30.8	
Approach LOS					C			D			C	
Queue Length 50th (m)					111.0		14.8				105.5	51.1
Queue Length 95th (m)					128.5		#45.8				#169.9	83.6
Internal Link Dist (m)		28.4			97.6			69.7			41.9	
Turn Bay Length (m)												
Base Capacity (vph)					2576		204				779	677
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					0.89		0.80				0.85	0.62

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 75			
Control Type: Pretimed			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 31.3		Intersection LOS: C	
Intersection Capacity Utilization 82.8%		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: 3: Queen Street South/Queen Street North & King Street West



Lane Group	Ø4
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	1906	0	150	0	0	0	607	389
Future Volume (vph)	0	0	0	214	1906	0	150	0	0	0	607	389
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5		3.0				3.7	3.7
Lane Util. Factor					0.86		1.00				1.00	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.97
Flpb, ped/bikes					0.99		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.99		0.95				1.00	1.00
Satd. Flow (prot)					6353		1770				1881	1552
Flt Permitted					0.99		0.10				1.00	1.00
Satd. Flow (perm)					6353		189				1881	1552
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	233	2072	0	163	0	0	0	660	423
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	34
Lane Group Flow (vph)	0	0	0	0	2305	0	163	0	0	0	660	389
Confl. Peds. (#/hr)	43		22	22		43	14		20	20		14
Heavy Vehicles (%)	2%	2%	2%	0%	2%	2%	2%	2%	2%	2%	1%	1%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7				8	
Permitted Phases				6			4					8
Actuated Green, G (s)					35.2		45.5				35.5	35.5
Effective Green, g (s)					36.5		45.5				37.3	37.3
Actuated g/C Ratio					0.41		0.51				0.41	0.41
Clearance Time (s)					4.8		3.0				5.5	5.5
Lane Grp Cap (vph)					2576		200				779	643
v/s Ratio Prot							c0.05				0.35	
v/s Ratio Perm					0.36		c0.36					0.25
v/c Ratio					0.89		0.81				0.85	0.61
Uniform Delay, d1					25.0		18.4				23.8	20.6
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					5.3		29.3				11.0	4.2
Delay (s)					30.3		47.7				34.8	24.8
Level of Service					C		D				C	C
Approach Delay (s)		0.0			30.3			47.7			30.9	
Approach LOS		A			C			D			C	

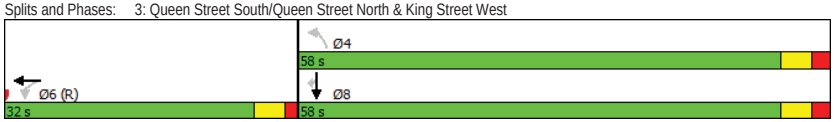
Intersection Summary					
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.87				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		10.2	
Intersection Capacity Utilization	82.8%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					

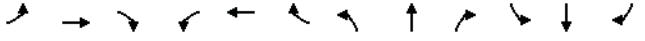
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	335	0	293	0	0	0	630	640
Future Volume (vph)	0	0	0	82	335	0	293	0	0	0	630	640
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor					0.99		0.96					0.87
Frt												0.850
Flt Protected					0.990		0.950					
Satd. Flow (prot)	0	0	0	0	1729	0	1770	0	0	0	3139	1369
Flt Permitted					0.990		0.362					
Satd. Flow (perm)	0	0	0	0	1717	0	649	0	0	0	3139	1194
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												168
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	89	364	0	318	0	0	0	685	696
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	453	0	318	0	0	0	685	696
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		Perm				NA	Perm
Protected Phases					6						8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		28.5				28.5	28.5
Total Split (s)				32.0	32.0		58.0				58.0	58.0
Total Split (%)				35.6%	35.6%		64.4%				64.4%	64.4%
Maximum Green (s)				27.2	27.2		52.5				52.5	52.5
Yellow Time (s)				3.3	3.3		3.3				3.3	3.3
All-Red Time (s)				1.5	1.5		2.2				2.2	2.2
Lost Time Adjust (s)					0.0		0.0				0.0	0.0
Total Lost Time (s)					4.8		5.5				5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				10.0	10.0		10.0				10.0	10.0
Flash Dont Walk (s)				8.0	8.0		8.0				8.0	8.0
Pedestrian Calls (#/hr)				0	0		0				0	0
Act Effct Green (s)					27.2		52.5				52.5	52.5
Actuated g/C Ratio					0.30		0.58				0.58	0.58
v/c Ratio					0.87		0.84				0.37	0.91

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					49.6		38.2				10.7	31.0
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					49.6		38.2				10.7	31.0
LOS					D		D				B	C
Approach Delay					49.6			38.2			21.0	
Approach LOS					D			D			C	
Queue Length 50th (m)					77.8		43.7				32.3	83.5
Queue Length 95th (m)					#132.9		#101.2				43.7	#174.3
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					518		378				1831	766
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					0.87		0.84				0.37	0.91

Intersection Summary		
Area Type:	Other	
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green		
Natural Cycle: 80		
Control Type: Pretimed		
Maximum v/c Ratio: 0.91		
Intersection Signal Delay: 29.5	Intersection LOS: C	
Intersection Capacity Utilization 93.6%	ICU Level of Service F	
Analysis Period (min) 15		
# 95th percentile volume exceeds capacity, queue may be longer.		
Queue shown is maximum after two cycles.		

Splits and Phases: 3: Queen Street South/Queen Street North & King Street West





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	82	335	0	293	0	0	0	630	640
Future Volume (vph)	0	0	0	82	335	0	293	0	0	0	630	640
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		5.5				5.5	5.5
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.87
Flpb, ped/bikes					0.99		0.96				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.99		0.95				1.00	1.00
Satd. Flow (prot)					1717		1703				3139	1194
Flt Permitted					0.99		0.36				1.00	1.00
Satd. Flow (perm)					1717		649				3139	1194
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	364	0	318	0	0	0	685	696
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	70
Lane Group Flow (vph)	0	0	0	0	453	0	318	0	0	0	685	626
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		Perm				NA	Perm
Protected Phases					6						8	
Permitted Phases				6			4					8
Actuated Green, G (s)					27.2		52.5				52.5	52.5
Effective Green, g (s)					27.2		52.5				52.5	52.5
Actuated g/C Ratio					0.30		0.58				0.58	0.58
Clearance Time (s)					4.8		5.5				5.5	5.5
Lane Grp Cap (vph)					518		378				1831	696
v/s Ratio Prot											0.22	
v/s Ratio Perm					0.26		0.49					c0.52
v/c Ratio					0.87		0.84				0.37	0.90
Uniform Delay, d1					29.8		15.3				10.0	16.4
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					18.3		19.8				0.6	16.9
Delay (s)					48.1		35.1				10.6	33.3
Level of Service					D		D				B	C
Approach Delay (s)		0.0			48.1			35.1			22.0	
Approach LOS		A			D			D			C	

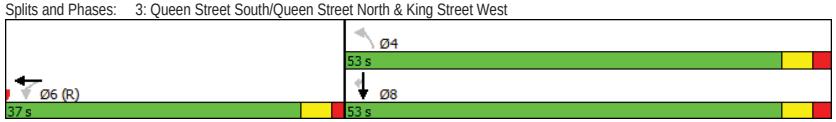
Intersection Summary				
HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.3	
Intersection Capacity Utilization	93.6%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	219	295	0	216	0	0	0	812	654
Future Volume (vph)	0	0	0	219	295	0	216	0	0	0	812	654
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	0.95	1.00
Ped Bike Factor					0.98		0.98					0.87
Frt												0.850
Flt Protected					0.979		0.950					
Satd. Flow (prot)	0	0	0	0	1713	0	1770	0	0	0	3139	1369
Flt Permitted					0.979		0.259					
Satd. Flow (perm)	0	0	0	0	1687	0	471	0	0	0	3139	1194
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												267
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	238	321	0	235	0	0	0	883	711
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	559	0	235	0	0	0	883	711
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		Perm				NA	Perm
Protected Phases					6						8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		28.5				28.5	28.5
Total Split (s)				37.0	37.0		53.0				53.0	53.0
Total Split (%)				41.1%	41.1%		58.9%				58.9%	58.9%
Maximum Green (s)				32.2	32.2		47.5				47.5	47.5
Yellow Time (s)				3.3	3.3		3.3				3.3	3.3
All-Red Time (s)				1.5	1.5		2.2				2.2	2.2
Lost Time Adjust (s)					0.0		0.0				0.0	0.0
Total Lost Time (s)					4.8		5.5				5.5	5.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				10.0	10.0		10.0				10.0	10.0
Flash Dont Walk (s)				8.0	8.0		8.0				8.0	8.0
Pedestrian Calls (#/hr)				0	0		0				0	0
Act Effct Green (s)					32.2		47.5				47.5	47.5
Actuated g/C Ratio					0.36		0.53				0.53	0.53
v/c Ratio					0.93		0.95				0.53	0.94

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					52.0		69.4				15.5	35.4
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					52.0		69.4				15.5	35.4
LOS					D		E				B	D
Approach Delay					52.0			69.4			24.4	
Approach LOS					D			E			C	
Queue Length 50th (m)					96.2		38.1				52.5	80.4
Queue Length 95th (m)					#161.9		#88.2				69.5	#171.3
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					603		248				1656	756
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					0.93		0.95				0.53	0.94

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Pretimed			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 35.3		Intersection LOS: D	
Intersection Capacity Utilization 96.9%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: Queen Street South/Queen Street North & King Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	219	295	0	216	0	0	0	812	654
Future Volume (vph)	0	0	0	219	295	0	216	0	0	0	812	654
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		5.5				5.5	5.5
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.87
Flpb, ped/bikes					0.98		0.98				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.98		0.95				1.00	1.00
Satd. Flow (prot)					1687		1727				3139	1194
Flt Permitted					0.98		0.26				1.00	1.00
Satd. Flow (perm)					1687		471				3139	1194
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	238	321	0	235	0	0	0	883	711
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	126
Lane Group Flow (vph)	0	0	0	0	559	0	235	0	0	0	883	585
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		Perm				NA	Perm
Protected Phases					6						8	
Permitted Phases				6			4					8
Actuated Green, G (s)					32.2		47.5				47.5	47.5
Effective Green, g (s)					32.2		47.5				47.5	47.5
Actuated g/C Ratio					0.36		0.53				0.53	0.53
Clearance Time (s)					4.8		5.5				5.5	5.5
Lane Grp Cap (vph)					603		248				1656	630
v/s Ratio Prot											0.28	
v/s Ratio Perm					0.33		c0.50					0.49
v/c Ratio					0.93		0.95				0.53	0.93
Uniform Delay, d1					27.8		20.1				14.0	19.7
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					22.5		45.1				1.2	22.0
Delay (s)					50.3		65.1				15.2	41.7
Level of Service					D		E				B	D
Approach Delay (s)		0.0			50.3			65.1			27.0	
Approach LOS		A			D			E			C	

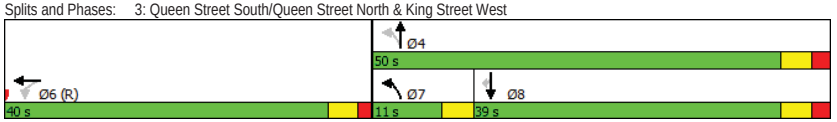
Intersection Summary					
HCM 2000 Control Delay		36.2	HCM 2000 Level of Service		D
HCM 2000 Volume to Capacity ratio		0.94			
Actuated Cycle Length (s)		90.0	Sum of lost time (s)		10.3
Intersection Capacity Utilization		96.9%	ICU Level of Service		F
Analysis Period (min)		15			
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	229	0	171	0	0	0	763	492
Future Volume (vph)	0	0	0	214	229	0	171	0	0	0	763	492
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	0.95	1.00
Ped Bike Factor					0.98		0.98					0.87
Frt												0.850
Flt Protected					0.976		0.950					
Satd. Flow (prot)	0	0	0	0	1709	0	1770	1863	0	0	3139	1369
Flt Permitted					0.976		0.192					
Satd. Flow (perm)	0	0	0	0	1679	0	351	1863	0	0	3139	1194
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												364
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.2			121.6			93.7			67.5	
Travel Time (s)		3.9			8.8			6.7			4.9	
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Adj. Flow (vph)	0	0	0	233	249	0	186	0	0	0	829	535
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	482	0	186	0	0	0	829	535
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			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Minimum Split (s)				28.3	28.3		8.0	28.5			28.5	28.5
Total Split (s)				40.0	40.0		11.0	50.0			39.0	39.0
Total Split (%)				44.4%	44.4%		12.2%	55.6%			43.3%	43.3%
Maximum Green (s)				35.2	35.2		7.5	44.5			33.5	33.5
Yellow Time (s)				3.3	3.3		3.5	3.3			3.3	3.3
All-Red Time (s)				1.5	1.5		0.0	2.2			2.2	2.2
Lost Time Adjust (s)					0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)					4.8		3.5	5.5			5.5	5.5
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Walk Time (s)				10.0	10.0			10.0			10.0	10.0
Flash Dont Walk (s)				8.0	8.0			8.0			8.0	8.0
Pedestrian Calls (#/hr)				0	0			0			0	0
Act Effct Green (s)					35.2		46.5				33.5	33.5
Actuated g/C Ratio					0.39		0.52				0.37	0.37
v/c Ratio					0.73		0.62				0.71	0.80

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					31.4		21.8				28.2	18.3
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					31.4		21.8				28.2	18.3
LOS					C		C				C	B
Approach Delay					31.4			21.8			24.3	
Approach LOS					C			C			C	
Queue Length 50th (m)					73.3		17.4				66.5	26.0
Queue Length 95th (m)					111.8		29.6				88.8	#92.8
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					656		299				1168	672
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					0.73		0.62				0.71	0.80

Intersection Summary		
Area Type:	Other	
Cycle Length: 90		
Actuated Cycle Length: 90		
Offset: 0 (0%), Referenced to phase 2: and 6:WBTL, Start of Green		
Natural Cycle: 70		
Control Type: Pretimed		
Maximum v/c Ratio: 0.80		
Intersection Signal Delay: 25.8	Intersection LOS: C	
Intersection Capacity Utilization 79.4%	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: 3: Queen Street South/Queen Street North & King Street West



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	214	229	0	171	0	0	0	763	492
Future Volume (vph)	0	0	0	214	229	0	171	0	0	0	763	492
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.8		3.5				5.5	5.5
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.87
Flpb, ped/bikes					0.98		1.00				1.00	1.00
Frt					1.00		1.00				1.00	0.85
Flt Protected					0.98		0.95				1.00	1.00
Satd. Flow (prot)					1680		1765				3139	1194
Flt Permitted					0.98		0.19				1.00	1.00
Satd. Flow (perm)					1680		357				3139	1194
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	233	249	0	186	0	0	0	829	535
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	229
Lane Group Flow (vph)	0	0	0	0	482	0	186	0	0	0	829	306
Confl. Peds. (#/hr)	33		24	24		33	44		16	16		44
Heavy Vehicles (%)	2%	2%	2%	8%	9%	2%	2%	2%	2%	2%	15%	18%
Turn Type				Perm	NA		pm+pt				NA	Perm
Protected Phases					6		7	4			8	
Permitted Phases				6			4					8
Actuated Green, G (s)					35.2		44.5				33.5	33.5
Effective Green, g (s)					35.2		44.5				33.5	33.5
Actuated g/C Ratio					0.39		0.49				0.37	0.37
Clearance Time (s)					4.8		3.5				5.5	5.5
Lane Grp Cap (vph)					657		293				1168	444
v/s Ratio Prot							c0.05				c0.26	
v/s Ratio Perm					0.29		0.26					0.26
v/c Ratio					0.73		0.63				0.71	0.69
Uniform Delay, d1					23.4		14.9				24.1	23.9
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					7.1		10.1				3.7	8.5
Delay (s)					30.5		25.0				27.8	32.4
Level of Service					C		C				C	C
Approach Delay (s)		0.0			30.5			25.0			29.6	
Approach LOS		A			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	79.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			