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

Paradigm Transportation Solutions Limited

December 2019

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Project Summary

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December 2019

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

Signatures

Signature

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Executive Summary

Content

A 6-storey student residence 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 student residence and 12-storey hotel. 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.

Conclusions

This study evaluated the impacts associated within the construction of 154 hotel suites and 322 student resident units on the northwest corner of King Street West and Queen Street North. Vehicle access is proposed by four driveway connections to King Street West, Queen Street North and Market Street. The proposed development is projected to generate between 111 – 393 new vehicle trips during the peak hours.

Detailed traffic analysis was conducted for each of the study area intersections under Base Year (2019) traffic conditions and 2026 Background and Total traffic conditions. Based on traffic data and analyses completed, the following is noted:

- **King Street West at Ray Street** – This intersection is expected to see increased delay for the southbound right turn movement and operate at level of service (LOS) E under the weekday AM peak hour. The southbound right turn movement is projected to have a volume to capacity (v/c) ratio of no greater than 0.23 and the 95th percentile queue is not projected to exceed 4 vehicles.

  The number of vehicles making the right-turn from Ray Street North onto King Street West is no more than 60 vehicles during any one peak period. As a result, drivers may seek an alternative route via Napier Street and Locke Street North. Additionally, the poor LOS is likely due to the high westbound through volume on King Street West. The method of analysis employed by the Synchro software program

does not consider gaps which will be available on King Street West due to the downstream traffic signal at Queen Street. The high delay is likely overstated and mitigation measures do not appear appropriate due to these factors.

- **King Street West with Driveway A and Driveway B** - The proposed right in/out driveway connections (Driveway A and Driveway B) to King Street West are projected to operate at LOS E during the weekday AM peak hour for the southbound right turn movement. A v/c ratio no greater than 0.23 and the 95th percentile queue length is not projected to exceed 4 vehicles. As stated previously, Synchro does not consider gaps which will be available on King Street West due to the downstream traffic signal at Queen Street. The high delay is likely overstated and mitigation measures do not appear appropriate due to these factors.
- All other intersections and driveway connections are projected to operate with acceptable levels of delay and queuing with build out of the proposed development.

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.

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;
- 5 Short-term bicycle parking;
- 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 student residence;

- 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:

- The development be approved with no off-site road improvements required to the roadways within the study area;
- City of Hamilton monitor the volumes on King Street West after the opening of the LRT service to determine if further study is warranted;
- The TDM strategies proposed and through design as outlined in Chapter 6 be implemented by the development to encourage sustainable travel modes.
- 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.

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1 Introduction

1.1 Overview

A 6-storey student residence 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.

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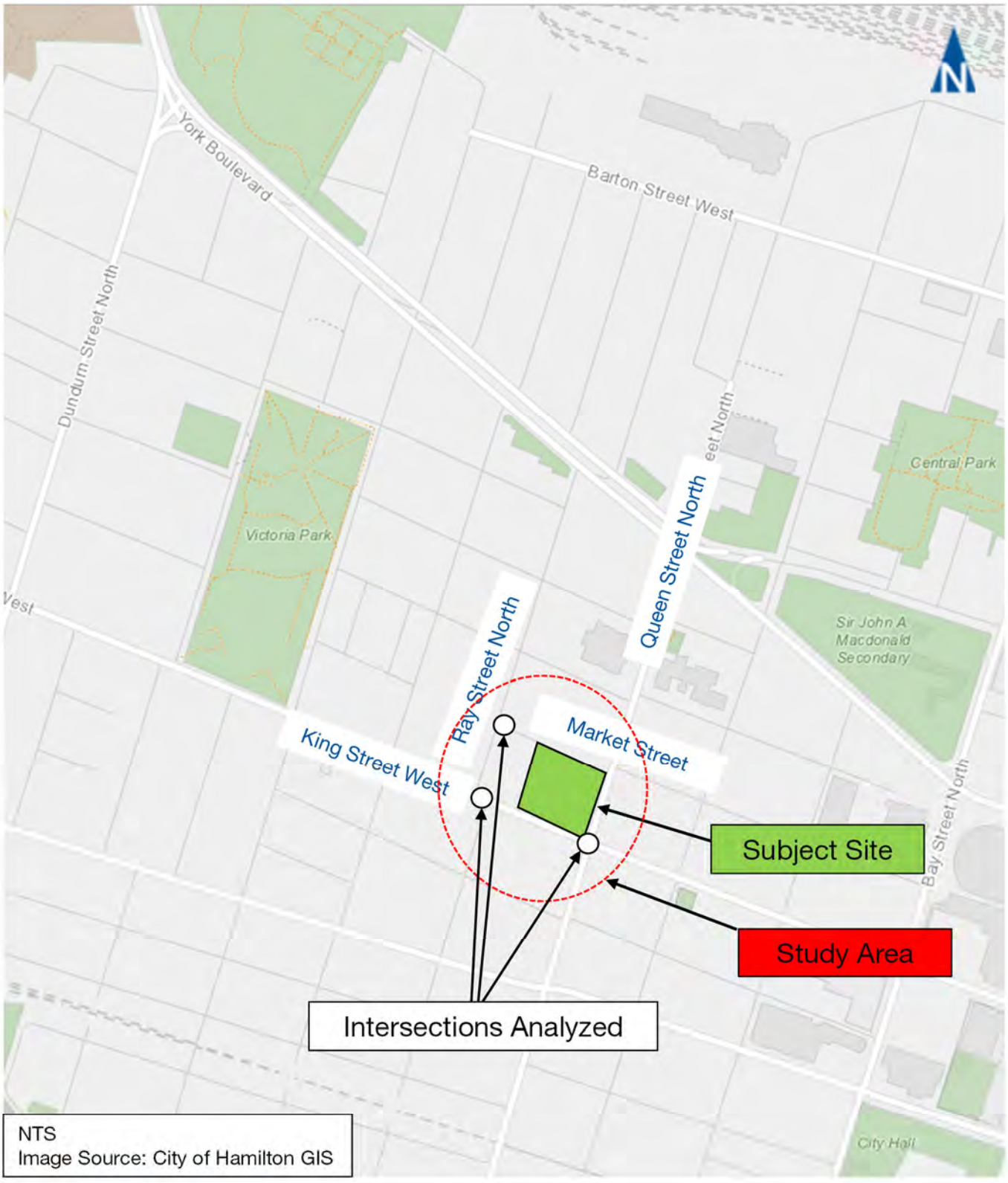
The study includes an analysis of existing traffic conditions, a description of the proposed development, traffic forecasts, recommendations to improve future traffic conditions and strategies to reduce dependency on single occupancy vehicle travel through transportation demand management

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 (2026). **Figure 1.1** illustrates the location of the proposed development.



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Subject Site Location

354 King Street West, Hamilton, Transportation Impact & TDM Study
190322

Figure 1.1

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)

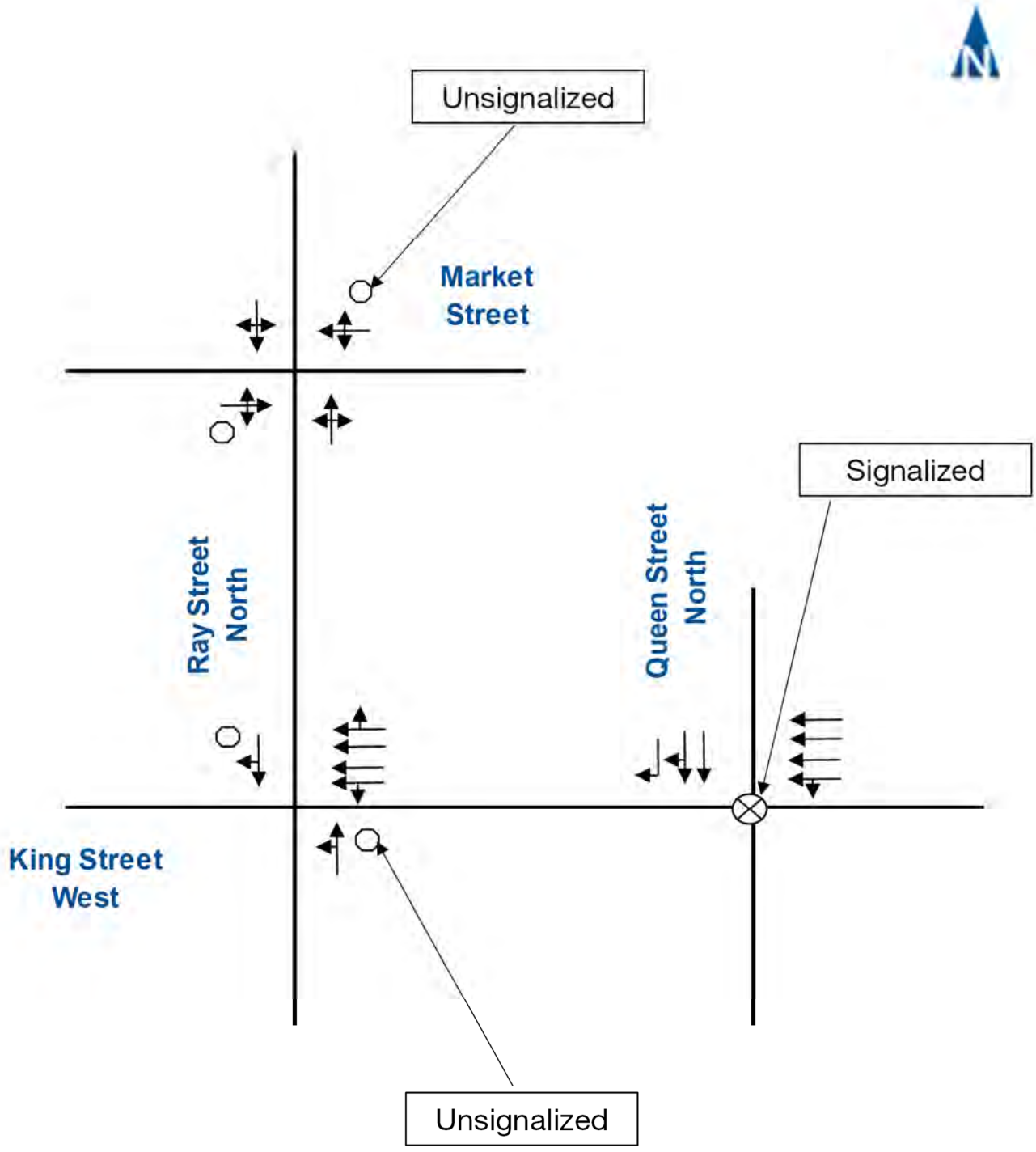
2 Existing Conditions

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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Existing Lane Configuration

2.2 Existing Transit Service

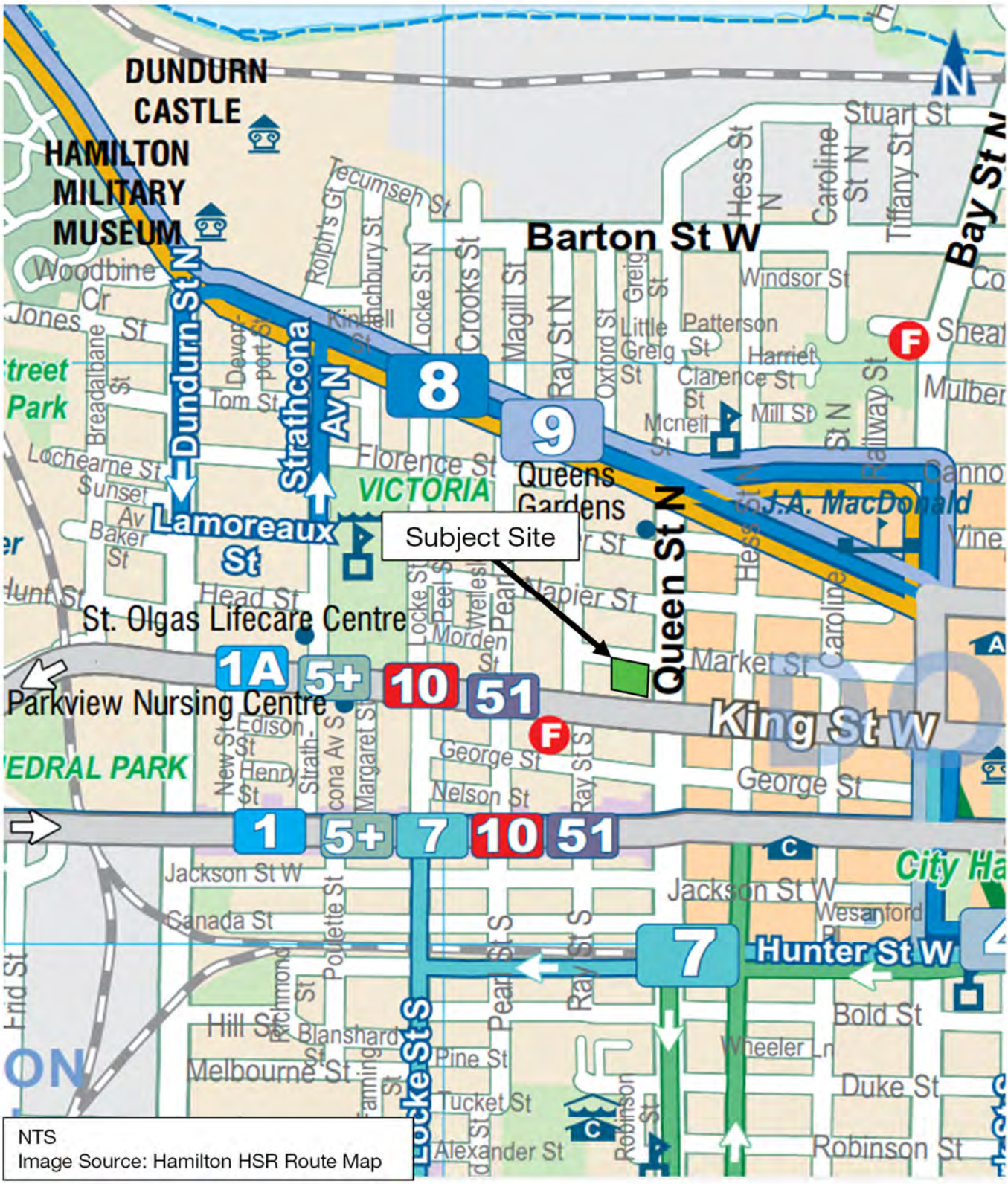
2.2.1 Hamilton Street Railway

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, 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 Light Rail Transit (LRT)

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 LRT 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 LRT is located at the intersection of King Street and Queen Street; directly adjacent to the development.

Figure 2.3 illustrates the proposed LRT 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. This may result in the proposed on-site parking to be utilized for visitors rather than residents.

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.

NTS
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, 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 are able to 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	May 2019	Paradigm
	Saturday	May 2019	Paradigm
King Street West at Queen Street	Weekday	April 2017	City
	Saturday	May 2019	Paradigm
Ray Street North at Market Street	Weekday	May 2019	Paradigm
	Saturday	May 2019	Paradigm

2.4.1 Adjustments

The weekday turning movement count provided by the City of Hamilton at the intersection of King Street West and Queen Street is from 2017. To reflect 2019 volumes, volume balancing has been applied. As there are no major access points between Ray Street and Queen Street, the 2019 weekday turning movement count at the King Street West and Ray Street intersection was used as the reference intersection for adjustments.

Figure 2.6 illustrate the base year traffic volumes with adjustments incorporated as described herein.

NTS
Image Source: SoBi Hamilton Network Map

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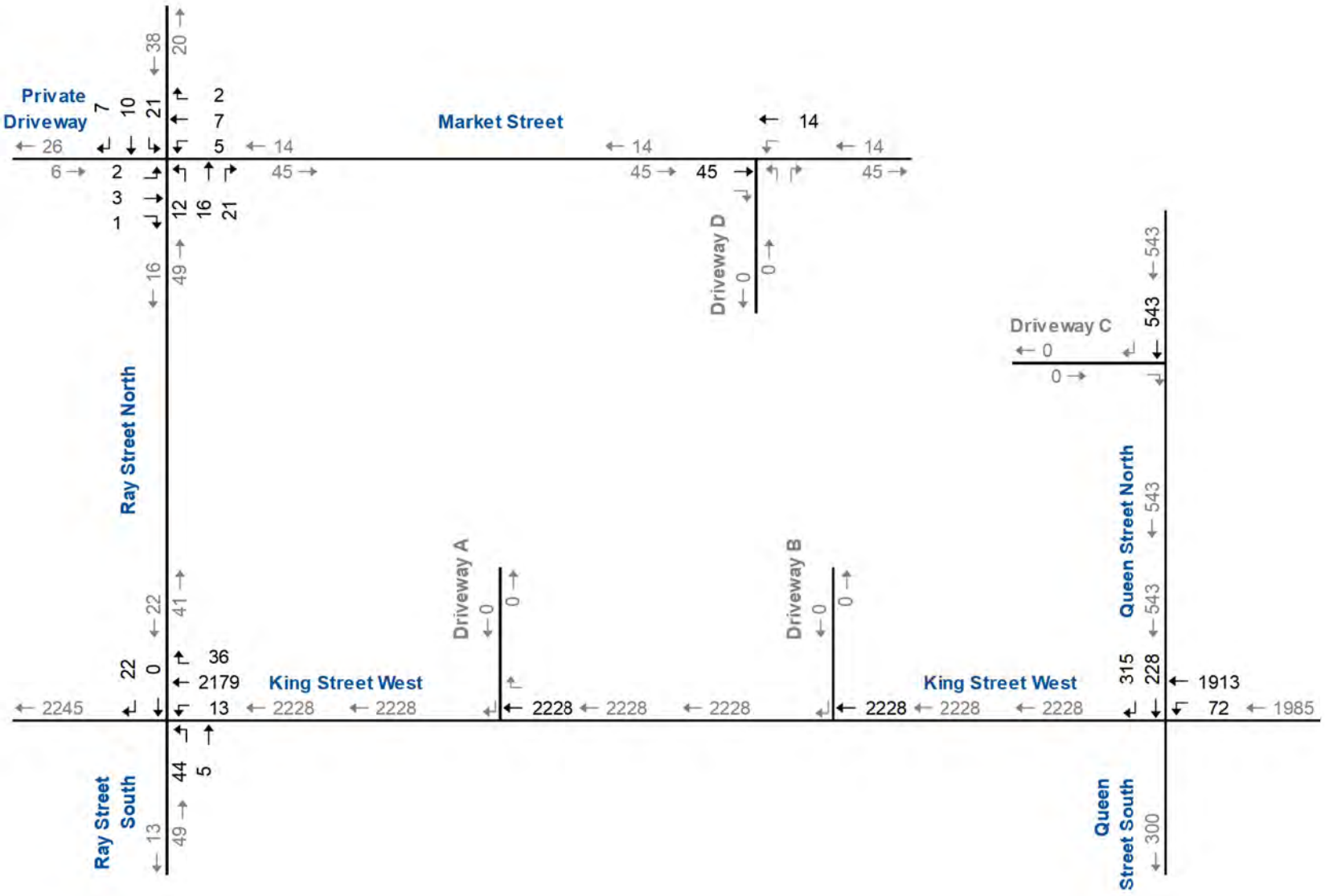
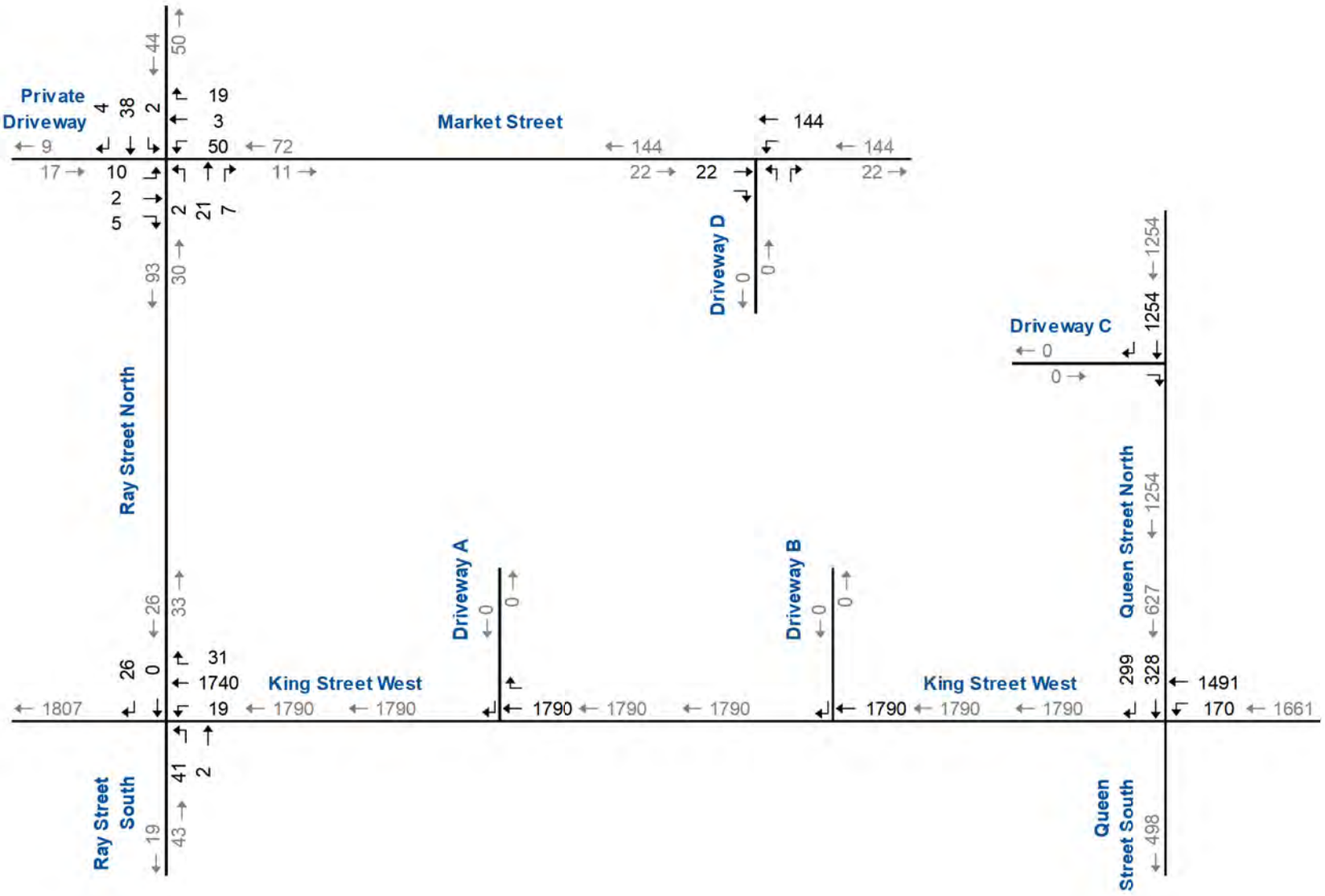
SoBi Hamilton Bikeshare Map



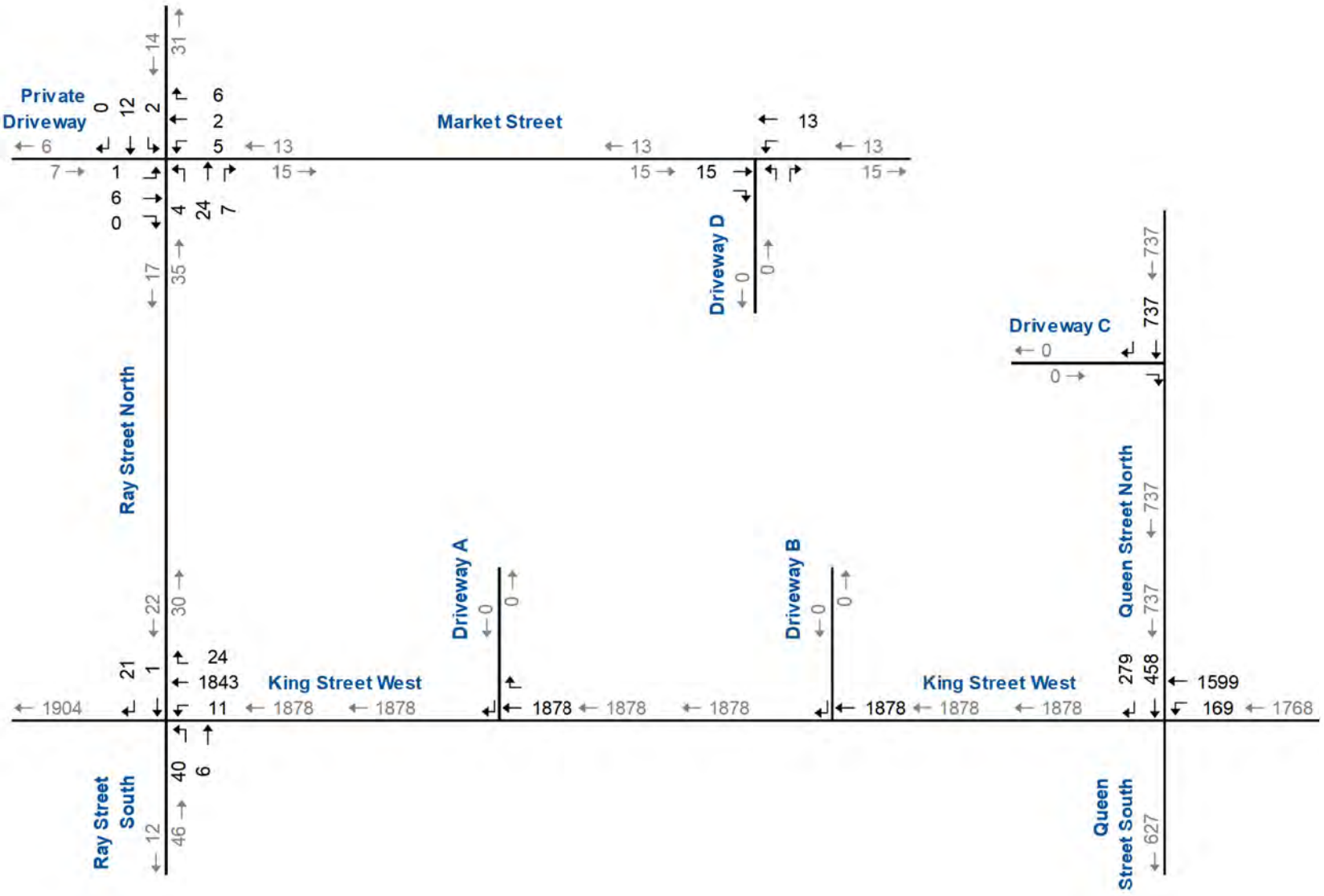
Base Year AM Peak Hour Traffic Volumes

Figure 2.6A



Base Year PM Peak Hour Traffic Volumes

Figure 2.6B



Base Year Sat. Peak Hour Traffic Volumes

3 Development Concept

3.1 Development Description

A 6-storey student residence 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 student residence and 12-storey hotel.

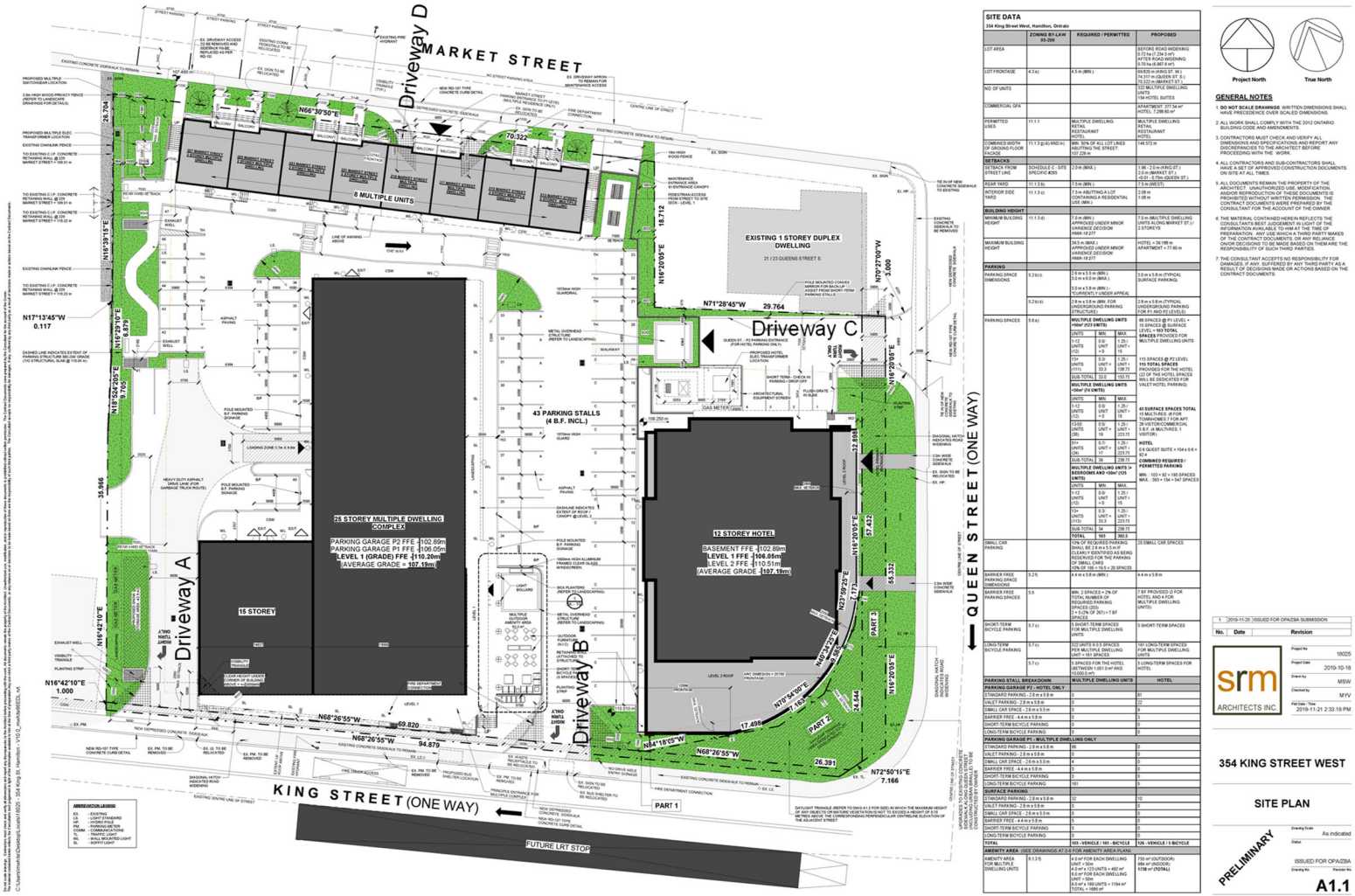
The development program entails a hotel for the eastern building pad and a student residence for the western building pad. A total of 154 hotel suites and 322 student resident units (1,002 beds).

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 student residence's 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.



SITE DATA

354 King Street West, Hamilton, Ontario

	ZONING BY-LAW 80-200	REQUIRED / PERMITTED	PROPOSED
LOT AREA			BEFORE ROAD WIDENING 0.704 ha (7578 ft²) AFTER ROAD WIDENING 0.70 ha (6,967.6 m²)
LOT FRONTAGE	4.3 a)	4.5 m (MIN.)	69.825 m (KING ST. W.) 74.317 m (QUEEN ST. S.) 73.322 m (MARKET ST.)
NO. OF UNITS			322 MULTIPLE DWELLING UNITS 154 HOTEL SUITES
COMMERCIAL GFA			APARTMENT: 377.34 m² HOTEL: 7,288.60 m²
PERMITTED USES	11.1.1	MULTIPLE DWELLING UNITS RESTAURANT HOTEL	MULTIPLE DWELLING UNITS RESTAURANT HOTEL
COMBINED WIDTH OF GROUND FLOOR FACADE	11.1.3 g) ii) AND iv)	MIN. 50% OF ALL LOT LINES ABUTTING THE STREET: 107.229 m	148.57 m
SETBACKS			
SETBACK FROM STREET LINE	SCHEDULE C - SITE SPECIFIC #295	2.0 m (MAX.)	1.96 - 2.0 m (KING ST.) 2.0 m (MARKET ST.) -0.01 - 0.75m (QUEEN ST.)
REAR YARD	11.1.3 b)	7.5 m (MIN.)	7.5 m (WEST)
INTERIOR SIDE YARD	11.1.3 c)	7.5 m ABUTTING A LOT CONTAINING A RESIDENTIAL USE (MIN.)	2.09 m 1.08 m
BUILDING HEIGHT			
MINIMUM BUILDING HEIGHT	11.1.3 d)	7.0 m (MIN.) APPROVED UNDER MINOR VARIENCE DECISION H68-18-277	7.0 m (MULTIPLE DWELLING UNITS ALONG MARKET ST.) / 2 STOREYS
MAXIMUM BUILDING HEIGHT		30.5 m (MAX.) APPROVED UNDER MINOR VARIENCE DECISION H68-18-277	HOTEL = 34.188 m APARTMENT = 77.60 m
PARKING			
PARKING SPACE DIMENSIONS	5.2 b) i)	2.6 m x 5.5 m (MIN.) 3.0 m x 6.0 m (MAX.)	3.0 m x 5.8 m (TYPICAL SURFACE PARKING)
	5.2 b) iii)	3.0 m x 5.8 m (MIN.) *CURRENTLY UNDER APPEAL	
	5.2 b) iii)	2.6 m x 5.5 m (MIN. FOR UNDERGROUND PARKING STRUCTURE)	2.8 m x 5.8 m (TYPICAL UNDERGROUND PARKING FOR P1 AND P2 LEVELS)
PARKING SPACES	5.6 a)	**MULTIPLE DWELLING UNITS >50m² (V2S UNITS)**	88 SPACES @ P1 LEVEL + 15 SPACES @ SURFACE LEVEL = 103 **TOTAL SPACES** PROVIDED FOR MULTIPLE DWELLING UNITS
		MULTIPLE DWELLING UNITS <50m² (S UNITS)	115 SPACES @ P2 LEVEL **115 TOTAL SPACES** PROVIDED FOR THE HOTEL (22 OF THE HOTEL SPACES WILL BE DEDICATED FOR VALET HOTEL PARKING)
		MULTIPLE DWELLING UNITS > BEDROOMS AND <50m² (V2S UNITS)	**43 SURFACE SPACES TOTAL** 10 MULTIPLE @ FOR TOWNHOMES 7 FOR APT. 26 VISITOR/COMMERCIAL 5 B.F. (4 MULTIPLES, 1 VISITOR)
			HOTEL 0.6 GUEST SUITE = 154 x 0.6 = 92.4
			COMBINED REQUIRED / PERMITTED PARKING MIN. - 103 + 92 = 195 SPACES MAX. - 393 + 154 = 547 SPACES
SMALL CAR PARKING		10% OF REQUIRED PARKING SHALL BE 2.6 m x 5.5 m IF CLEARLY IDENTIFIED AS BEING RESERVED FOR THE PARKING OF SMALL CARS 10% OF 195 = 19.5 = 20 SPACES	23 SMALL CAR SPACES
BARRIER FREE PARKING SPACE DIMENSIONS	5.2 f)	4.4 m x 5.8 m (MIN.)	4.4 m x 5.8 m
BARRIER FREE PARKING SPACES	5.5	MIN. 2 SPACES + 2% OF TOTAL NUMBER OF REQUIRED PARKING SPACES (323) 2 + 5-2% OF 357) = 7.97 SPACES	7 SP PROVIDED (3 FOR HOTEL AND 4 FOR MULTIPLE DWELLING UNITS)
SHORT-TERM BICYCLE PARKING	5.7 c)	5 SHORT-TERM SPACES FOR MULTIPLE DWELLING UNITS	5 SHORT-TERM SPACES
LONG-TERM BICYCLE PARKING	5.7 c)	0.5 SPACES PER DWELLING UNIT = 161 SPACES	161 LONG-TERM SPACES FOR MULTIPLE DWELLING UNITS
	5.7 c)	5 SPACES FOR THE HOTEL (BETWEEN 1,001 (I=#1AND 10,000 (I-m²)	5 LONG-TERM SPACES FOR HOTEL
PARKING STALL BREAKDOWN		**MULTIPLE DWELLING UNITS**	**HOTEL**
PARKING GARAGE P2 - HOTEL ONLY			
STANDARD PARKING - 2.6 m x 5.5 m		0	81
VALET PARKING - 2.6 m x 5.5 m		0	22
SMALL CAR SPACE - 2.6 m x 5.5 m		0	9
BARRIER FREE - 4.4 m x 5.8 m		0	3
SHORT-TERM BICYCLE PARKING		0	0
LONG-TERM BICYCLE PARKING		0	0
PARKING GARAGE P1 - MULTIPLE DWELLING ONLY			
STANDARD PARKING - 2.6 m x 5.5 m		88	0
VALET PARKING - 2.6 m x 5.5 m		0	0
SMALL CAR SPACE - 2.6 m x 5.5 m		4	0
BARRIER FREE - 4.4 m x 5.8 m		0	0
SHORT-TERM BICYCLE PARKING		0	0
LONG-TERM BICYCLE PARKING		161	5
SURFACE PARKING			
STANDARD PARKING - 2.6 m x 5.5 m		32	10
VALET PARKING - 2.6 m x 5.5 m		0	0
SMALL CAR SPACE - 2.6 m x 5.5 m		0	0
BARRIER FREE - 4.4 m x 5.8 m		5	0
SHORT-TERM BICYCLE PARKING		5	0
LONG-TERM BICYCLE PARKING		0	0
TOTAL		**163 - VEHICLE / 161 - BICYCLE**	**126 - VEHICLE / 5 BICYCLE**
AMENITY AREA (SEE DRAWINGS A7.3-A7.6 FOR AMENITY AREA PLANS)			
AMENITY AREA FOR MULTIPLE DWELLING UNITS	6.1.3 f)	4.0 m² FOR EACH DWELLING UNIT = 322m 4.0 m² x 123 UNITS = 492 m² 8.0 m² FOR EACH DWELLING UNIT = 199 8.0 m² x 199 UNITS = 1194 m² TOTAL = 1686 m²	700 m² (OUTDOOR) 994 m² (INDOOR) **1738 m² (TOTAL)**

Project North

True North

GENERAL NOTES

1. **DO NOT SCALE DRAWINGS.** WRITTEN DIMENSIONS SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS.
2. ALL WORK SHALL COMPLY WITH THE 2012 ONTARIO BUILDING CODE AND AMENDMENTS.
3. CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND SPECIFICATIONS AND REPORT ANY DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.
4. ALL CONTRACTORS AND SUB-CONTRACTORS SHALL HAVE A SET OF APPROVED CONSTRUCTION DOCUMENTS ON SITE AT ALL TIMES.
5. ALL DOCUMENTS REMAIN THE PROPERTY OF THE CONSULTANT AND MAY NOT BE USED IN PART OR IN WHOLE AND/OR REPRODUCTION OF THESE DOCUMENTS IS PROHIBITED WITHOUT WRITTEN PERMISSION. THE CONTRACT DOCUMENTS WERE PREPARED BY THE CONSULTANT FOR THE ACCOUNT OF THE OWNER.
6. THE MATERIAL CONTAINED HEREIN REFLECTS THE CONSULTANTS BEST JUDGEMENT IN LIGHT OF THE INFORMATION AVAILABLE TO HIM AT THE TIME OF PREPARATION. ANY USE WHICH A THIRD PARTY MAKES OF THE CONTRACT DOCUMENTS, OR ANY RELIANCE ON/OR DECISIONS TO BE MADE BASED ON THEM ARE THE RESPONSIBILITY OF SUCH THIRD PARTIES.
7. THE CONSULTANT ACCEPTS NO RESPONSIBILITY FOR DAMAGES, IF ANY, SUFFERED BY ANY THIRD PARTY AS A RESULT OF DECISIONS MADE OR ACTIONS BASED ON THE CONTRACT DOCUMENTS.

No.	Date	Revision
1	2019-11-20	ISSUED FOR OPA/ZBA SUBMISSION

srm ARCHITECTS INC.

Project No. 18025
Project Date 2019-10-18
Drawn by MSW
Checked by MYV
Plot Date / Time 2019-11-21 2:33:18 PM

354 KING STREET WEST

SITE PLAN

PRELIMINARY

Drawing Scale As indicated
Status ISSUED FOR OPA/ZBA
Drawing No. A1.1
Revision No.

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Site Plan

Figure 3.1

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 has 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 with regard to 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 the future LRT 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 225 – Off-Campus Student Apartment**: An off-campus student apartment is part of an apartment complex that serves college or university students. These properties are generally located nearby and within walking distance of a college campus. Most apartments include student-related amenities such as free high-speed Internet, study lounges, fitness centers, sports courts, and swimming pools. Apartments included in this land use can be furnished or unfurnished and range in size from studio apartments to apartments with four bedrooms. Units typically have washer and dryers in each unit. Most facilities also include security and 24-hour emergency maintenance.
- **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 111 - 393 new trips during the respective peak hours are forecast to be added to the area roadways.

TABLE 3.1: TRIP GENERATION

Land Use	Bedrooms	Units	AM Peak Hour				PM Peak Hour				Sat. Peak Hour			
			Rate	In	Out	Total	Rate	In	Out	Total	Rate	In	Out	Total
Off-Campus Student Apartment (225)	1,002	-	0.16	45	116	**161**	0.30	156	145	**301**	n/a		n/a	
Hotel (310)	-	154	0.47	42	30	**72**	0.60	47	45	**92**	0.72	62	49	**111**
Total Generation				**87**	**146**	**233**		**203**	**190**	**393**		**62**	**49**	**111**

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 trip distribution for the student housing has been developed assuming these trips will either originate or be destined to McMaster University campuses during the weekday peak hours. Both the hotel and student housing distribution take into consideration the future roadway network as described in **Sub-Section 4.1.3.**

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

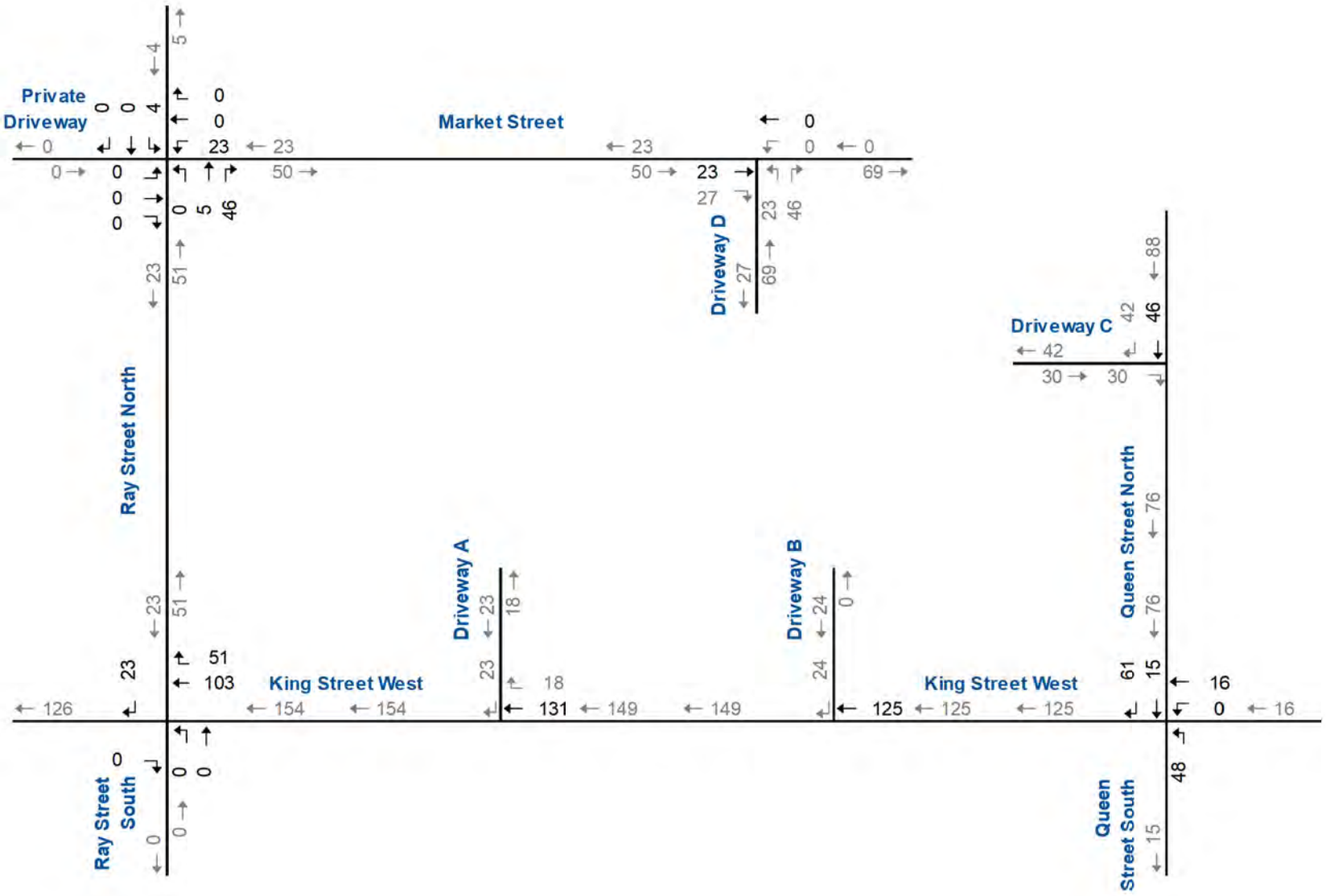
- Inbound vehicles travelling southbound along Highway 403 will utilize the York Boulevard ramp terminal and vehicles travelling northbound along Highway 403 will utilized the Main Street East ramp terminal.
- Outbound vehicles travelling southbound and northbound along Highway 403 will utilize the King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

Table 3.2 summarizes the estimated trip distribution for the development.

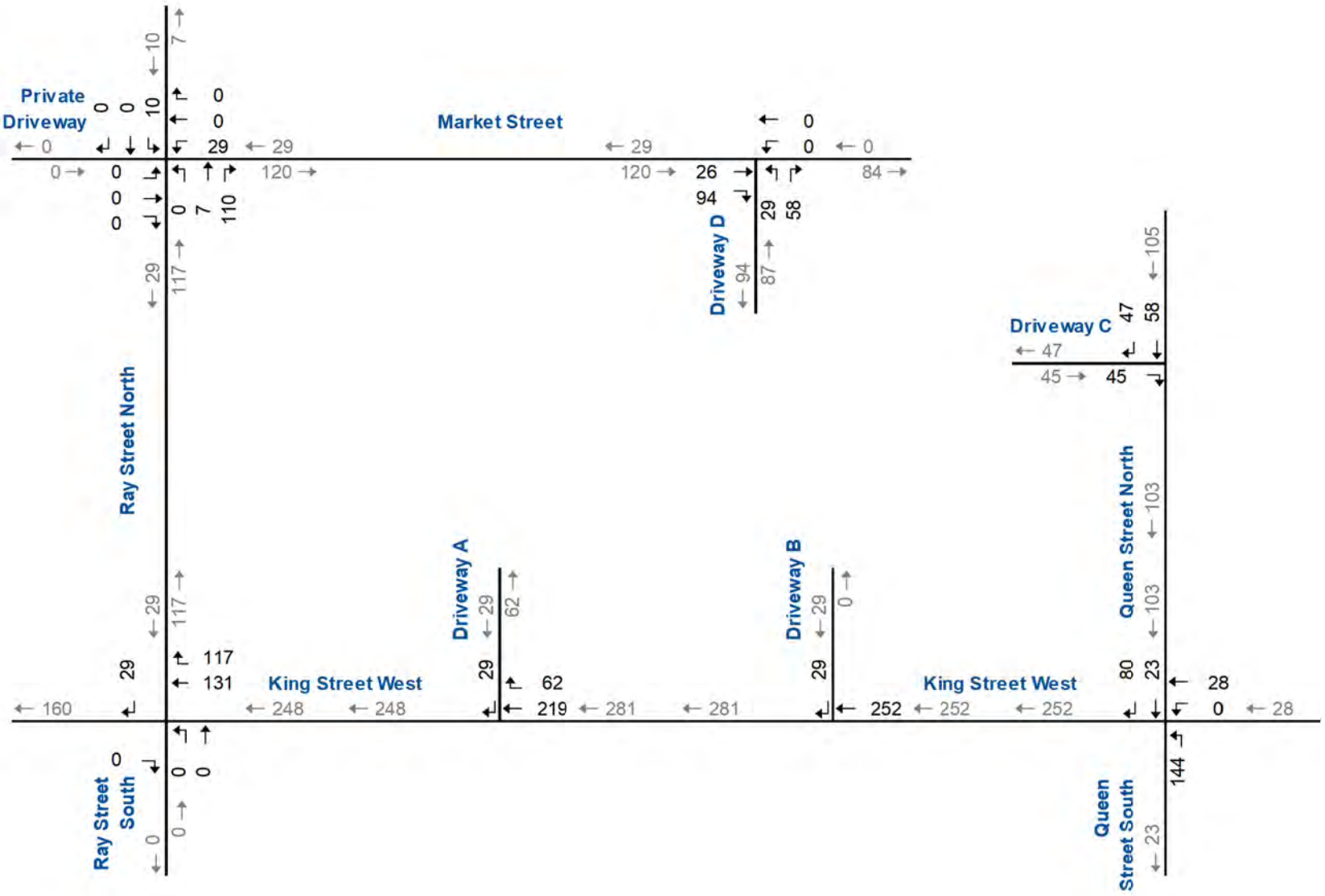
TABLE 3.2: TRIP DISTRIBUTION

Direction (To/From)	Travel Route	% Assigned To Route			
		Hotel		Student Housing	
		In	Out	In	Out
North	Ray Street North	5%	15%	5%	-
	Queen Street North	45%	-	-	-
South	Queen Street South	24%	51%	85%	-
East	King Street West	26%	-	10%	-
West	King Street West	-	34%	-	100%
Total		**100%**	**100%**	**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



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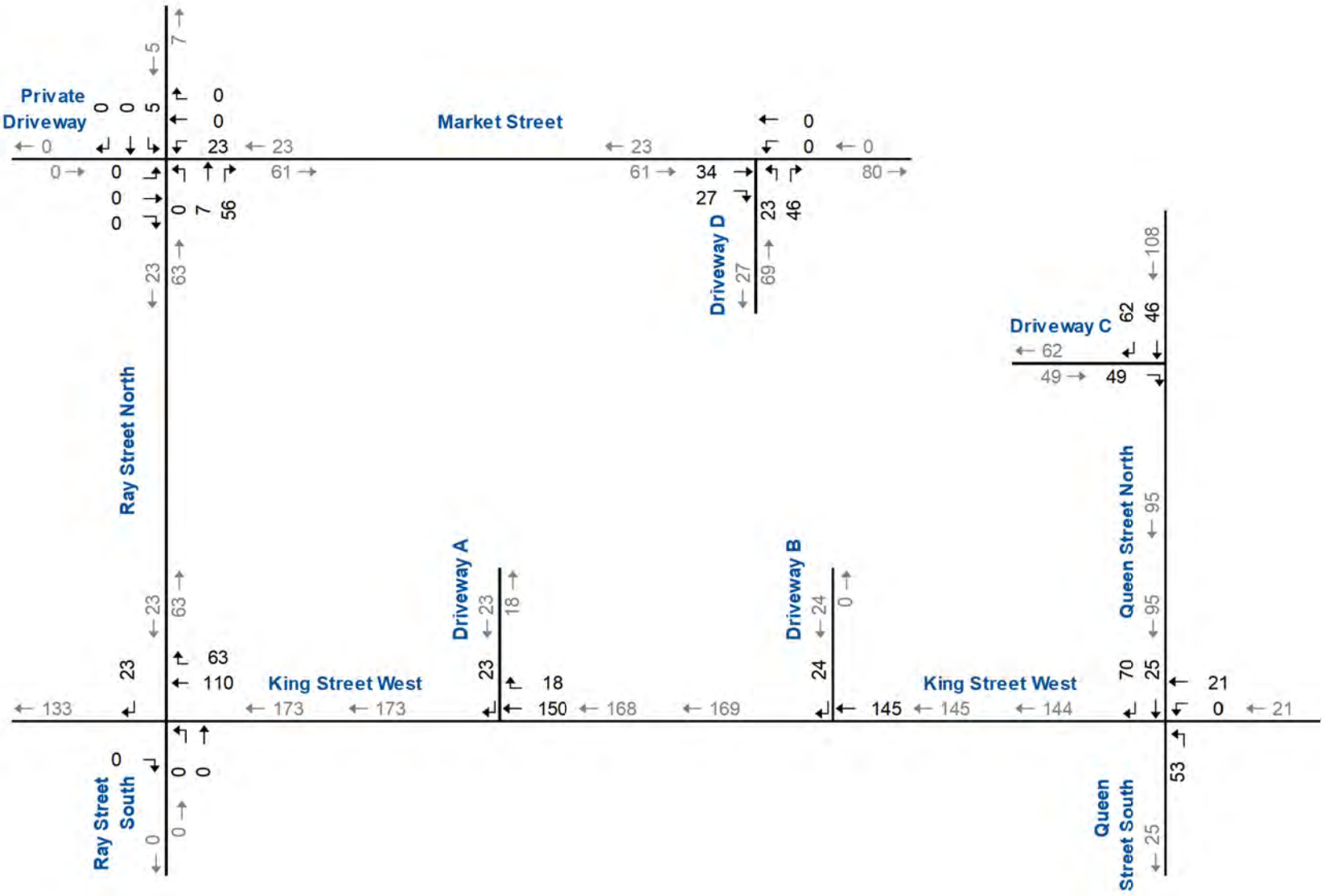
Development PM Peak Hour Traffic Volumes



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 2026 horizon. The future traffic volumes in the vicinity of 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 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.

Appendix D provides the forecasts traffic volumes for the above noted development applications

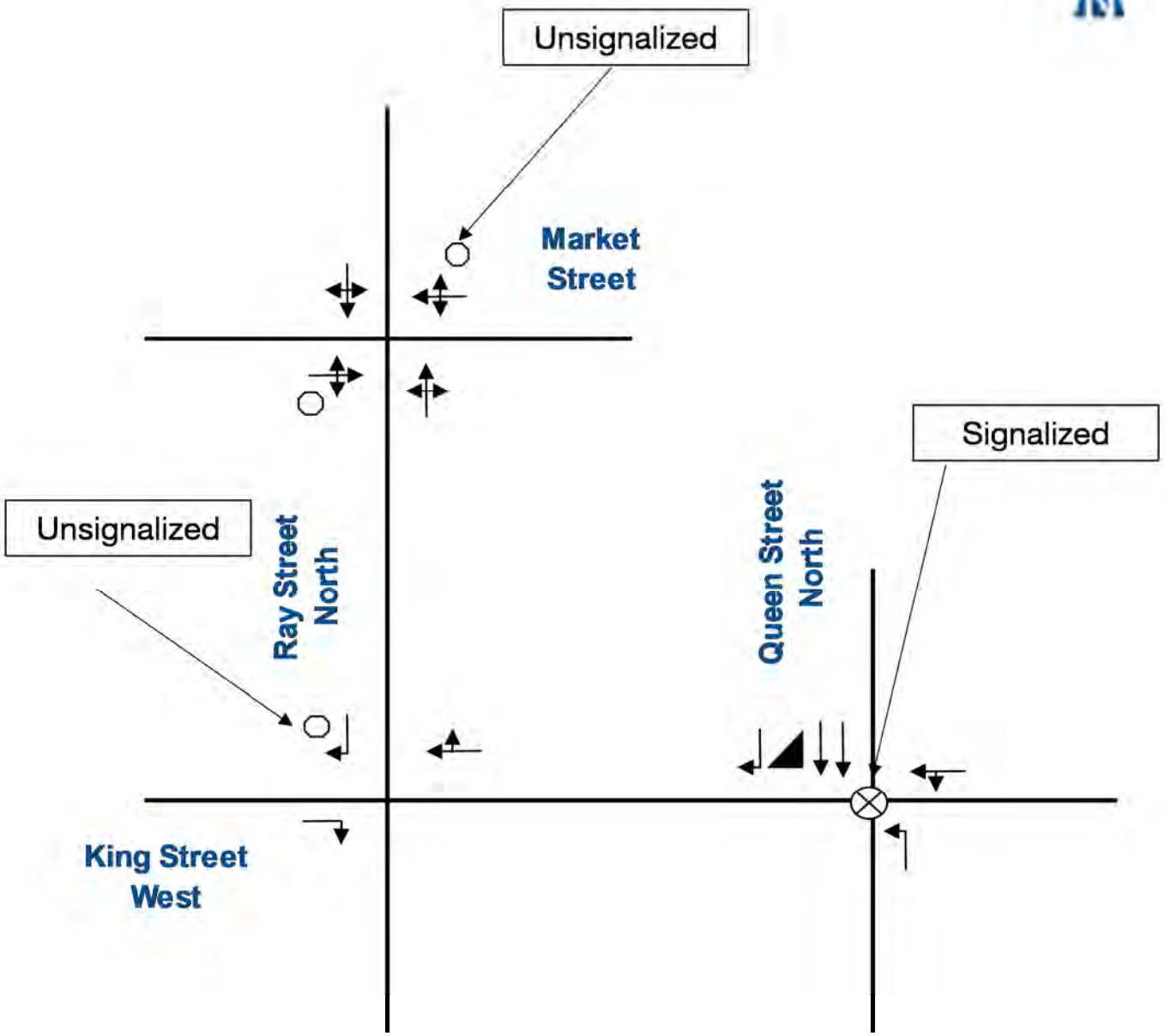
4.1.3 Roadway Network Changes

With the implementation of the LRT along King Street West and the conversion of Queen Street South to two-way traffic between King Street West and Herkimer Street, changes to the surrounding road network will be created. Based on input received from the City of Hamilton the following road network changes have been assumed:

- 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;
- No left turns will be permitted into or out of the development from King Street West;

- 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 4.1 illustrates the assumed roadway network for the 2026 horizon post LRT.



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Assumed Lane Configuration Post LRT

4.1.4 Travel Pattern Adjustments

Once the LRT is introduced and Queen Street South converted to two-way traffic, traffic patterns will need to be adjusted to reflect the changed capacity and lane configuration of the network.

EMME plots as contained in the Hamilton Light Rail Transit (LRT) Environmental Project Report (EPR) Addendum[9] were used to develop the travel pattern adjustments with the LRT 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 AM 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 between King Street West and Herkimer Street; northbound traffic at the intersection of King Street West and Queen Street South was assumed based on a directional split (AM - 72/28 and PM/SAT - 88/12) as outlined in the Queen Street South Conversion report[10].

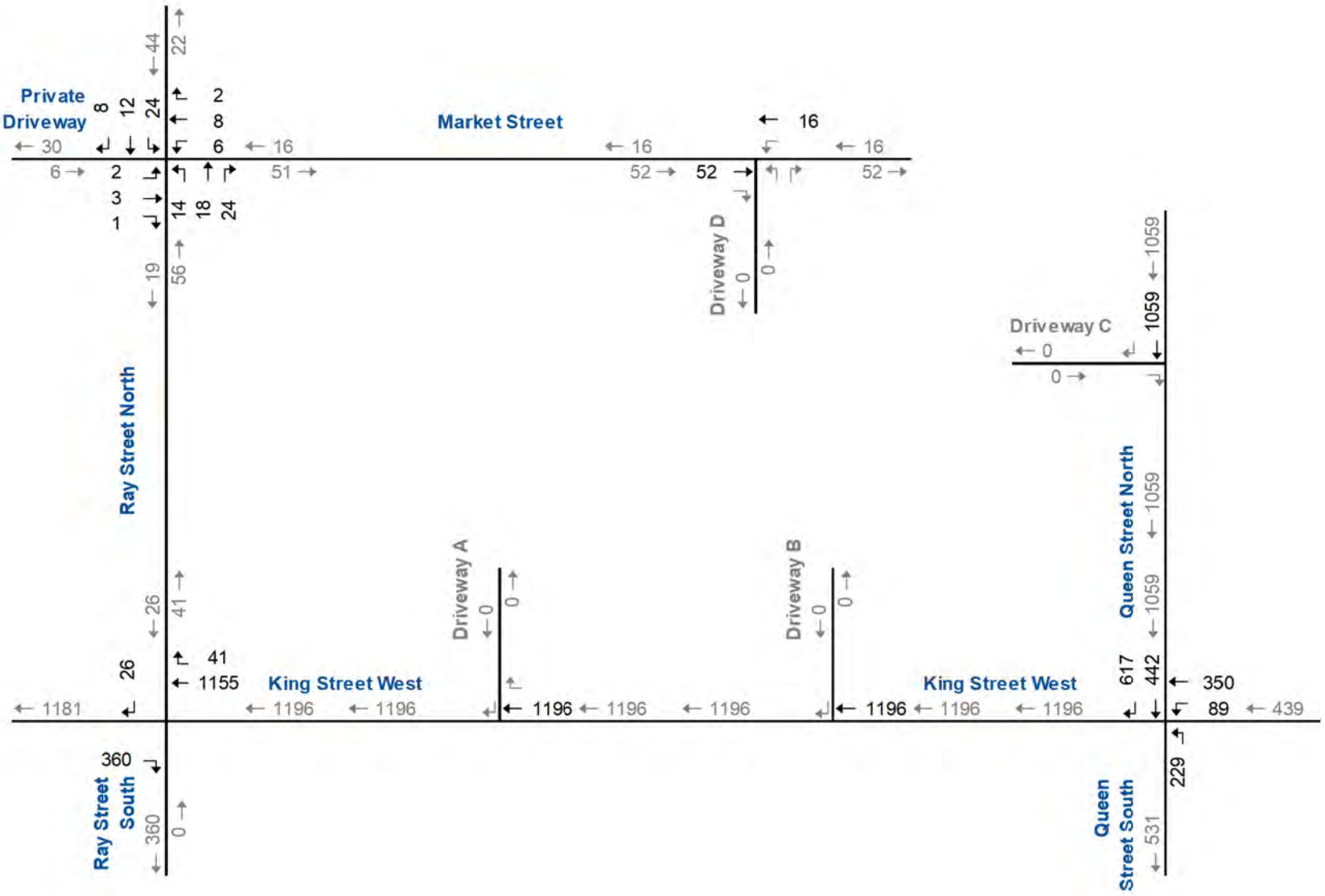
4.1.5 Background Projections

The Background traffic volumes is illustrated in **Figure 4.2.**

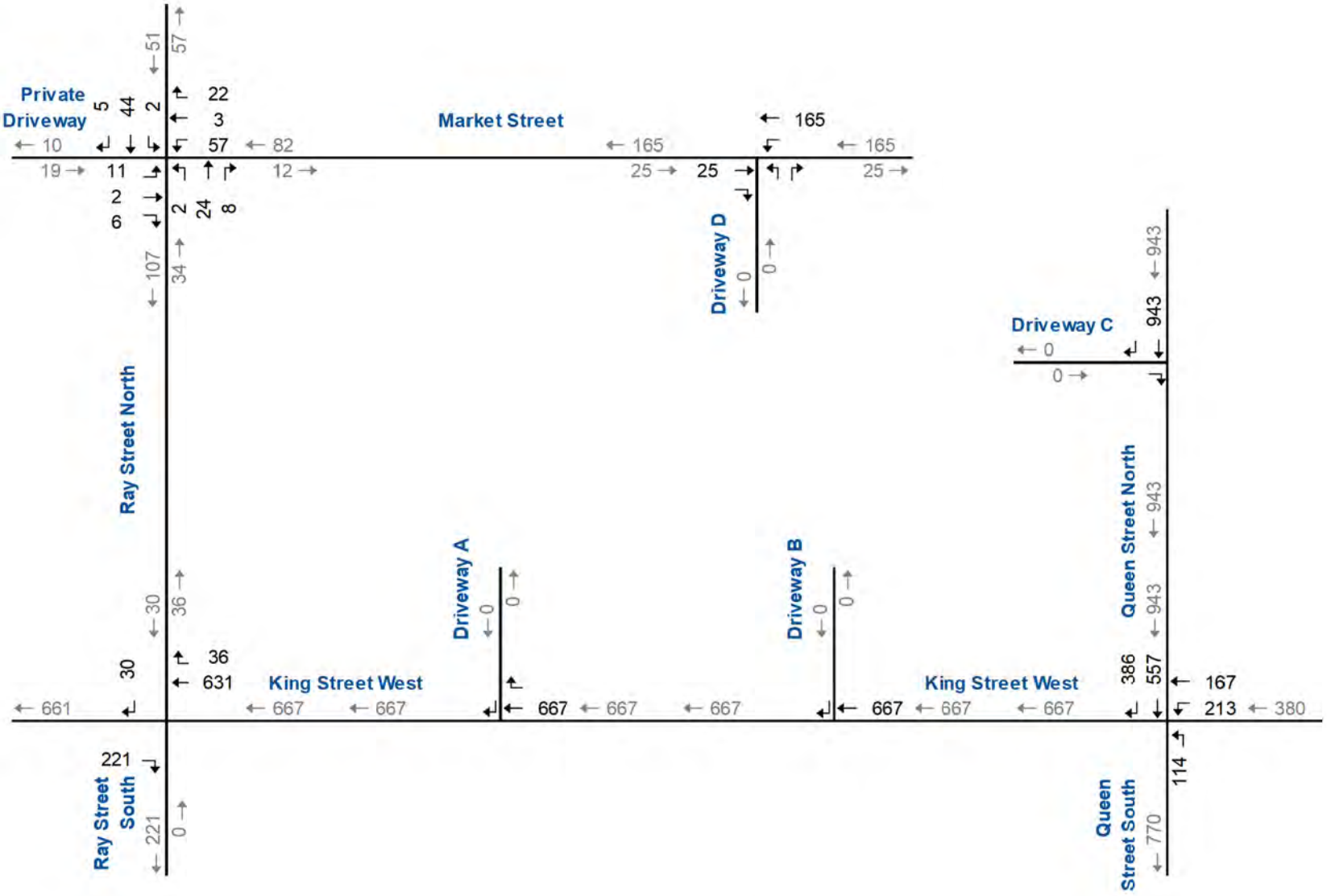
4.1.6 Total Projections

The projected site-generated traffic volumes were added to the Background projections to develop the Total traffic volumes. The Total traffic volumes are illustrated in **Figure 4.3**.

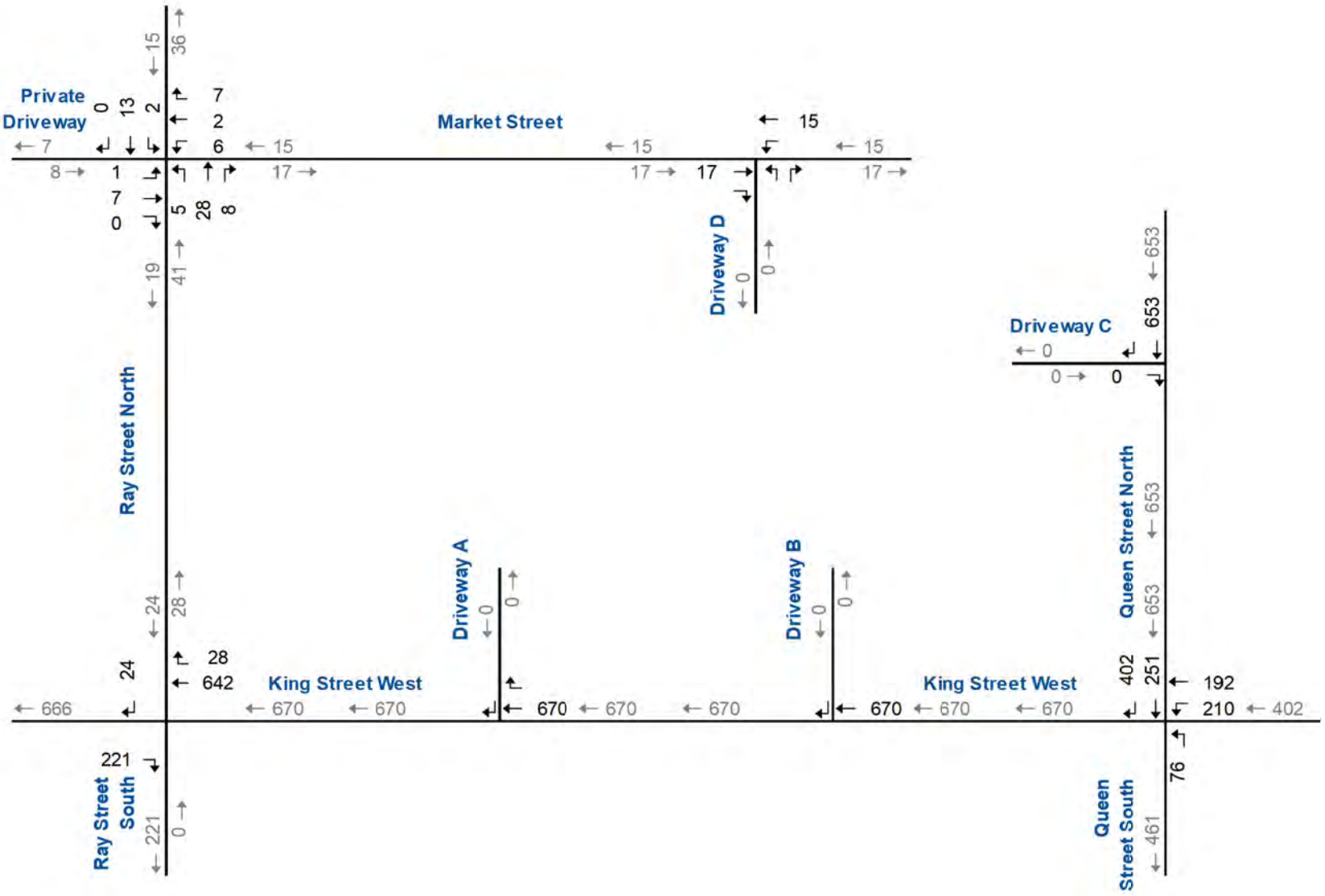
[9] City of Hamilton and Metrolinx Hamilton Light Rail Transit (LRT) Environmental Project Report (EPR) Addendum – Appendix E-2 Wider Area Impacts, Steer Davies Gleave & J. Bruin Associates Inc., February 2017.
[10] Queen Street South One-Way to Two-Way Conversion Feasibility Study, King Street to Aberdeen Avenue, AECOM, June 2017



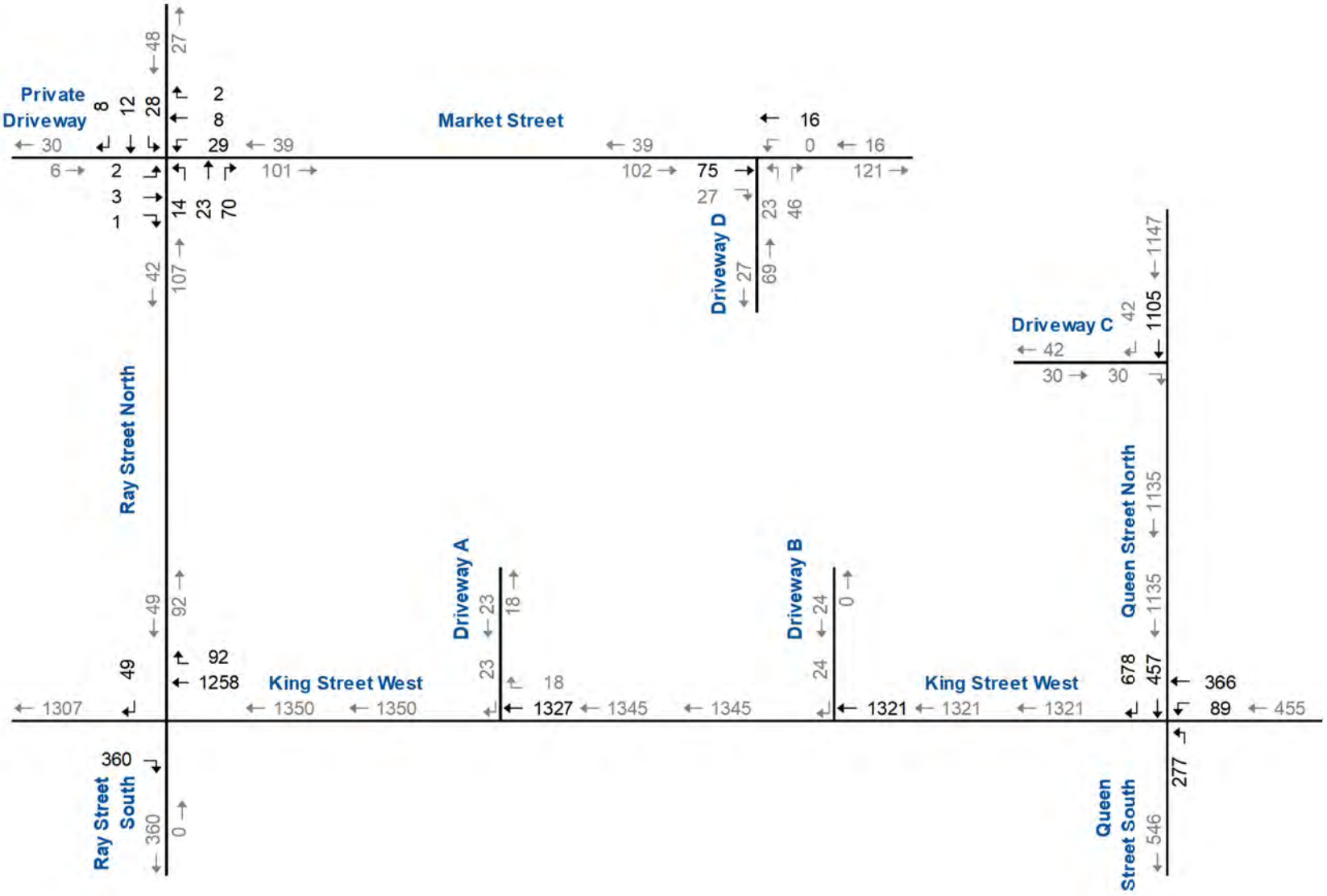
2026 Background AM Peak Hour Traffic Volumes



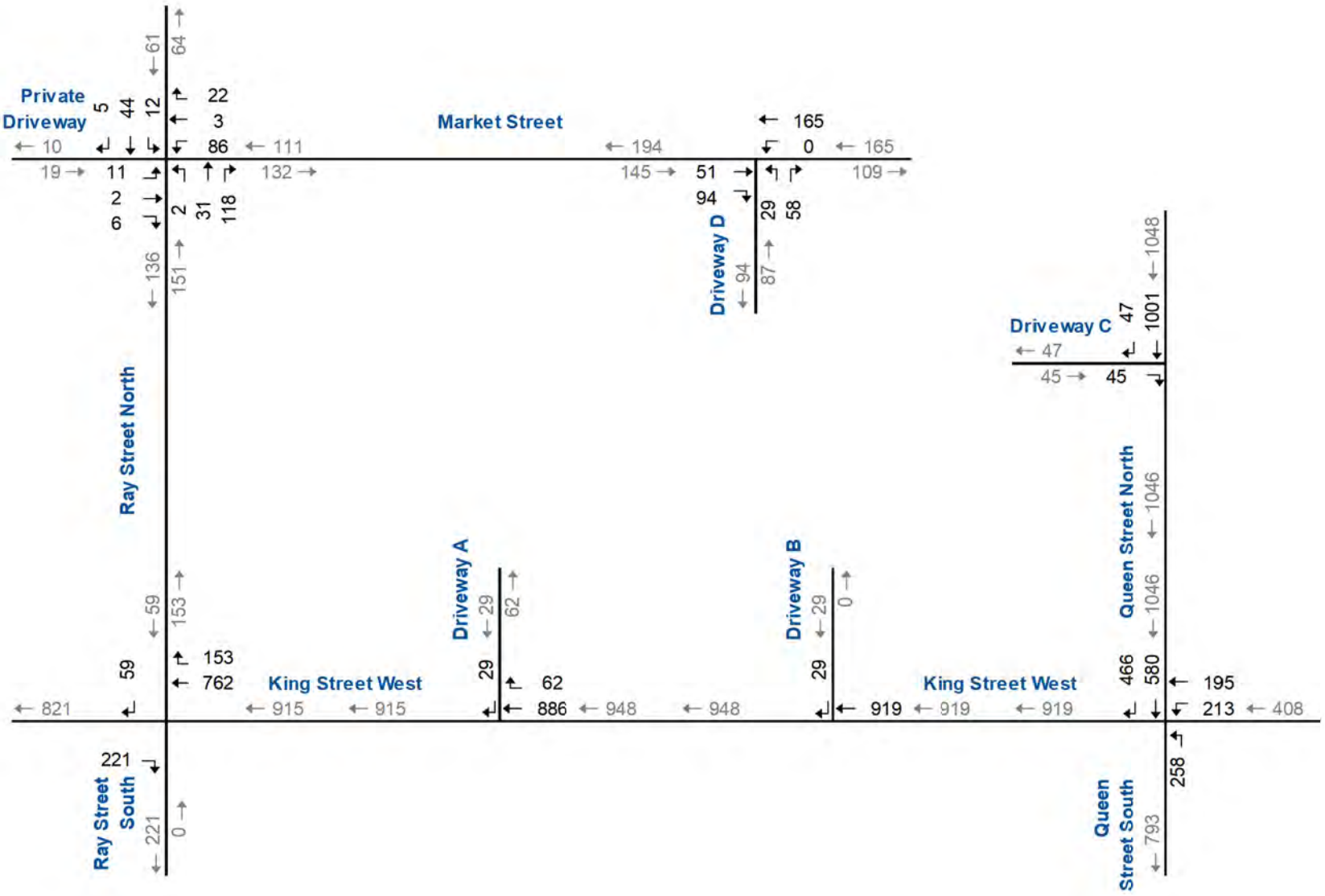
2026 Background PM Peak Hour Traffic Volumes



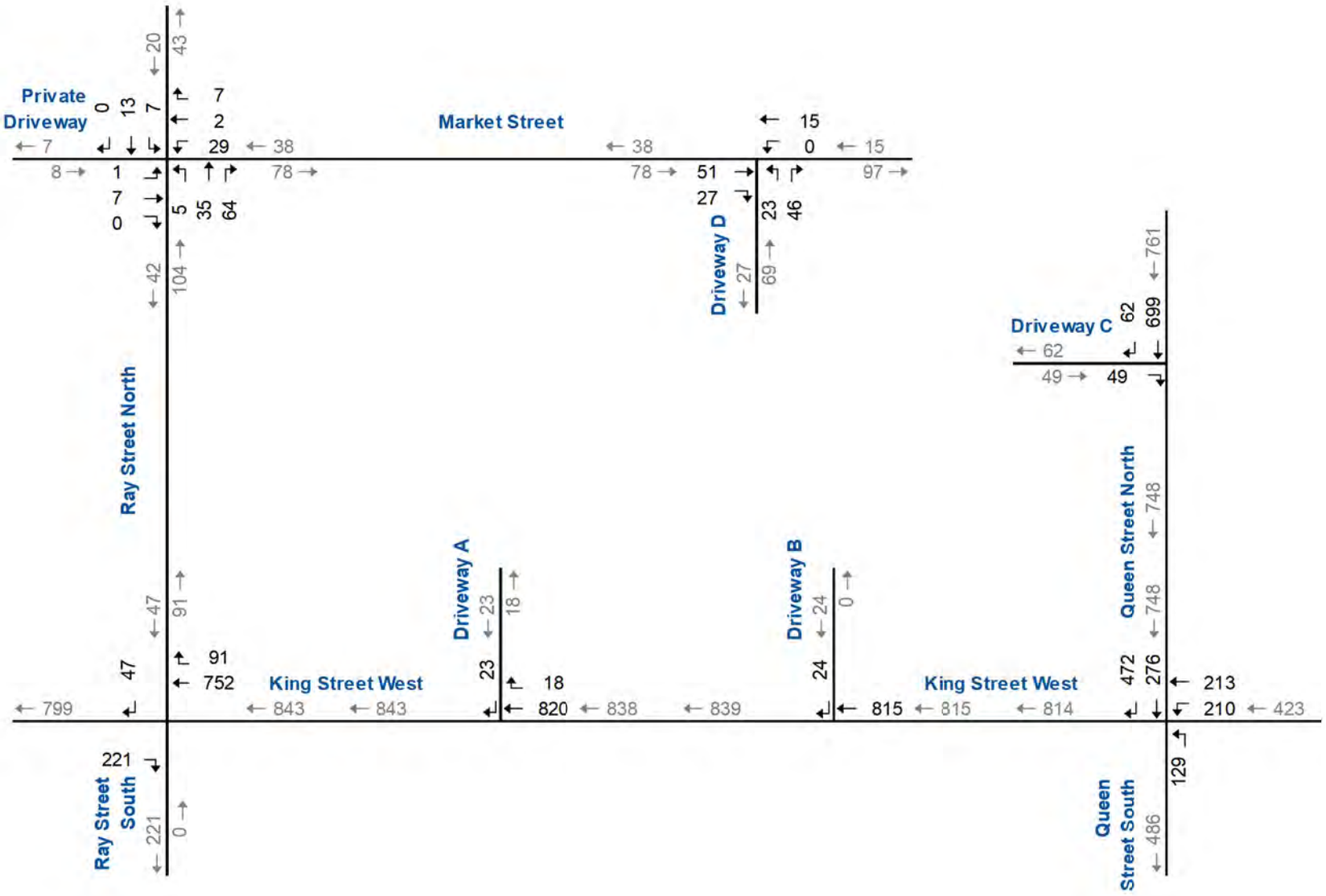
2026 Background Sat. Peak Hour Traffic Volumes



2026 Total AM Peak Hour Traffic Volumes



2026 Total PM Peak Hour Traffic Volumes



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2026 Total Sat. Peak Hour Traffic Volumes

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 mentioned in **Sub-Section 4.1.3**, changes made to the roadway network with implementation of the LRT 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 summarizes the capacity analyses for the study area intersections for base year and all horizon years for the AM and PM 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 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 Background traffic conditions the southbound right turn movement is projected to degrade to LOS D and ultimately to LOS F under the Total traffic conditions during the weekday AM peak hour with a volume to capacity (v/c) ratio no greater than 0.49. This indicates the southbound right turn movement is operating at 49 percent (or less) of its available capacity.

The number of vehicles making the right-turn from Ray Street North onto King Street West is no more than 60 vehicles during any one peak period. As a result, drivers may seek an alternative route via Napier Street and Locke Street North.

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

Additionally, the poor LOS is likely due to the high westbound through volume on King Street West. However, the method of analysis employed by the Synchro software program does not take into account gaps which will be available on King Street West due to the downstream traffic signal at Queen Street. The high delay is likely overstated, mitigation measures do not appear appropriate due to these factors.

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 Background/Total traffic conditions, the westbound approach is projected to degrade from LOS B to LOS D during the weekday AM peak hour with a v/c ratio no greater than 0.85.

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 weekday PM and Saturday peak hours is projected to operate at LOS C or better. During the AM peak hour, the stop controlled southbound right turn movement is projected to operate at LOS E with a v/c ratio of 0.23. This indicates the southbound right turn movement is operating at 23 percent (or less) of its available capacity.

The number of vehicles making the right-turn from Driveway A onto King Street West is no more than 25 vehicles during the weekday AM peak hour. The poor LOS is likely due to the high westbound through volume on King Street West.

However, the method of analysis employed by the Synchro software program does not take into account gaps which will be available on King Street West due to the downstream traffic signal at Queen Street. The high delay is likely overstated, mitigation measures do not appear appropriate due to these factors.

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 weekday PM and Saturday peak hours is projected to operate at LOS C or better. During the AM peak hour, the stop controlled southbound right turn movement is projected to operate at LOS E with a v/c ratio of 0.23. This indicates the southbound right turn movement is operating at 23 percent (or less) of its available capacity.

The number of vehicles making the right-turn from Driveway B onto King Street West is no more than 25 vehicles during the weekday AM peak hour. The poor LOS is likely due to the high westbound through volume on King Street West.

However, the method of analysis employed by the Synchro software program does not take into account gaps which will be available on King Street West

due to the downstream traffic signal at Queen Street. The high delay is likely overstated, mitigation measures do not appear appropriate due to these factors.

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. The stop controlled eastbound right turn movement is projected to operate with a v/c ratio no greater than 0.08. This indicates the southbound right turn movement is operating at 8 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. The stop controlled northbound approach is projected to operate with a v/c ratio no greater than 0.11. This indicates the northbound approach is operating at 11 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	A	A	**A**	A	A	A	**A**	**A**
				Delay	10	10	10	**10**	10	10	10	**10**	2	2	2	**2**	4	4	4	**4**	**4**
				V/C	0.01	0.01	0.01		0.02	0.02	0.02		0.01	0.01	0.01		0.01	0.01	0.01		
			2026 Background	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	**A**
				Delay	10	10	10	**10**	10	10	10	**10**	2	2	2	**2**	4	4	4	**4**	**4**
				V/C	0.01	0.01	0.01		0.02	0.02	0.02		0.01	0.01	0.01		0.02	0.02	0.02		
			2026 Total	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	**A**
				Delay	10	10	10	**10**	10	10	10	**10**	1	1	1	**1**	4	4	4	**4**	**4**
				V/C	0.01	0.01	0.01		0.06	0.06	0.06		0.01	0.01	0.01		0.02	0.02	0.02		
	2. Ray Street at King Street West	TWSC	Base Year	LOS					A	A	A	**A**	C	C		**C**		A	A	**A**	**A**
				Delay					0	0	0	**0**	15	15		**15**		10	10	**10**	**1**
				V/C					0.01	0.46	0.26		0.12	0.12				0.03	0.03		
			2026 Background	LOS			A	**A**		A	A	**A**							D	**D**	**A**
				Delay			0	**0**		0	0	**0**							31	**31**	**1**
				V/C			0.23			0.74	0.74								0.17		
			2026 Total	LOS			A	**A**		A	A	**A**							F	**F**	**A**
				Delay			0	**0**		0	0	**0**							66	**66**	**2**
				V/C			0.23			0.86	0.86								0.49		
	3. Queen Street at King Street West	TCS	Base Year	LOS					B	B		**B**						C	C	**C**	**B**
				Delay					16	16		**16**						25	27	**26**	**18**
				V/C					0.64	0.64								0.41	0.41		
			2026 Background	LOS					D	D		**D**	B			**B**		B	A	**A**	**B**
				Delay					43	43		**43**	17			**17**		11	1	**5**	**16**
				V/C					0.82	0.82			0.53					0.26	0.51		
			2026 Total	LOS					D	D		**D**	C			**C**		B	A	**A**	**B**
				Delay					45	45		**45**	22			**22**		11	2	**5**	**18**
				V/C					0.85	0.85			0.66					0.27	0.56		
	4. King Street West at Driveway A	TWSC	2026 Total	LOS						A	A	**A**							E	**E**	**A**
				Delay						0	0	**0**							47	**47**	**1**
				V/C						0.86	0.86								0.23		
	5. King Street West at Driveway B	TWSC	2026 Total	LOS						A		**A**							E	**E**	**A**
				Delay						0		**0**							46	**46**	**1**
				V/C						0.84									0.23		
	6. Queen Street North at Driveway C	TWSC	2026 Total	LOS			B	**B**										A	A	**A**	**A**
				Delay			12	**12**										0	0	**0**	**0**
				V/C			0.06											0.28	0.17		
	7. Market Street at Driveway D	TWSC	2026 Total	LOS		A	A	**A**	A	A		**A**	A		A	**A**					**A**
				Delay		0	0	**0**	0	0		**0**	9		9	**9**					**3**
				V/C		0.07	0.07		0.00	0.00			0.08		0.08						

MOE - Measure of Effectiveness
LOS - Level of Service
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 (PM PEAK HOUR)

Analysis Period	Intersection	Control Type	Horizon	MOE	Direction / Movement / Approach																Overall
					Eastbound				Westbound				Northbound				Southbound				
					Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	1. Ray Street North at Market Street	TWSC	Base Year	LOS	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
				Delay	9	9	9	9	9	9	9	9	1	1	1	1	0	0	0	0	5
				V/C	0.02	0.02	0.02		0.09	0.09	0.09		0.00	0.00	0.00		0.00	0.00	0.00		
			2026 Background	LOS	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
				Delay	9	9	9	9	10	10	10	10	0	0	0	0	0	0	0	0	5
				V/C	0.02	0.02	0.02		0.10	0.10	0.10		0.00	0.00	0.00		0.00	0.00	0.00		
			2026 Total	LOS	A	A	A	A	B	B	B	B	A	A	A	A	A	A	A	A	A
				Delay	10	10	10	10	11	11	11	11	0	0	0	0	2	2	2	2	4
				V/C	0.03	0.03	0.03		0.15	0.15	0.15		0.00	0.00	0.00		0.01	0.01	0.01		
	2. Ray Street at King Street West	TWSC	Base Year	LOS					A	A	A	A	B	B		B		A	A	A	A
				Delay					1	0	0	0	11	11		11		9	9	9	1
				V/C					0.01	0.37	0.37		0.07	0.07				0.03	0.03		
			2026 Background	LOS			A	A		A	A	A							C	C	A
				Delay			0	0		0	0	0							15	15	1
				V/C			0.14			0.43	0.43								0.08		
			2026 Total	LOS			A	A		A	A	A							C	C	A
				Delay			0	0		0	0	0							20	20	1
				V/C			0.14			0.58	0.58								0.21		
	3. Queen Street at King Street West	TCS	Base Year	LOS					B	B		B						C	C	C	B
				Delay					15	15		15						25	27	26	18
				V/C					0.54	0.54								0.43	0.44		
			2026 Background	LOS					C	C		C	C			C		B	A	A	B
				Delay					24	24		24	21			21		17	1	10	15
				V/C					0.57	0.57			0.40					0.38	0.31		
			2026 Total	LOS					D	D		D	C			C		B	A	A	B
				Delay					40	40		40	26			26		11	1	7	18
				V/C					0.78	0.78			0.72					0.33	0.37		
	4. King Street West at Driveway A	TWSC	2026 Total	LOS						A	A	A							C	C	A
				Delay						0	0	0							19	19	1
				V/C						0.61	0.61								0.11		
	5. King Street West at Driveway B	TWSC	2026 Total	LOS						A		A							C	C	A
				Delay						0		0							19	19	1
				V/C						0.59									0.11		
	6. Queen Street North at Driveway C	TWSC	2026 Total	LOS			B	B										A	A	A	A
				Delay			11	11										0	0	0	1
				V/C			0.08											0.26	0.16		
	7. Market Street at Driveway D	TWSC	2026 Total	LOS		A	A	A	A	A		A	A		A	A					A
				Delay		0	0	0	0	0		0	10		10	10					2
				V/C		0.09	0.09		0.00	0.00			0.11		0.11						

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

TABLE 5.1C: INTERSECTION OPERATIONS (SAT. PEAK HOUR)

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	
Sat Peak Hour	1. Ray Street North at Market Street	TWSC	Base Year	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	**A**
				Delay	9	9	9	**9**	9	9	9	**9**	1	1	1	**1**	1	1	1	**1**	**3**
				V/C	0.01	0.01	0.01		0.01	0.01	0.01		0.00	0.00	0.00		0.00	0.00	0.00		
			2026 Background	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	**A**
				Delay	10	10	10	**10**	9	9	9	**9**	1	1	1	**1**	1	1	1	**1**	**3**
				V/C	0.01	0.01	0.01		0.02	0.02	0.02		0.00	0.00	0.00		0.00	0.00	0.00		
			2026 Total	LOS	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	A	A	A	**A**	**A**
				Delay	10	10	10	**10**	10	10	10	**10**	0	0	0	**0**	3	3	3	**3**	**3**
				V/C	0.01	0.01	0.01		0.05	0.05	0.05		0.00	0.00	0.00		0.01	0.01	0.01		
	2. Ray Street at King Street West	TWSC	Base Year	LOS					A	A	A	**A**	B	B		**B**		A	A	**A**	**A**
				Delay					0	0	0	**0**	13	13		**13**		10	10	**10**	**1**
				V/C					0.01	0.39	0.39		0.10	0.10				0.03	0.03		
			2026 Background	LOS			A	**A**		A	A	**A**							C	**C**	**A**
				Delay			0	**0**		0	0	**0**							15	**15**	**0**
				V/C			0.14			0.43	0.43								0.07		
			2026 Total	LOS			A	**A**		A	A	**A**							C	**C**	**A**
				Delay			0	**0**		0	0	**0**							18	**18**	**1**
				V/C			0.14			0.54	0.54								0.16		
	3. Queen Street at King Street West	TCS	Base Year	LOS					B	B		**B**						B	B	**B**	**B**
				Delay					19	19		**19**						15	16	**15**	**18**
				V/C					0.66	0.66								0.37	0.35		
			2026 Background	LOS					B	B		**B**	B			**B**		B	A	**A**	**A**
				Delay					17	17		**17**	16			**16**		14	1	**6**	**10**
				V/C					0.51	0.51			0.19					0.18	0.28		
			2026 Total	LOS					B	B		**B**	B			**B**		B	A	**A**	**B**
				Delay					17	17		**17**	18			**18**		15	1	**6**	**11**
				V/C					0.25	0.25			0.14					0.20	0.33		
	4. King Street West at Driveway A	TWSC	2026 Total	LOS						A	A	**A**							C	**C**	**A**
				Delay						0	0	**0**							17	**17**	**0**
				V/C						0.54	0.54								0.07		
	5. King Street West at Driveway B	TWSC	2026 Total	LOS						A		**A**							C	**C**	**A**
				Delay						0		**0**							16	**16**	**1**
				V/C						0.52									0.08		
	6. Queen Street North at Driveway C	TWSC	2026 Total	LOS			B	**B**										A	A	**A**	**A**
				Delay			11	**11**										0	0	**0**	**1**
				V/C			0.07											0.18	0.18		
	7. Market Street at Driveway D	TWSC	2026 Total	LOS		A	A	**A**	A	A		**A**	A		A	**A**					**A**
				Delay		0	0	**0**	0	0		**0**	9		9	**9**					**4**
				V/C		0.05	0.05		0.00	0.00			0.08		0.08						

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

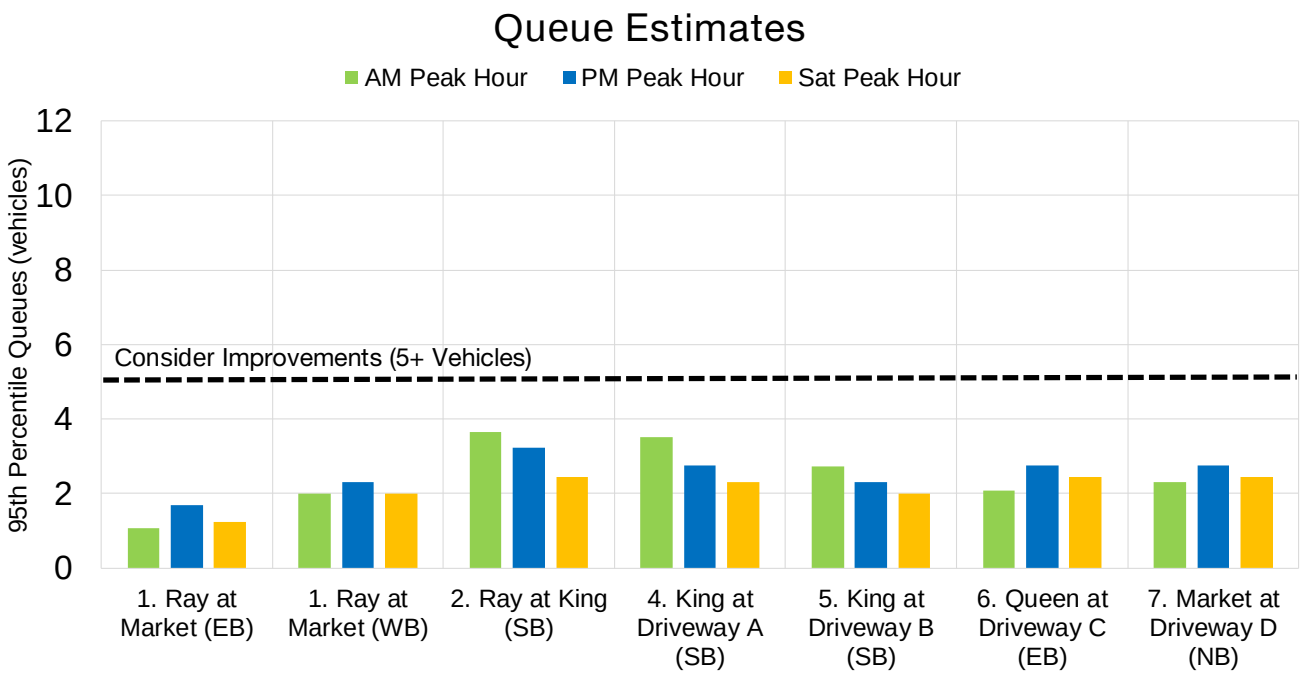
5.3 Queue Assessment

As part of this assessment, Paradigm completed a queue assessment of the unsignalized intersections with study area 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.

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. **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, mitigation measures are not warranted.

CHART 5.2: QUEUE ASSESSMENT



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 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.

6.1 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.

6.1.1 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.

6.1.2 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.

6.1.3 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.

6.1.4 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.

6.1.5 Light Rail 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 LRT 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.

6.2 Proposed Strategies

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

6.2.1 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.

6.2.2 Unbundled Parking

Implementing a paid-parking operation is one of the most effective TDM strategies for encouraging alternative travel habits. To further encourage student residence 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.

6.2.3 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.

6.2.4 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.

6.3 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).

6.3.1 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 student residence during the initial opening. This would help create and establish a culture of transit use amongst the development.

6.3.2 Live Transit Information

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

6.3.3 Bike Share Pass

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

6.3.4 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.

6.4 Evaluation of TDM

Table 6.1 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 6.1: 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***

7 Conclusions

7.1 Conclusions

This study evaluated the impacts associated within the construction of 154 hotel suites and 322 student resident units on the northwest corner of King Street West and Queen Street North. Vehicle access is proposed by four driveway connections to King Street West, Queen Street North and Market Street. The proposed development is projected to generate between 111 – 393 new vehicle trips during the peak hours.

Detailed traffic analysis was conducted for each of the study area intersections under Base Year (2019) traffic conditions and 2026 Background and Total traffic conditions. Based on traffic data and analyses completed, the following is noted:

- **King Street West at Ray Street** – This intersection is expected to see increased delay for the southbound right turn movement and operate at level of service (LOS) E under the weekday AM peak hour. The southbound right turn movement is projected to have a volume to capacity (v/c) ratio of no greater than 0.23 and the 95th percentile queue is not projected to exceed 4 vehicles.

  The number of vehicles making the right-turn from Ray Street North onto King Street West is no more than 60 vehicles during any one peak period. As a result, drivers may seek an alternative route via Napier Street and Locke Street North. Additionally, the poor LOS is likely due to the high westbound through volume on King Street West. The method of analysis employed by the Synchro software program does not consider gaps which will be available on King Street West due to the downstream traffic signal at Queen Street. The high delay is likely overstated and mitigation measures do not appear appropriate due to these factors.
- **King Street West with Driveway A and Driveway B** - The proposed right in/out driveway connections (Driveway A and Driveway B) to King Street West are projected to operate at LOS E during the weekday AM peak hour for the southbound right turn movement. A v/c ratio no greater than 0.23 and the 95th percentile queue length is not projected to exceed 4 vehicles. As stated previously, Synchro does not consider gaps which will be available on King Street West due to the downstream traffic signal at Queen Street. The high delay is likely overstated and mitigation measures do not appear appropriate due to these factors.
- All other intersections and driveway connections are projected to operate with acceptable levels of delay and queuing with build out of the proposed development.

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.

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;
- 5 Short-term bicycle parking;
- 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 student residence;
- 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.

7.2 Recommendations

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

- The development be approved with no off-site road improvements required to the roadways within the study area;
- City of Hamilton monitor the volumes on King Street West after the opening of the LRT service to determine if further study is warranted;
- The TDM strategies proposed and through design as outlined in Chapter 6 be implemented by the development to encourage sustainable travel modes.
- 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.

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

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Appendix B

Traffic Data

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

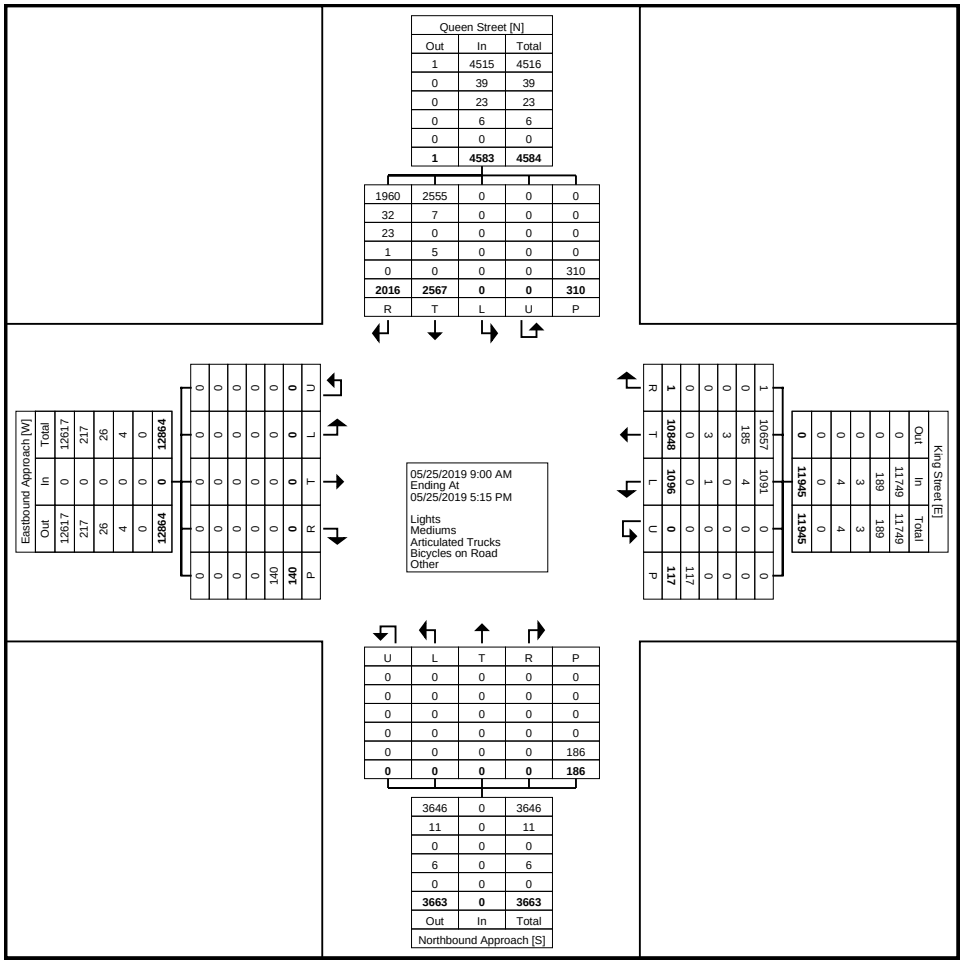
Start Time	Eastbound Approach Eastbound						King Street Westbound						Northbound Approach Northbound						Queen Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
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
Page No: 5

Peak Hour Data

05/25/2019 3:00 PM
Ending At
05/25/2019 4:00 PM

Lights
Mediums
Articulated Trucks
Bicycles on Road
Other

Queen Street [N]

Out	In	Total
0	732	732
0	2	2
0	1	1
0	2	2
0	0	0
0	**737**	**737**

R	T	L	U	P
276	456	0	0	0
2	0	0	0	0
1	0	0	0	0
0	2	0	0	0
0	0	0	0	45
279	**458**	**0**	**0**	**45**

Eastbound Approach [W]

Out	In	Total
1800	0	1800
27	0	27
1	0	1
0	0	0
0	0	0
1828	**0**	**1828**

U	L	T	R	P
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	14
0	**0**	**0**	**0**	**14**

King Street [E]

Out	In	Total
0	1693	1693
0	25	25
0	0	0
0	0	0
0	0	0
0	**1718**	**1718**

R	T	L	U	P
0	1524	169	0	0
0	25	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	21
0	**1549**	**169**	**0**	**21**

U	L	T	R	P
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	24
0	**0**	**0**	**0**	**24**

Out	In	Total
625	0	625
0	0	0
0	0	0
2	0	2
0	0	0
627	**0**	**627**

Northbound Approach [S]

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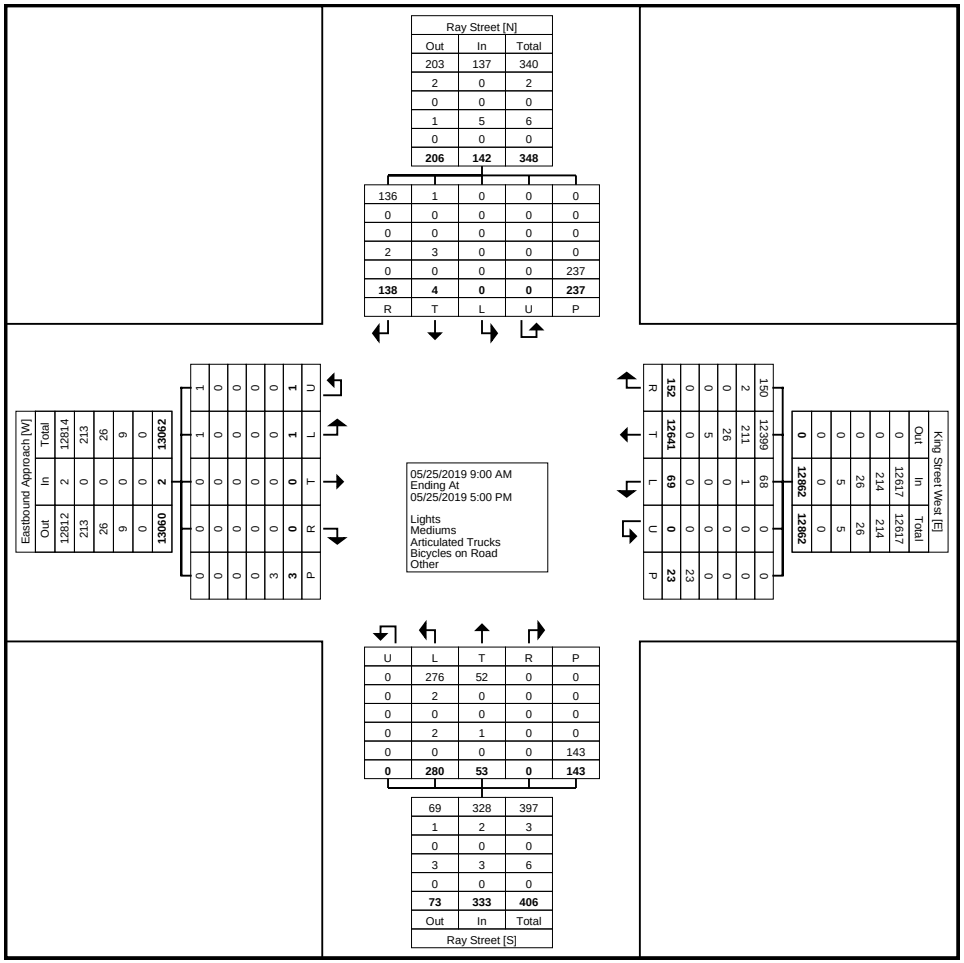
Count Name: King Street & Ray Street - Saturday
Site Code:
Start Date: 05/25/2019



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

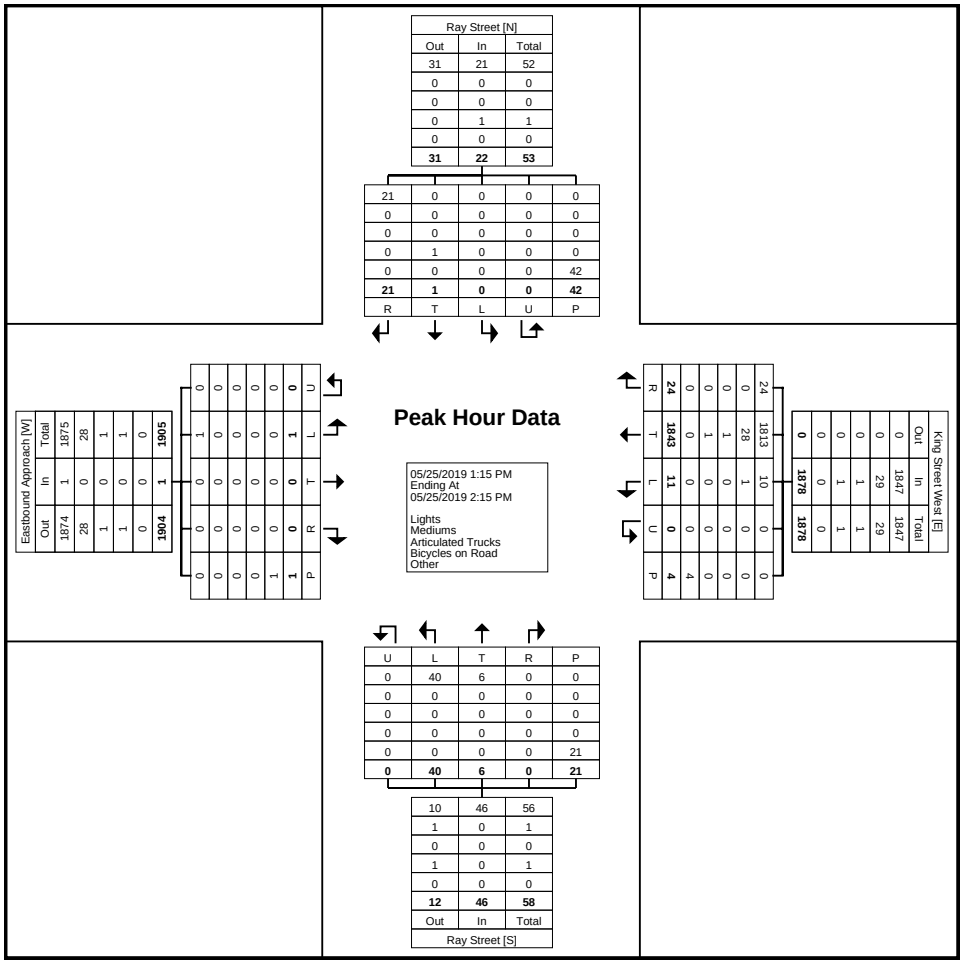
Turning Movement Peak Hour Data (1:15 PM)

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

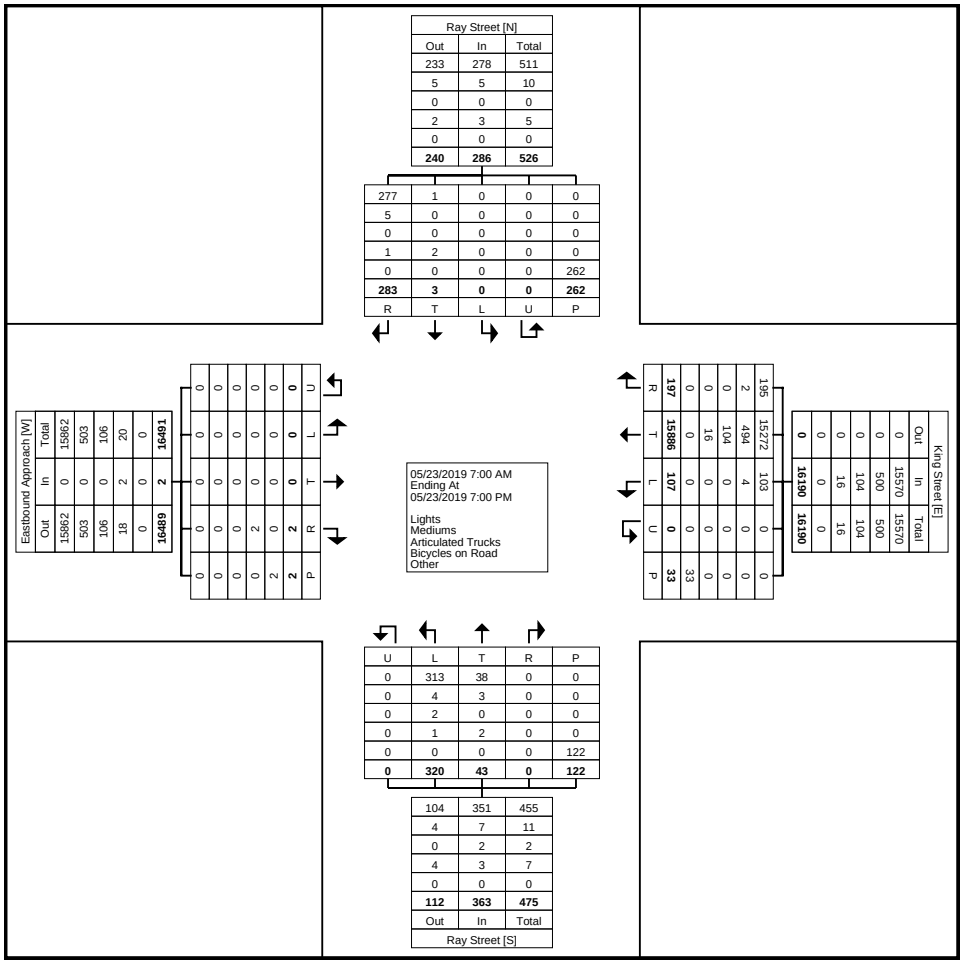
Start Time	Eastbound Approach Eastbound						King Street Westbound						Ray Street Northbound						Ray Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	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

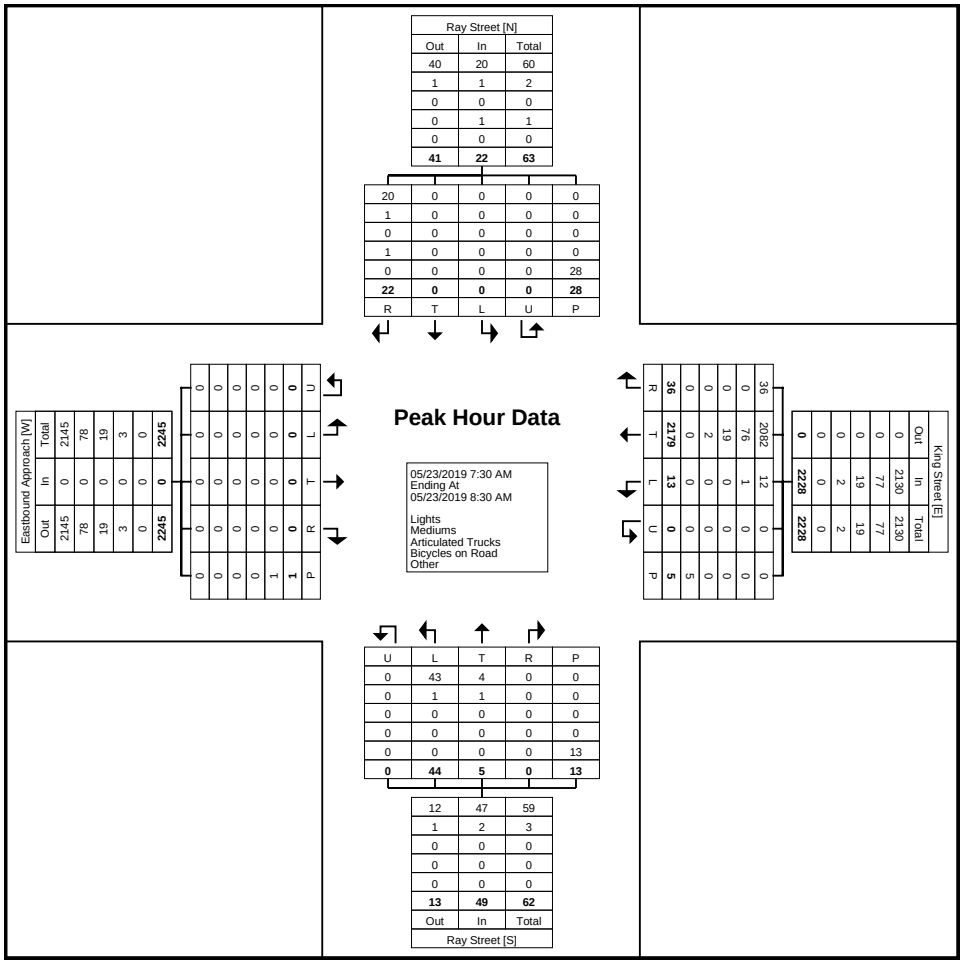
Turning Movement Peak Hour Data (7:30 AM)

Start Time	Eastbound Approach Eastbound						King Street Westbound						Ray Street Northbound						Ray Street Southbound						
	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
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
Site Code:
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

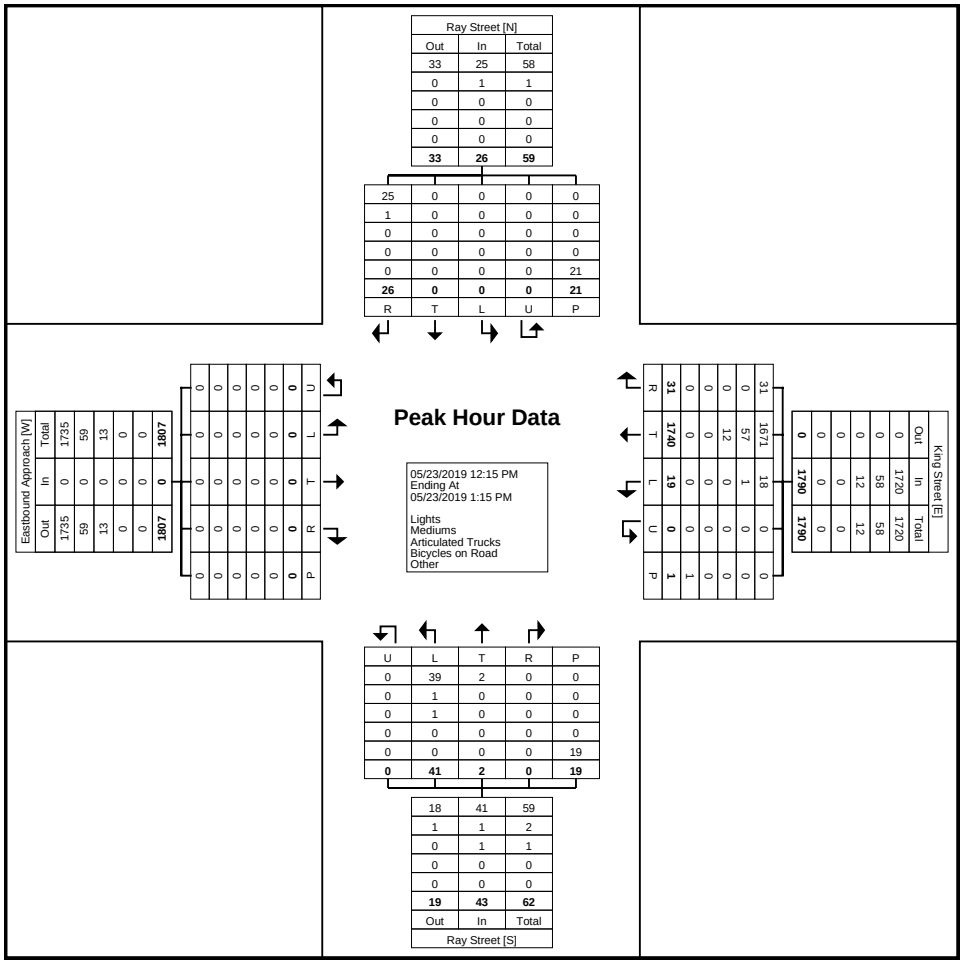
Turning Movement Peak Hour Data (12:15 PM)

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	-	-

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 (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

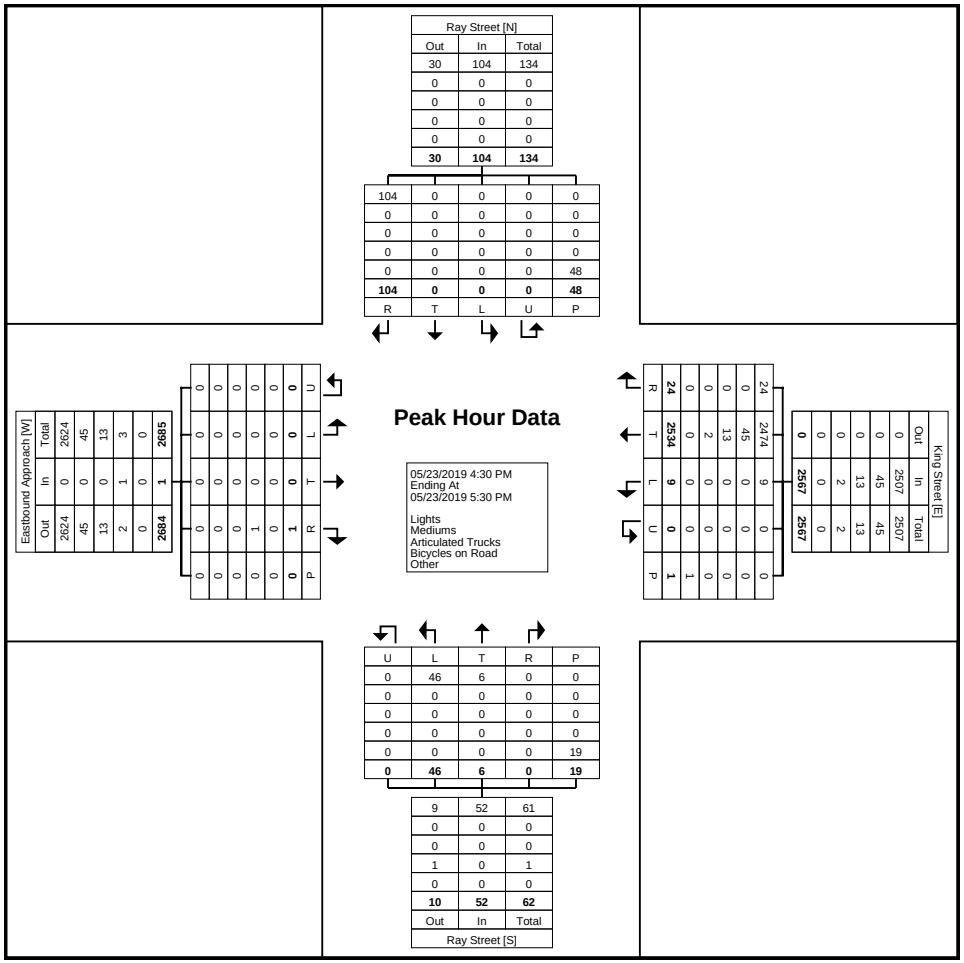
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Eastbound Approach Eastbound						King Street Westbound						Ray Street Northbound						Ray Street Southbound						
	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
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

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

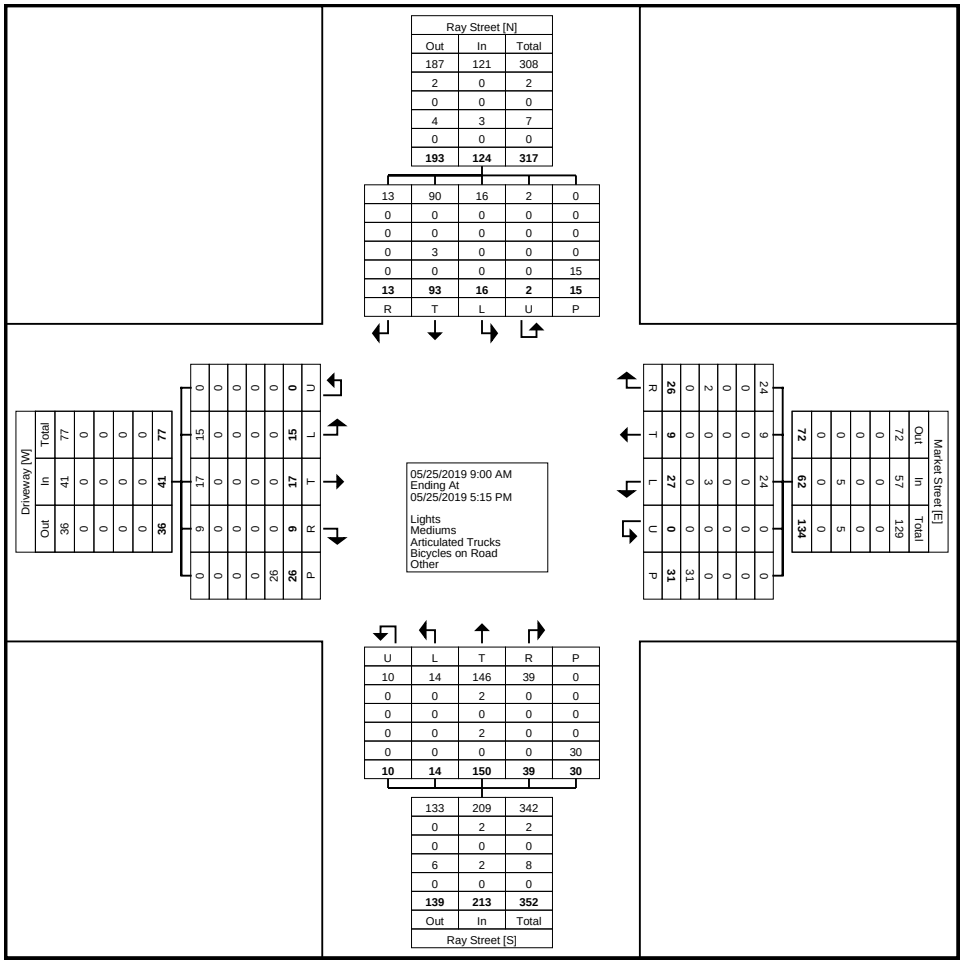
Start Time	Driveway Eastbound						Market Street Westbound						Ray Street Northbound						Ray Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
9:00 AM	0	0	1	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

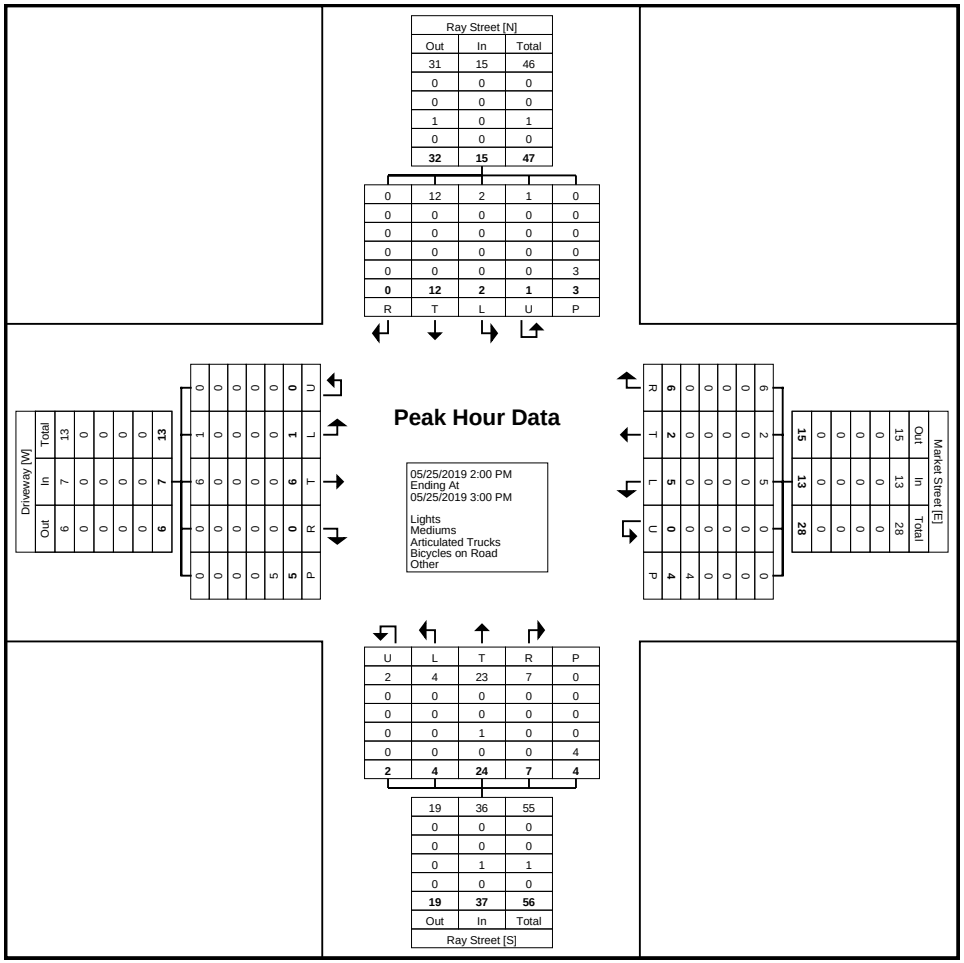
Turning Movement Peak Hour Data (2:00 PM)

Start Time	Driveway Eastbound						Market Street Westbound						Ray Street Northbound						Ray Street Southbound						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	
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

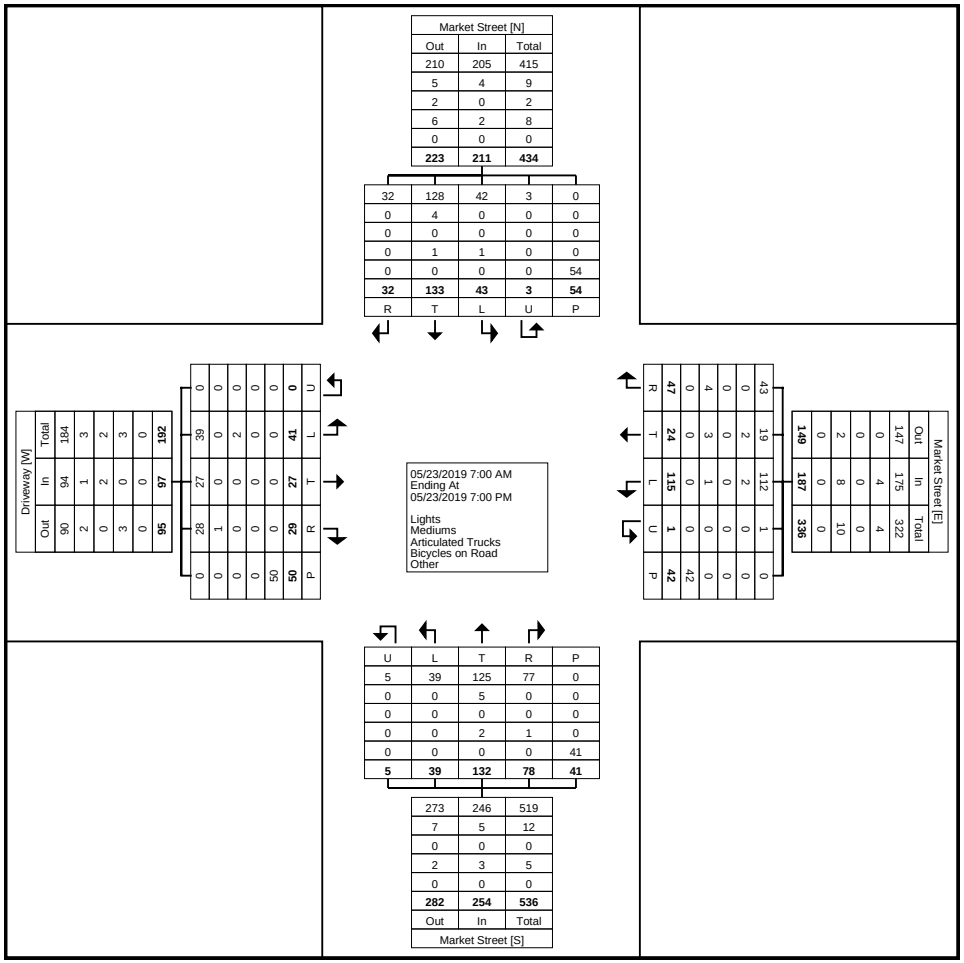
Start Time	Driveway Eastbound						Market Street Westbound						Market Street Northbound						Market Street Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	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	-	-

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 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

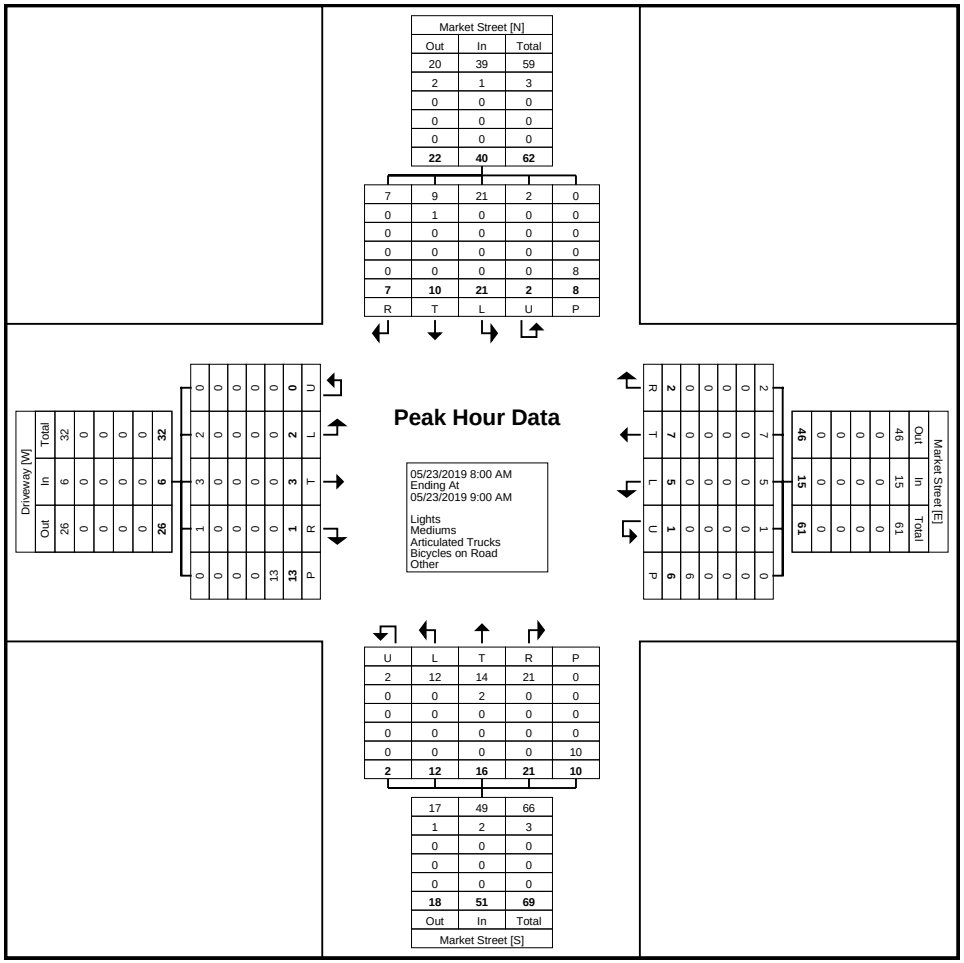
Turning Movement Peak Hour Data (8:00 AM)

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	-	-

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 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	-	-

Paradigm Transportation Solutions Limited
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Count Name: Market Street & Ray Street - Weekday
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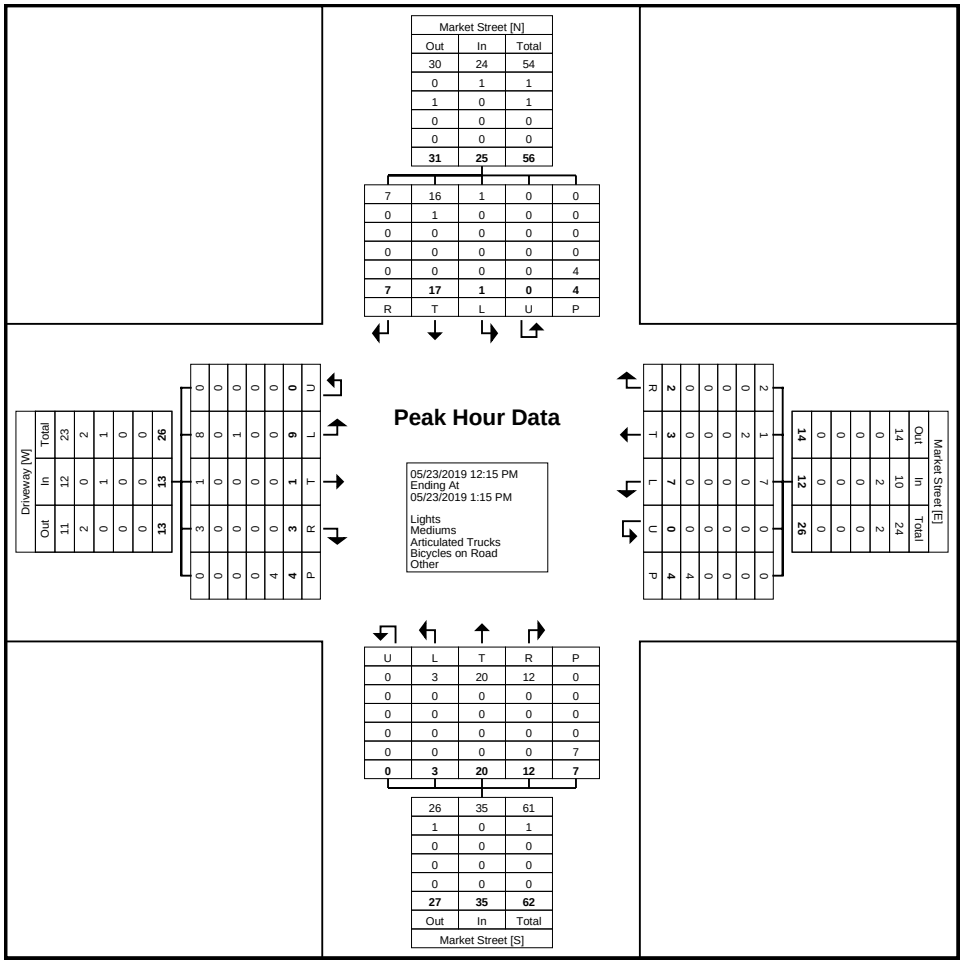
Start Date: 05/23/2019



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

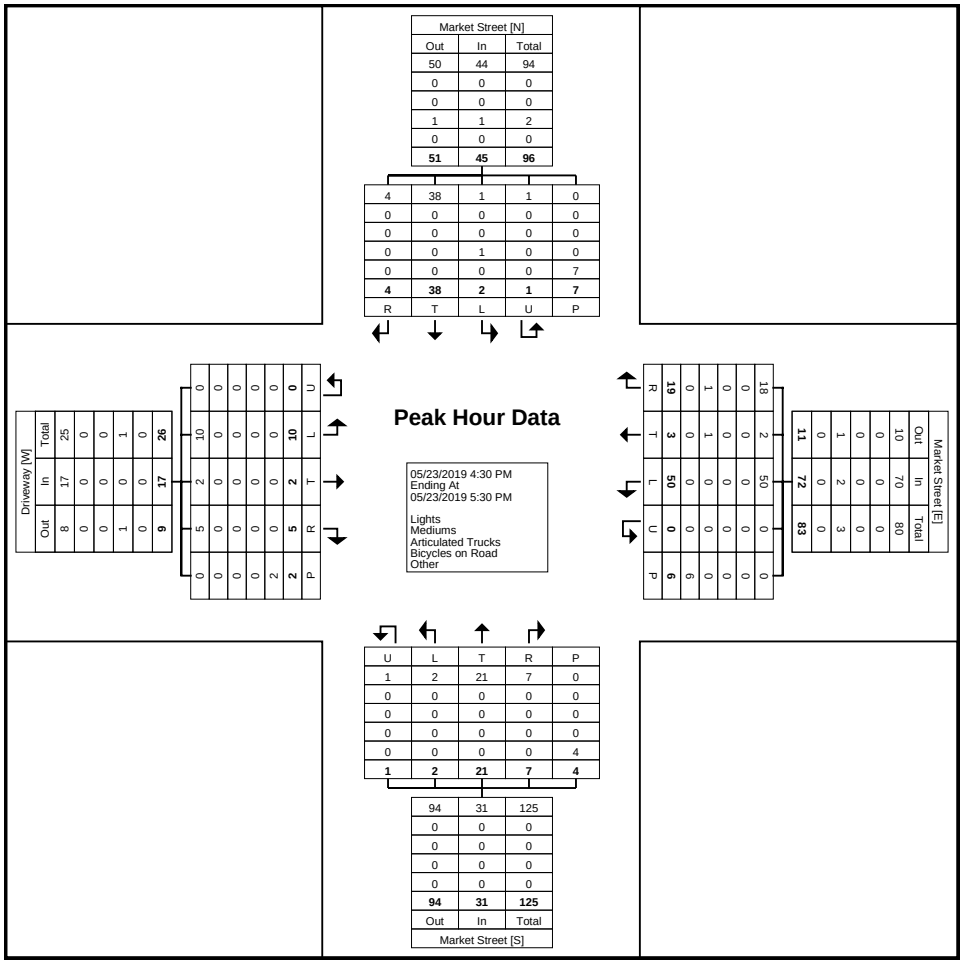
Turning Movement Peak Hour Data (4:30 PM)

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	-	-

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 Plot (4:30 PM)

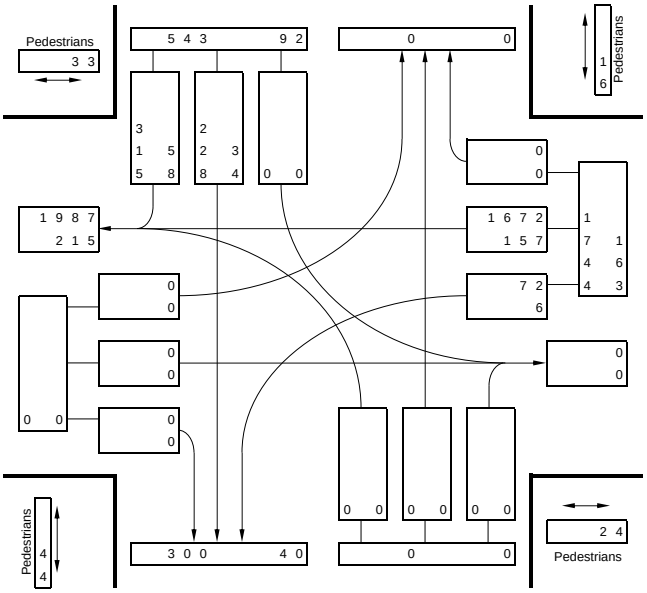
Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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

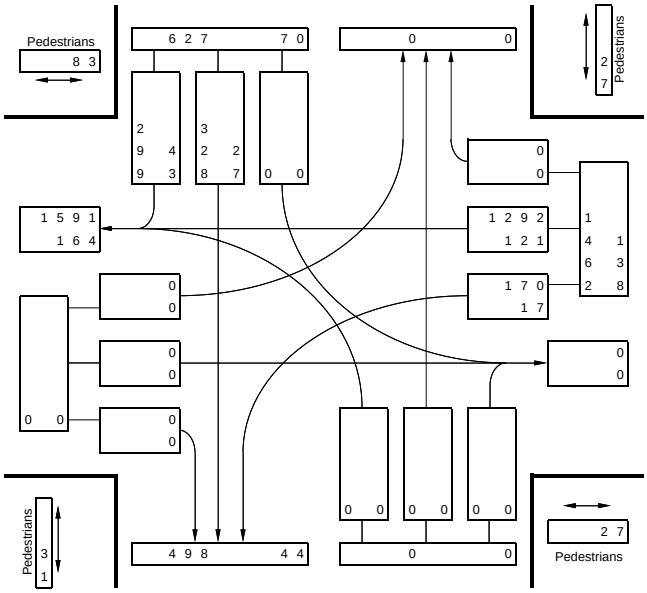
Count Name: Market Street & Ray Street - Weekday
Site Code:
Start Date: 05/23/2019

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

Intersection: **King St W** **at** **Queen St** Total Vehicles: 13,093 Date: Wednesday
Direction: (East/West) (North/South) M.V.E./Year: 9.660 Apr 17, 2019
Road Condition: Dry Weather: Clear AWDT Factor: 2.17 Period: 7 hours
Comments:

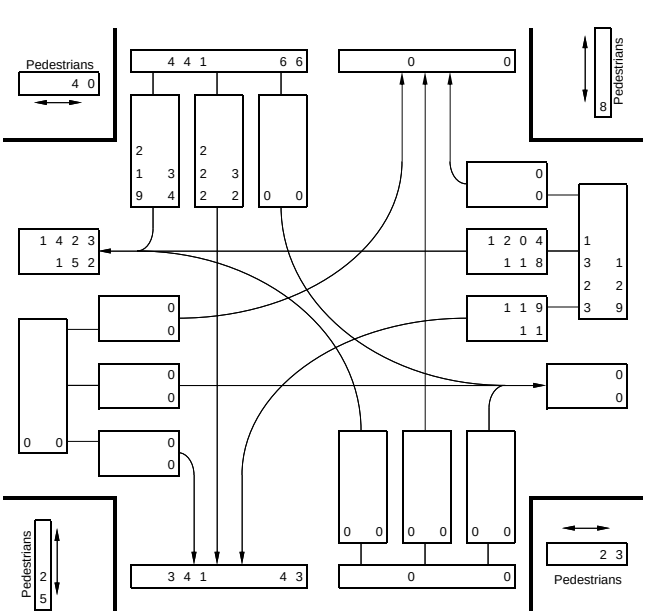


A.M. PEAK HOUR = 8:30 AM - 9:30 AM

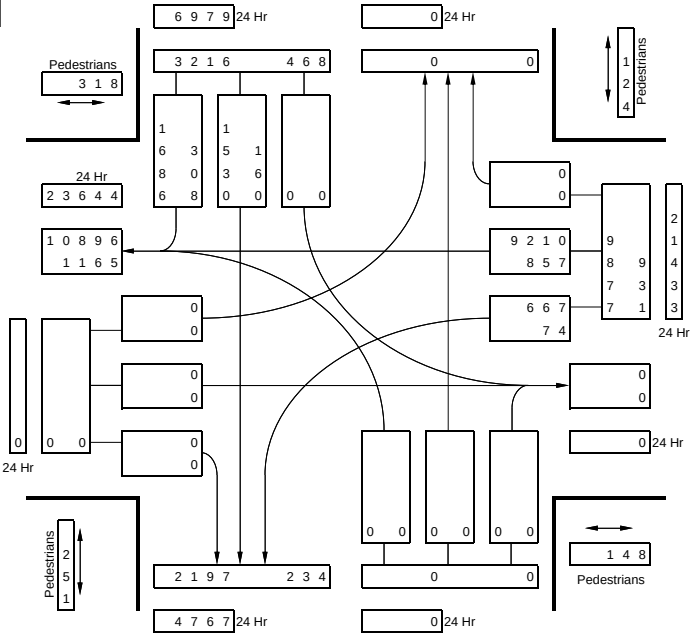


P.M. PEAK HOUR = 4:45 PM - 5:45 PM

N



NORMAL HOUR = 2:15 PM - 3:15 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: 13,093 Date: Wednesday
Direction: (East/West) (North/South) M.V.E./Year: 9.660 Apr 17, 2019
Road Condition: Dry Weather: Clear AWDT Factor: 2.17 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				Pedestrians			
(Pk.Hr.*)	L	S	R	L	S	R	L	S	R	L	S	R	Total Veh's	N side	E side	S side	W side
7:15	0	0	0	0	0	0	0	9	22	28	209	0	268	2	0	0	0
7:30	0	0	0	0	0	0	0	12	30	5	341	0	388	2	0	4	5
7:45	0	0	0	0	0	0	0	16	39	7	420	0	482	1	0	2	3
8:00	0	0	0	0	0	0	0	36	42	13	402	0	493	0	0	1	4
8:15	0	0	0	0	0	0	0	29	43	11	391	0	474	1	2	3	4
8:30	0	0	0	0	0	0	0	37	57	9	359	0	462	5	4	4	10
8:45 *	0	0	0	0	0	0	0	45	72	15	416	0	548	9	3	7	17
9:00 *	0	0	0	0	0	0	0	51	64	20	411	0	546	4	3	7	7
9:15 *	0	0	0	0	0	0	0	60	82	19	442	0	603	11	6	6	11
9:30 *	0	0	0	0	0	0	0	72	97	18	403	0	590	9	4	4	9
9:45	0	0	0	0	0	0	0	81	76	16	343	0	516	14	7	6	14
10:00	0	0	0	0	0	0	0	95	63	21	279	0	458	9	6	5	16
13:45	0	0	0	0	0	0	0	59	48	23	277	0	407	16	7	10	12
14:00	0	0	0	0	0	0	0	52	59	24	294	0	429	13	3	8	6
14:15	0	0	0	0	0	0	0	33	59	20	259	0	371	12	1	0	8
14:30 *	0	0	0	0	0	0	0	40	51	17	312	0	420	13	1	5	8
14:45 *	0	0	0	0	0	0	0	51	42	36	294	0	423	6	3	5	6
15:00 *	0	0	0	0	0	0	0	69	61	33	302	0	465	8	2	7	5
15:15 *	0	0	0	0	0	0	0	62	65	33	296	0	456	13	2	6	6
15:30	0	0	0	0	0	0	0	45	48	14	247	0	354	17	3	4	18
16:15	0	0	0	0	0	0	0	56	57	23	311	0	447	21	22	6	25
16:30	0	0	0	0	0	0	0	56	60	32	258	0	406	11	3	6	6
16:45	0	0	0	0	0	0	0	56	72	24	318	0	470	15	3	8	15
17:00 *	0	0	0	0	0	0	0	85	84	50	331	0	550	16	6	11	12
17:15 *	0	0	0	0	0	0	0	84	67	39	333	0	523	17	11	1	5
17:30 *	0	0	0	0	0	0	0	63	71	44	311	0	489	18	5	10	6
17:45 *	0	0	0	0	0	0	0	96	77	37	317	0	527	32	5	5	8
18:00	0	0	0	0	0	0	0	80	78	36	334	0	528	23	12	7	5
TOTAL	0	0	0	0	0	0	0	1,530	1,686	667	9,210	0		318	124	148	251
APPR.		0			0			3,216			9,877		13,093			841	

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	1	2	2	20	0	25
7:30	0	0	0	0	0	0	0	1	2	2	23	0	28
7:45	0	0	0	0	0	0	0	0	10	2	33	0	45
8:00	0	0	0	0	0	0	0	1	7	2	29	0	39
8:15	0	0	0	0	0	0	0	6	10	2	31	0	49
8:30	0	0	0	0	0	0	0	2	5	1	32	0	40
8:45 *	0	0	0	0	0	0	0	7	11	2	37	0	57
9:00 *	0	0	0	0	0	0	0	5	18	1	42	0	66
9:15 *	0	0	0	0	0	0	0	9	13	1	43	0	66
9:30 *	0	0	0	0	0	0	0	13	16	2	35	0	66
9:45	0	0	0	0	0	0	0	7	21	4	33	0	65
10:00	0	0	0	0	0	0	0	11	12	2	27	0	52
13:45	0	0	0	0	0	0	0	6	11	6	48	0	71
14:00	0	0	0	0	0	0	0	4	9	2	36	0	51
14:15	0	0	0	0	0	0	0	5	17	1	27	0	50
14:30 *	0	0	0	0	0	0	0	6	10	3	25	0	44
14:45 *	0	0	0	0	0	0	0	7	8	2	27	0	44
15:00 *	0	0	0	0	0	0	0	11	7	3	26	0	47
15:15 *	0	0	0	0	0	0	0	8	9	3	40	0	60
15:30	0	0	0	0	0	0	0	4	11	1	25	0	41
16:15	0	0	0	0	0	0	0	2	10	3	29	0	44
16:30	0	0	0	0	0	0	0	6	16	1	16	0	39
16:45	0	0	0	0	0	0	0	6	17	3	24	0	50
17:00 *	0	0	0	0	0	0	0	6	9	4	28	0	47
17:15 *	0	0	0	0	0	0	0	11	17	5	33	0	66
17:30 *	0	0	0	0	0	0	0	3	9	4	32	0	48
17:45 *	0	0	0	0	0	0	0	7	8	4	28	0	47
18:00	0	0	0	0	0	0	0	5	13	6	28	0	52
TOTAL	0	0	0	0	0	0	0	160	308	74	857	0	
APPR.		0			0			468			931		1,399

TRUCKS

7:15	0	0	0	0	0	0	0	1	2	1	16	0	20
7:30	0	0	0	0	0	0	0	1	2	1	16	0	20
7:45	0	0	0	0	0	0	0	0	10	2	28	0	40
8:00	0	0	0	0	0	0	0	1	7	1	21	0	30
8:15	0	0	0	0	0	0	0	4	10	1	22	0	37
8:30	0	0	0	0	0	0	0	2	5	0	23	0	30
8:45 *	0	0	0	0	0	0	0	6	10	1	27	0	44
9:00 *	0	0	0	0	0	0	0	4	18	1	30	0	53
9:15 *	0	0	0	0	0	0	0	5	12	1	26	0	44
9:30 *	0	0	0	0	0	0	0	9	16	1	17	0	43
9:45	0	0	0	0	0	0	0	7	21	3	17	0	48
10:00	0	0	0	0	0	0	0	11	12	1	15	0	39
13:45	0	0	0	0	0	0	0	5	11	5	34	0	55
14:00	0	0	0	0	0	0	0	4	9	1	27	0	41
14:15	0	0	0	0	0	0	0	5	17	1	18	0	41
14:30 *	0	0	0	0	0	0	0	6	9	2	16	0	33
14:45 *	0	0	0	0	0	0	0	6	8	2	18	0	34
15:00 *	0	0	0	0	0	0	0	11	7	2	19	0	39
15:15 *	0	0	0	0	0	0	0	8	9	3	32	0	52
15:30	0	0	0	0	0	0	0	3	11	1	19	0	34
16:15	0	0	0	0	0	0	0	1	10	3	20	0	34
16:30	0	0	0	0	0	0	0	6	16	0	11	0	33
16:45	0	0	0	0	0	0	0	6	17	3	16	0	42
17:00 *	0	0	0	0	0	0	0	5	9	4	21	0	39
17:15 *	0	0	0	0	0	0	0	11	15	4	21	0	51
17:30 *	0	0	0	0	0	0	0	3	9	3	24	0	39
17:45 *	0	0	0	0	0	0	0	6	8	4	19	0	37
18:00	0	0	0	0	0	0	0	5	13	5	19	0	42
TOTAL	0	0	0	0	0	0	0	142	303	57	592	0	
APPR.		0			0			445			649		1,094

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

Intersection: **King St W** **at** **Queen St** Total Vehicles: 14,755 Date: Wednesday
Direction: (East/West) (North/South) Apr 17, 2019
Road Condition: Dry Weather: Clear 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 N side	Pedestrians E side	Pedestrians S side	Pedestrians W side
	L	S	R	L	S	R	L	S	R	L	S	R	Veh's				
7:15	0	0	0	0	0	0	0	9	22	28	209	0	268	2	0	0	0
7:30	0	0	0	0	0	0	0	12	30	5	341	0	388	2	0	4	5
7:45	0	0	0	0	0	0	0	16	39	7	420	0	482	1	0	2	3
8:00	0	0	0	0	0	0	0	36	42	13	402	0	493	0	0	1	4
8:15	0	0	0	0	0	0	0	29	43	11	391	0	474	1	2	3	4
8:30	0	0	0	0	0	0	0	37	57	9	359	0	462	5	4	4	10
8:45	0	0	0	0	0	0	0	45	72	15	416	0	548	9	3	7	17
9:00	0	0	0	0	0	0	0	51	64	20	411	0	546	4	3	7	7
9:15	0	0	0	0	0	0	0	60	82	19	442	0	603	11	6	6	11
9:30	0	0	0	0	0	0	0	72	97	18	403	0	590	9	4	4	9
9:45	0	0	0	0	0	0	0	81	76	16	343	0	516	14	7	6	14
10:00	0	0	0	0	0	0	0	95	63	21	279	0	458	9	6	5	16
13:45	0	0	0	0	0	0	0	59	48	23	277	0	407	16	7	10	12
14:00	0	0	0	0	0	0	0	52	59	24	294	0	429	13	3	8	6
14:15	0	0	0	0	0	0	0	33	59	20	259	0	371	12	1	0	8
14:30	0	0	0	0	0	0	0	40	51	17	312	0	420	13	1	5	8
14:45	0	0	0	0	0	0	0	51	42	36	294	0	423	6	3	5	6
15:00	0	0	0	0	0	0	0	69	61	33	302	0	465	8	2	7	5
15:15	0	0	0	0	0	0	0	62	65	33	296	0	456	13	2	6	6
15:30	0	0	0	0	0	0	0	45	48	14	247	0	354	17	3	4	18
16:15	0	0	0	0	0	0	0	56	57	23	311	0	447	21	22	6	25
16:30	0	0	0	0	0	0	0	56	60	32	258	0	406	11	3	6	6
16:45	0	0	0	0	0	0	0	56	72	24	318	0	470	15	3	8	15
17:00	0	0	0	0	0	0	0	85	84	50	331	0	550	16	6	11	12
17:15	0	0	0	0	0	0	0	84	67	39	333	0	523	17	11	1	5
17:30	0	0	0	0	0	0	0	63	71	44	311	0	489	18	5	10	6
17:45	0	0	0	0	0	0	0	96	77	37	317	0	527	32	5	5	8
18:00	0	0	0	0	0	0	0	80	78	36	334	0	528	23	12	7	5
18:15	0	0	0	0	0	0	0	65	70	42	302	0	479	13	12	11	9
18:30	0	0	0	0	0	0	0	63	66	33	268	0	430	6	3	6	3
18:45	0	0	0	0	0	0	0	49	72	25	240	0	386	8	5	2	6
19:00	0	0	0	0	0	0	0	58	57	13	239	0	367	9	7	4	6
TOTAL	0	0	0	0	0	0	0	1,765	1,951	780	10,259	0		354	151	171	275
APPR.		0			0			3,716			11,039		14,755			951	

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			Total
	L	S	R	L	S	R	L	S	R	L	S	R	
7:15	0	0	0	0	0	0	0	1	2	2	20	0	25
7:30	0	0	0	0	0	0	0	1	2	2	23	0	28
7:45	0	0	0	0	0	0	0	0	10	2	33	0	45
8:00	0	0	0	0	0	0	0	1	7	2	29	0	39
8:15	0	0	0	0	0	0	0	6	10	2	31	0	49
8:30	0	0	0	0	0	0	0	2	5	1	32	0	40
8:45	0	0	0	0	0	0	0	7	11	2	37	0	57
9:00	0	0	0	0	0	0	0	5	18	1	42	0	66
9:15	0	0	0	0	0	0	0	9	13	1	43	0	66
9:30	0	0	0	0	0	0	0	13	16	2	35	0	66
9:45	0	0	0	0	0	0	0	7	21	4	33	0	65
10:00	0	0	0	0	0	0	0	11	12	2	27	0	52
13:45	0	0	0	0	0	0	0	6	11	6	48	0	71
14:00	0	0	0	0	0	0	0	4	9	2	36	0	51
14:15	0	0	0	0	0	0	0	5	17	1	27	0	50
14:30	0	0	0	0	0	0	0	6	10	3	25	0	44
14:45	0	0	0	0	0	0	0	7	8	2	27	0	44
15:00	0	0	0	0	0	0	0	11	7	3	26	0	47
15:15	0	0	0	0	0	0	0	8	9	3	40	0	60
15:30	0	0	0	0	0	0	0	4	11	1	25	0	41
16:15	0	0	0	0	0	0	0	2	10	3	29	0	44
16:30	0	0	0	0	0	0	0	6	16	1	16	0	39
16:45	0	0	0	0	0	0	0	6	17	3	24	0	50
17:00	0	0	0	0	0	0	0	6	9	4	28	0	47
17:15	0	0	0	0	0	0	0	11	17	5	33	0	66
17:30	0	0	0	0	0	0	0	3	9	4	32	0	48
17:45	0	0	0	0	0	0	0	7	8	4	28	0	47
18:00	0	0	0	0	0	0	0	5	13	6	28	0	52
18:15	0	0	0	0	0	0	0	6	13	3	30	0	52
18:30	0	0	0	0	0	0	0	4	14	3	25	0	46
18:45	0	0	0	0	0	0	0	2	10	1	25	0	38
19:00	0	0	0	0	0	0	0	5	6	0	20	0	31
TOTAL	0	0	0	0	0	0	0	177	351	81	957	0	
APPR.		0			0			528			1,038		1,566

TRUCKS

7:15	0	0	0	0	0	0	0	1	2	1	16	0	20
7:30	0	0	0	0	0	0	0	1	2	1	16	0	20
7:45	0	0	0	0	0	0	0	0	10	2	28	0	40
8:00	0	0	0	0	0	0	0	1	7	1	21	0	30
8:15	0	0	0	0	0	0	0	4	10	1	22	0	37
8:30	0	0	0	0	0	0	0	2	5	0	23	0	30
8:45	0	0	0	0	0	0	0	6	10	1	27	0	44
9:00	0	0	0	0	0	0	0	4	18	1	30	0	53
9:15	0	0	0	0	0	0	0	5	12	1	26	0	44
9:30	0	0	0	0	0	0	0	9	16	1	17	0	43
9:45	0	0	0	0	0	0	0	7	21	3	17	0	48
10:00	0	0	0	0	0	0	0	11	12	1	15	0	39
13:45	0	0	0	0	0	0	0	5	11	5	34	0	55
14:00	0	0	0	0	0	0	0	4	9	1	27	0	41
14:15	0	0	0	0	0	0	0	5	17	1	18	0	41
14:30	0	0	0	0	0	0	0	6	9	2	16	0	33
14:45	0	0	0	0	0	0	0	6	8	2	18	0	34
15:00	0	0	0	0	0	0	0	11	7	2	19	0	39
15:15	0	0	0	0	0	0	0	8	9	3	32	0	52
15:30	0	0	0	0	0	0	0	3	11	1	19	0	34
16:15	0	0	0	0	0	0	0	1	10	3	20	0	34
16:30	0	0	0	0	0	0	0	6	16	0	11	0	33
16:45	0	0	0	0	0	0	0	6	17	3	16	0	42
17:00	0	0	0	0	0	0	0	5	9	4	21	0	39
17:15	0	0	0	0	0	0	0	11	15	4	21	0	51
17:30	0	0	0	0	0	0	0	3	9	3	24	0	39
17:45	0	0	0	0	0	0	0	6	8	4	19	0	37
18:00	0	0	0	0	0	0	0	5	13	5	19	0	42
18:15	0	0	0	0	0	0	0	6	13	3	19	0	41
18:30	0	0	0	0	0	0	0	4	14	2	17	0	37
18:45	0	0	0	0	0	0	0	2	9	0	15	0	26
19:00	0	0	0	0	0	0	0	4	6	0	13	0	23
TOTAL	0	0	0	0	0	0	0	158	345	62	656	0	
APPR.		0			0			503			718		1,221

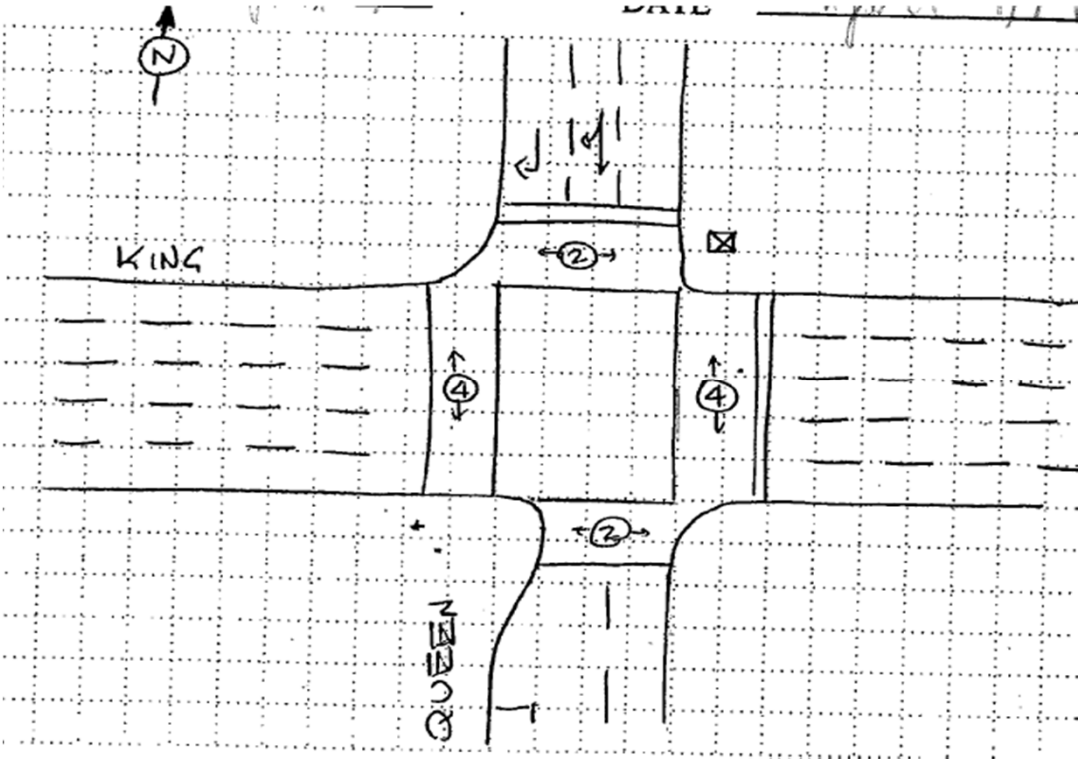
City of Hamilton - Traffic
Traffic Signal Controller Timing Data

Intersection: **King & Queen**

Controller Type: **3000E** Page **1** of **14**

Programmed By: **RDG** Installed By:

Date: **Aug 31/15** Date:



ϕ1:
ϕ2: **King - WB, North & South Xwalks**
ϕ3:
ϕ4: **Queen - SB, East & West Xwalks**
ϕ5:
ϕ6:
ϕ7:
ϕ8:

Flash Operation: **Red: Queen**
Red: King

SEQUENCE/START-UP (MM-3-1-1)

START-UP PHASES/INTERVAL/SEQUENCE

(X = Enable for start-up phases. Must be compatible if more than one)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
START-UP	Phases				**X**												
	Interval	**0**	(0=Red, 1=Yel, 2= Grn, determines color of selected phases above on start-up)														
	Flash	**10**	(0-255 seconds start-up flash time)														
	Red	**5.0**	(0-25.5 secs = length of first red after start-up if start-up in yellow or red)														
	Sequence	**2**	(2=single ring, 3=dual ring, 4=123/567+48, 5=12/56+3478, 6=1234/56+78, 7=1234/5678, 8=dual quad, 9=12ph														

PHASE RING ASSIGNMENTS

X = Phase assigned to ring (if used). Phases in different rings but same co-phase group can time together.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RING	Ring 1		**X**		**X**												
	Ring 2																
	Ring 3																
	Ring 4																

CO-PHASE GRP 1-4 ASSIGNMENTS

X = phase assigned to co-phase group. All ph's assigned to rings must be assigned to co-phase group.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CO-PHASE	CO PH 1		**X**														
	CO PH 2				**X**												
	CO PH 3																
	CO PH 4																

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CONTROLLER DATA

PHASE RECALLS/MODES; MIN, MAX, etc. (MM-3-1-2-1-PGDN, etc.) USE 1 TO ALL 4 TIMING PLANS

TP1 PHASE RECALLS

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK																
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

TP2 PHASE RECALLS

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK																
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

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CONTROLLER DATA

TP3 PHASE RECALLS

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK																
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

TP4 PHASE RECALLS

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	MIN RCL																
	MAX RCL																
	PED RCL																
	SOFT REC																
	NON-LOCK																
	VEH OMIT																
	PED OMIT																
	WLK REST																
	MAX II																
	RED REST																
	NO SKIP																

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CONTROLLER DATA

PHASE RECALLS/MODES; CNA, INH MAX, PED OPTIONS, etc. (MM-3-1-2-2) ONLY 1 PLAN PER UNIT

(X = ENABLE)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE RECALLS	CNA 1		X		X												
	CNA 2																
	CNA 3																
	CNA 4																
	WRM		X		X												
	INH MAX																
	PED RECY																
	FL WALK																
	FDW->YEL																
	FDW->RED																
	COND PED																

PHASE TIMES (MM-3-1-3-PGDN, etc.) USE 1 TO ALL 4 TIMING PLANS

TP1

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial		**20**		**10**												
	Passage																
	Yellow		**3.3**		**3.3**												
	Red		**2.0**		**2.2**												
	Walk		**12**		**7**												
	Ped Clr		**11**		**15**												
	Max 1		**40**		**40**												
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	AI/Act																
	Max In																

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CONTROLLER DATA

TP2

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial		**20**		**10**												
	Passage																
	Yellow		**3.3**		**3.3**												
	Red		**2.0**		**2.2**												
	Walk		**12**		**12**												
	Ped Clr		**11**		**15**												
	Max 1		**60**		**40**												
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	AI/Act																
	Max In																

TP3

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial		**20**		**10**												
	Passage																
	Yellow		**3.3**		**3.3**												
	Red		**2.0**		**2.5**												
	Walk		**12**		**12**												
	Ped Clr		**12**		**16**												
	Max 1		**60**		**40**												
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	AI/Act																
	Max In																

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CONTROLLER DATA

		TP4															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE TIMES	Initial																
	Passage																
	Yellow																
	Red																
	Walk																
	Ped Clr																
	Max 1																
	Max 2																
	Mx 3 Lim																
	Mx 3 Adh																
	TBR																
	TTR																
	Min Gap																
	AI/Act																
	Max In																

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SELECTION SOURCE (MM-3-2-2)

Entries determine how parameters get selected

Cycle Source:	**1**	0=TOD, 1=CL, 2=INT
Split Source:	**1**	0=TOD, 1=CL, 2=INT
Offset Source:	**1**	0=TOD, 1=CL, 2=INT

Free Source:	**1**	0=TOD, 1=CL, 2=INT
Flash Source:	**0**	0=TOD, 1=CL, 2=INT
Inter-TOD Revert:	**255**	0-255 SECS

TOD = Time of day control by internal clock, CL = Closed loop (comm), INT = Interconnect. Inter-TOD Revert is time allowed after failed interconnect before unit reverts to TOD (Time Base) control.

COORD BASIC OPTIONS (MM-3-2-3)

Reference to End (vs. begin) of Main St.:	**N**	Y/N: Y = Offset references to end of main st. green. N = Beginning of Main st. green.
Use % (vs. secs) for Phase Allocation:	**N**	Y/N: Y = Phase allocations loaded as percent of 100. N = Allocations in seconds.
Use % (vs. secs) for Offset Entry:	**N**	Y/N: Y = Offset loaded as percent of 100. N = Offset loaded in seconds.
Use Fixed (vs. floating) Force Offs:	**Y**	Y/N: Y = Force offs are fixed to cycle. N=Force offs like max times, begin with green.
Permissive Type:	**1**	0-2: 0=Yield, 1= Single, 2= Multiple. See Permissives note below

C/S TO TIMING PLAN (MM-3-2-9-6)

USE THIS CHART WHEN 4 SPLITS/CYCLE = Y

	CYCLE	1	2	3	4	5	6
SPLIT TO TIME PLAN	SPLIT 1	**1**	**2**	**3**	**4**		
	SPLIT 2						
	SPLIT 3						
	SPLIT 4						

(0-4 = TIME PLAN IMPLEMENTED WHEN SPLIT IN EFFECT)

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CYCLES & OFFSETS (MM-3-2-4)

NOTE: FIRST SPECIFY OFSET SEEKING MODE AND 4 SPLITS CYCLE MODE (ENHANCED OPTIONS, OPERATING MODES)

	Cycle #	1/1	2/1	3/1	4/1			
CYCLE & OFFSETS	Length	**70**	**90**	**90**				
	Offset 1	**17**	**67**	**70**				**Secs**
	Offset 2							
	Offset 3							
	Offset 4							
	Offset 5							
	Max Dwell	**32**	**32**	**32**				

COORD PHASES (MM-3-2-5)

	CYCLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COORD PHASES	**1-1**		**X**														
	2-1		**X**														
	3-1		**X**														
	4-1																

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PHASE ALLOCATION (MM-3-2-6)

ENTRY IN:	Secs	% or Secs: Not a controller entry--for reference only. Controller entry is under

	PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE ALLO-CATION	**C1 S1**		**42**		**28**												
	C1 S2																
	C1 S3																
	C1 S4																
	C2 S1		**57**		**33**												
	C2 S2																
	C2 S3																
	C2 S4																
	C3 S1		**57**		**33**												
	C3 S2																
	C3 S3																
	C3 S4																
	C4 S1																
	C4 S2																
	C4 S3																
	C4 S4																

OFFSET SEEKING MODE (MM-3-2-7)

Offset Seeeling Mode:	**0**

Mode

0 Add only, cycle times 20% slow only to get in sync

1 Dwell, cycle timer stops at cycle 0 up to max dwell time to get in step

2 Short Route, cycle times 20% fast or slow--whichever gets in step fastest

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ENHANCED OPTIONS

OPERATING OPTIONS (MM-3-2-9-1)

Enhanced Perm:	**Y**	Y/N: See note	Invert Free In:	**N**	Y/N: See note
Central Override:	**N**	Y/N: See note	Split Matrix:	**N**	Y/N: See note
No PCL Offset Adjust:	**N**	Y/N: See note	4 Splits/Cycle:	**Y**	Y/N: See note
			No Early Coord Ped:	**N**	Y/N: See note

Yield Percent	**0**	0-10%: See note
EGB%	**0**	0-100%: See note
RGB%	**0**	0-100%: See note
# Cycles to out of step:	**0**	0-255: 0=Disable

CYCLE SYNC OPTIONS (MM-3-2-9-2)

Sync Source:	**0**	0-2, 0=TOD/CL/Interconnect, 1= City Zero, 2= Absolute

Charts below only For City Zero offfsets or Absolute (0's). These are not daily reference times for Sync Source Option 0 (see TOD).

Cycle 1:	**0**	Cycle 2:	**0**	Cycle 3:	**0**
Cycle 4:	**0**	Cycle 5:	**0**	Cycle 6:	**0**

MANUAL/AUTO FORCE OFFS & PERMS

SET MANUAL MODE (MM-3-2-9-3-1)

Auto Perm and FO:	**Y**	Y/N: Y = Perms & Force offs auto-calculated from phase allocations. N = Manually entered
Ped Perm:	**0**	0-255: 0 = Auto calculated. 1-255 = secs each ped perm, starting with vehicle permissives

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CONTROLLER DATA

DAY PLANS (MM-3-3-1-#)

	HH	MM	CIRCUIT PLAN	C	O	S	CKT	ON/OFF
1	00	00					11(FRE)	OFF
	00	00		1	1	1		
2	00	00					11(FRE)	OFF
	00	00		1	1	1		
	06	00		2	1	1		
	10	00		1	1	1		
	14	30		3	1	1		
	18	30		1	1	1		

WEEK PLANS (MM-3-3-3)

Plan	SUN	MON	TUE	WED	THU	FRI	SAT
1	1	2	2	2	2	2	1
2							
3							
4							
5							

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CIRCUIT OVERRIDES (MM-3-3-6)

For each ciruit specify TOD (time of day controlled), or manually ON or OFF. Default = TOD

CIRCUIT OVER-RIDES	Circuit	65	66	67	68	69	70	71	72
	Function	LL1	LL2	LL3	LL4	LL5	LL6	LL7	LL8
	State								
	Circuit	**73**	74	75	76	**77**	78	79	80
	Function	**CN1**	CN2	CN3	CN4	**WRM**	MIN	DIM	CVS
	State	**ON**				**ON**			
CIRCUIT OVER-RIDES	Circuit	113	114	115	116	117	118	119	120
	Function	UD1	UD2	UD3	UD4	UD5	UD6	UD7	UD8
	State								
	Circuit	121	122	123	124	**125**	**126**	127	128
	Function	PH2	DP2	DP3	3CD	**EVL**	**EML**	ASC	DCP
	State					**ON**	**ON**		

DAYLIGHT SAVINGS (MM-3-3-7)

DAY LIGHT SAVINGS	Spring		Fall	
	(0-12)	(0-5)	(0-12)	(0-5)
	Month	WOM	Month	WOM
	3	**2**	**11**	**1**

Enter Month and Week of Month for Spring Forward and Fall Back days (typical 4 - 1 and 10 - 5). Unit will adjust at 2AM on Sunday of week specified. Enter zero (or leave blank) if Daylight Savings not used.

SYNC REFERENCE MODE (MM-3-3-8)

Mode:	**0**	0 = Time dependent, 1 = C/O/S Event

	HH	MM	
Time Clock Reset:	**00**	**00**	TOD clock reset to by TBC input
Interrupter:		**N**	Y/N; Y = Interrupter pulses provided
Pulses:		**0**	0-6 = Number of interrupter pulses

TIME DEPENDENT CYCLE REFERENCES		HH	MM		HH	MM		HH	MM
	CYC 1:	**00**	**00**	CYC 2:	**00**	**00**	CYC 3:	**00**	**00**
	CYC 4:	**00**	**00**	CYC 5:	**00**	**00**	CYC 6:	**00**	**00**

When mode = Time dependent, enter reference times of day for each cycle. Default = 00:00 = midnight = most commonly used reference.
When mode = C/O/S Event, cycle restarts on each COS change. Only use this mode for specific reasons. Time dependent most common used mode.

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CLOSED LOOP ID (MM-3-5-1)

CLOSED LOOP ID	Master Type:	**1**	0 = None, 1 = 3000 Series Master, 2 = 3800 EL master
	Intersection ID	**1**	0-255
	Master Identification	**14**	0-255
	Allow Comm Xfer Between Ports 2 & 3		Y/N: Y = Incoming signal on Master port (2 or 3), gets echo'd on other port

COMM SET-UP (MM-3-5-2)

PG1 PORT ASSIGN	Master (CL) Port:		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used to receive Master Comm)
	Monitor Port		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used for Monitor Data Upload)
	Central Port:		0 = None, 2 = Port 2, 3 = Port 3 (Port to be used for Direct Dial-up Modem)

PG2 PORT 2 SETUP	Data Rate:	**9600**	1200, 2400, 4800, 9600, 14400, 19200
	Parity	**0**	0 = None, 1 = Odd, 2=Even
	Data bits	**1**	0 = 7 bits, 1 = 8 bits

PG3 PORT 3 SETUP	Data Rate:	**1200**	1200, 2400, 4800, 9600, 14400, 19200
	Parity	**0**	0 = None, 1 = Odd, 2=Even
	Data bits	**1**	0 = 7 bits, 1 = 8 bits

PG4	Modem Set-up String:		Up to 40 charaters; A-Z, or # @ = , ! ; % \ &

PHONE NUMBERS (MM-3-5-3)

PHONE NUM-BERS	Tone:		Y/N
	Phone 1:		Number & control characters (W , ; # ' / T P) if used
	Phone 2:		Number & control characters (W , ; # ' / T P) if used

LOG DATA (MM-3-5-5)

PG1 SAMPLE	Volume Log Sample period:	**60**	0, 6, 10, 15, 20, 30, 60 minutes, Enabled by TOD Ckt. 125 (EVL)
	MOE Log Sample period:	**60**	0, 6, 10, 15, 20, 30, 60 minutes, Enabled by TOD Ckt. 126 (EML)

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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:

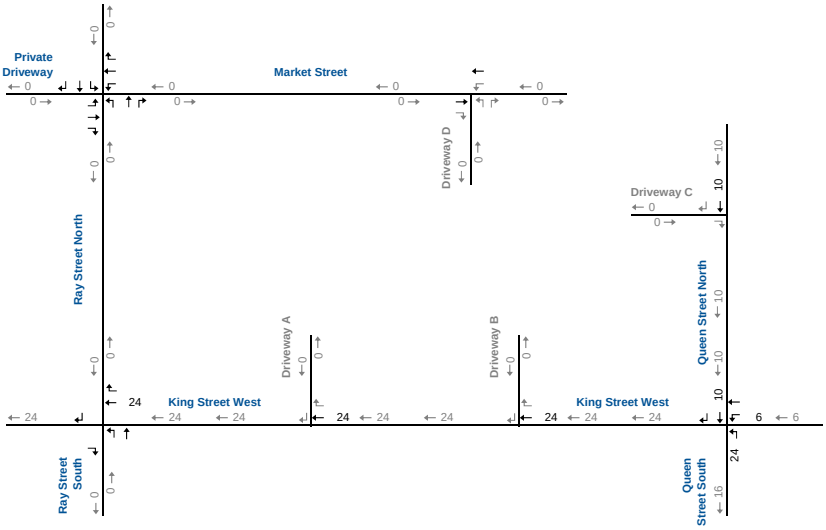
	PD 1 of To	PD 3 of To	PD 4 of To	PD 7 of To	Mississaug	Milton	Oakville	Burlington	Flamborou	Dundas	Ancaster	Glanbrook	Stoney Creek	Hamilton	
5187	42	0	0	0	51	0	359	613	0	0	0	0	153	3274	
5192	65	12	0	0	122	0	0	627	89	46	0	0	0	1663	
5195	0	0	207	0	77	101	0	82	0	141	43	0	0	476	
5200	117	0	0	41	0	0	48	514	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%	
	QEW	QEW	QEW	QEW	QEW	QEW	QEW	QEW	QEW	QEW	QEW		South Queen		

Appendix D

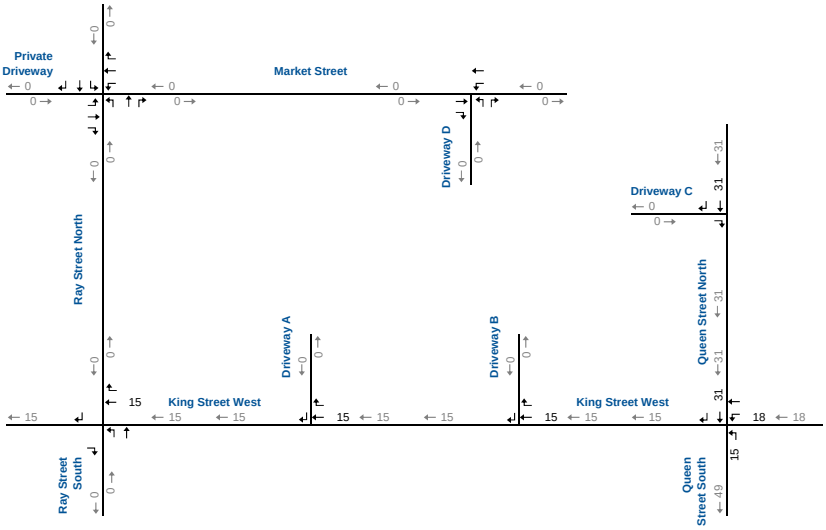
Background Development Projections

15 Queen Street

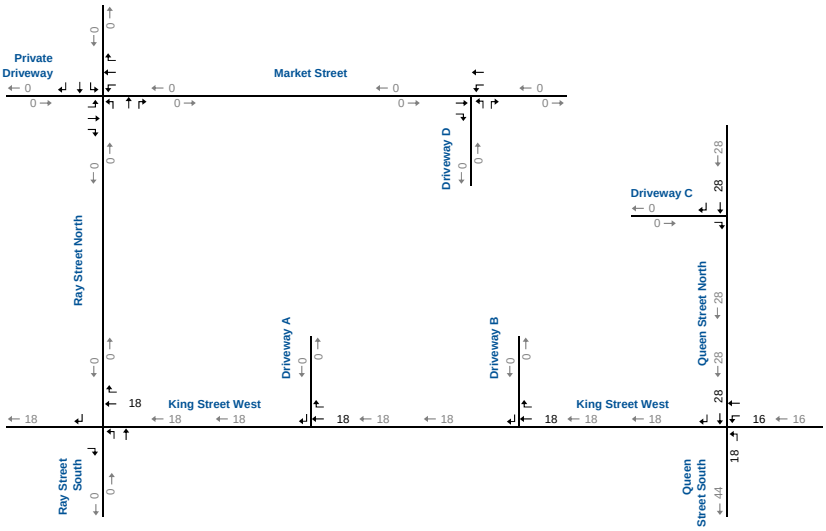
AM Peak Hour



PM Peak Hour

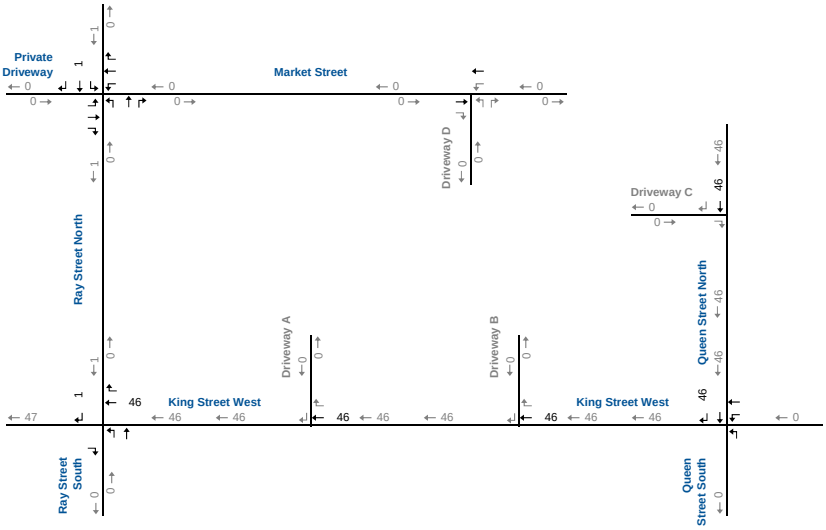


SAT Peak Hour

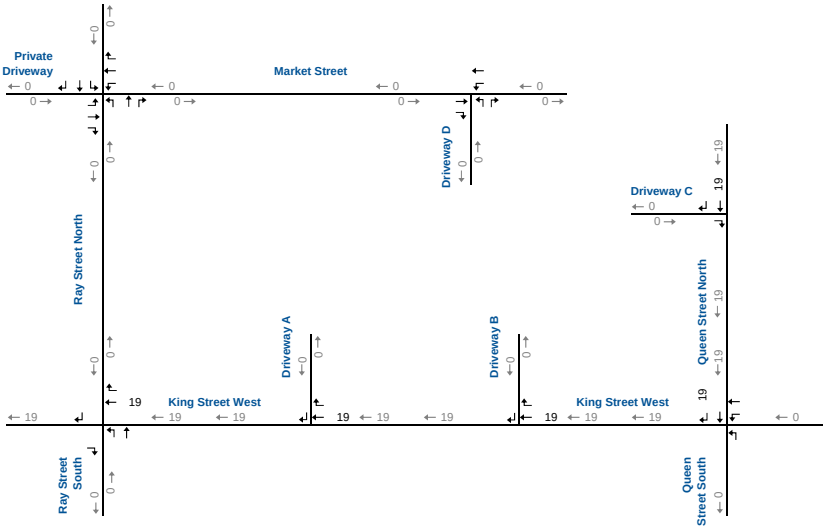


200 Market Street

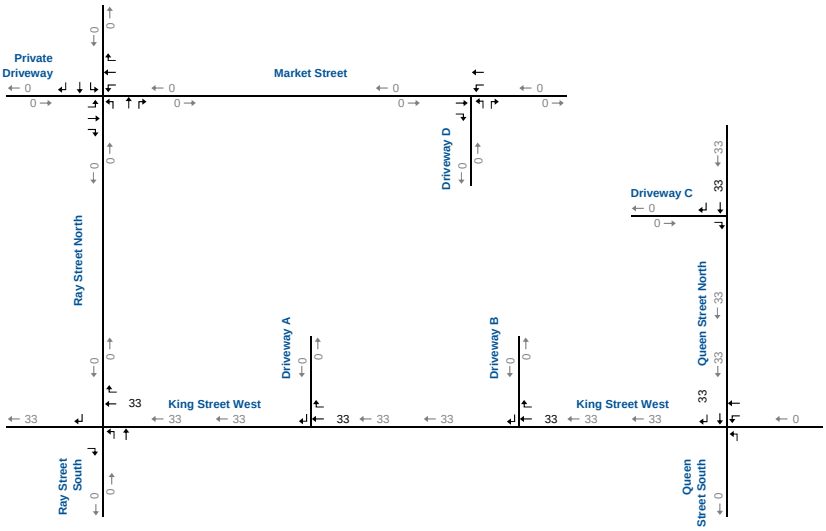
AM Peak Hour



PM Peak Hour



SAT Peak Hour

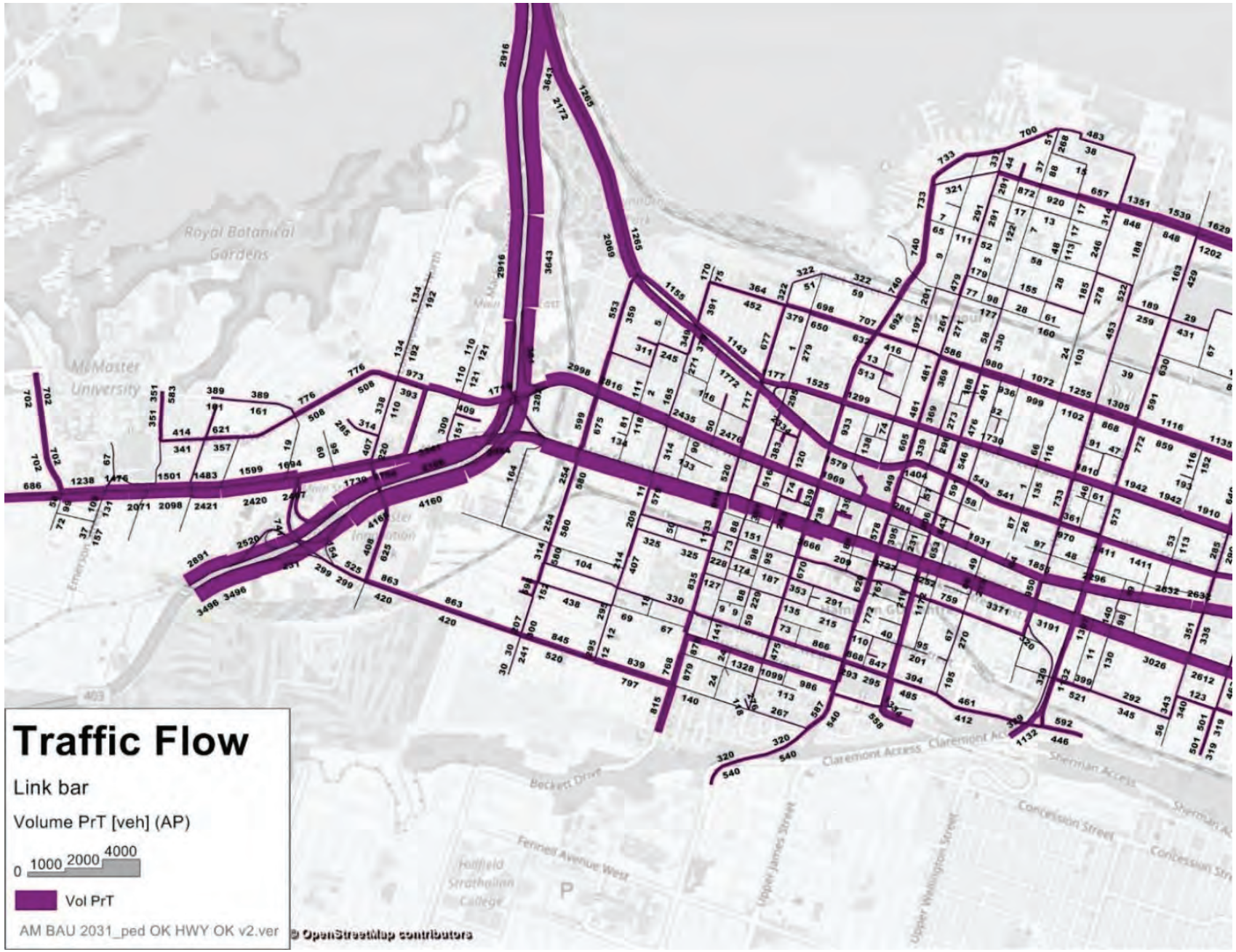


Appendix E

EMME Projections

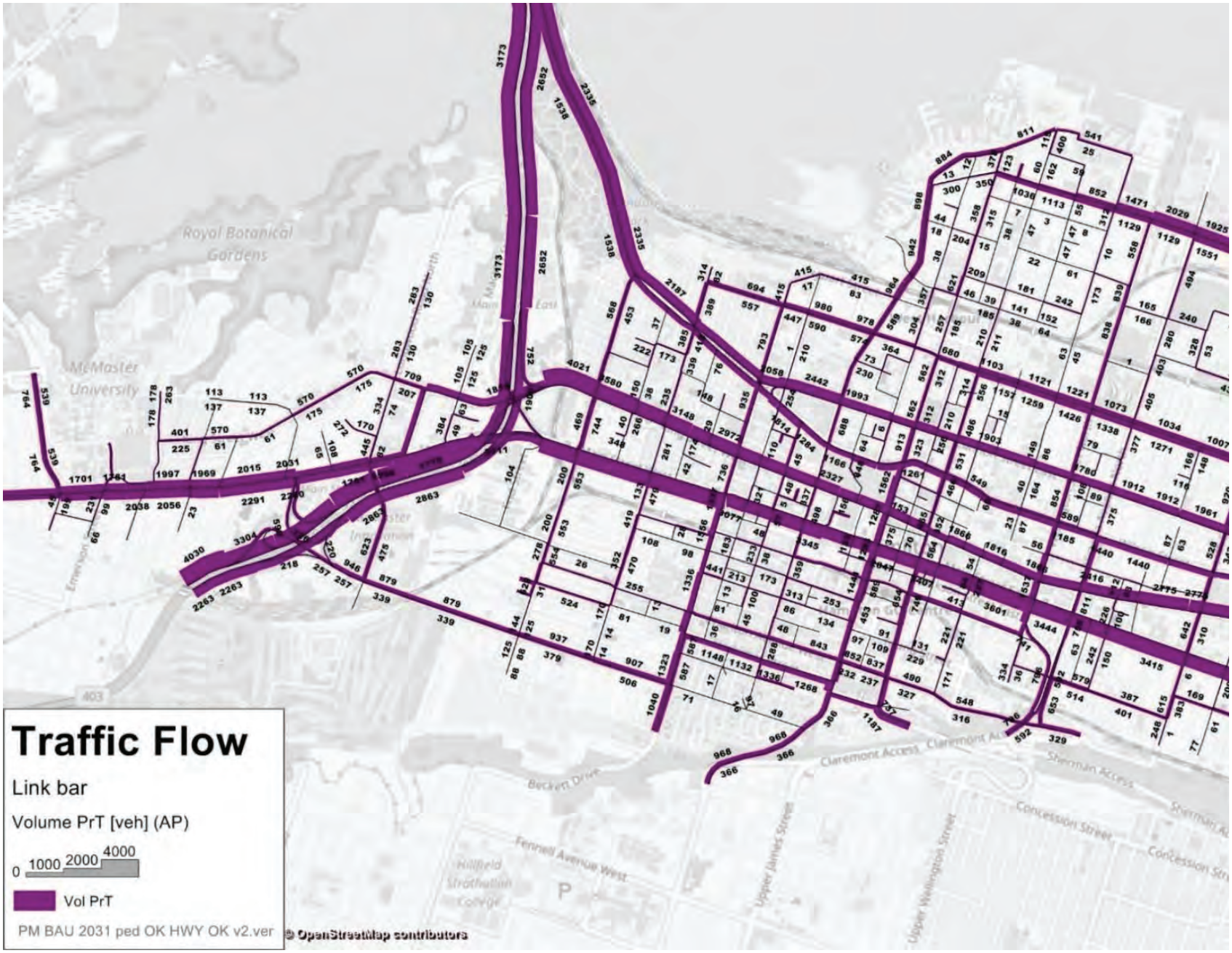
AM BAU VOLUMES

West



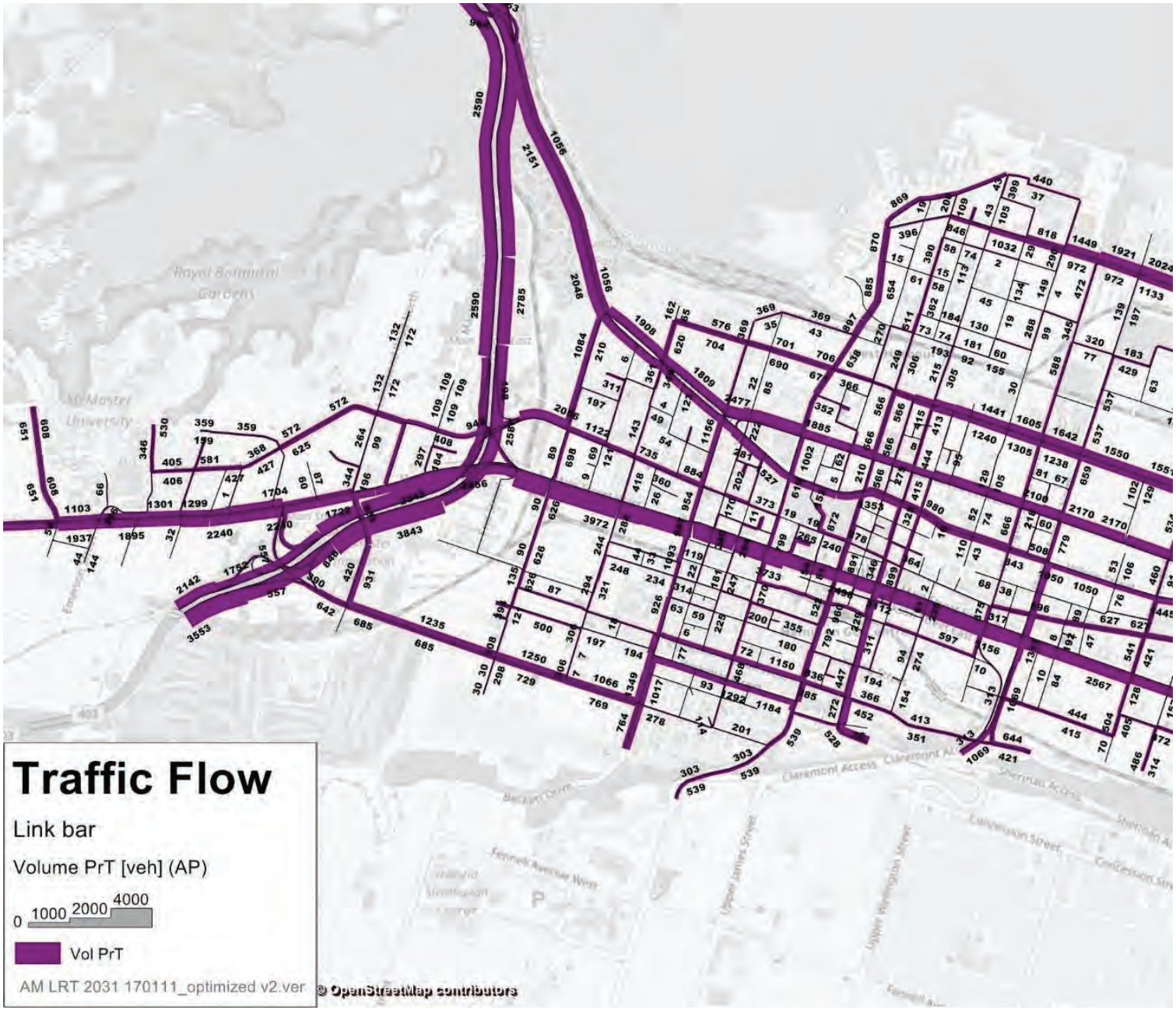
PM BAU VOLUMES

West



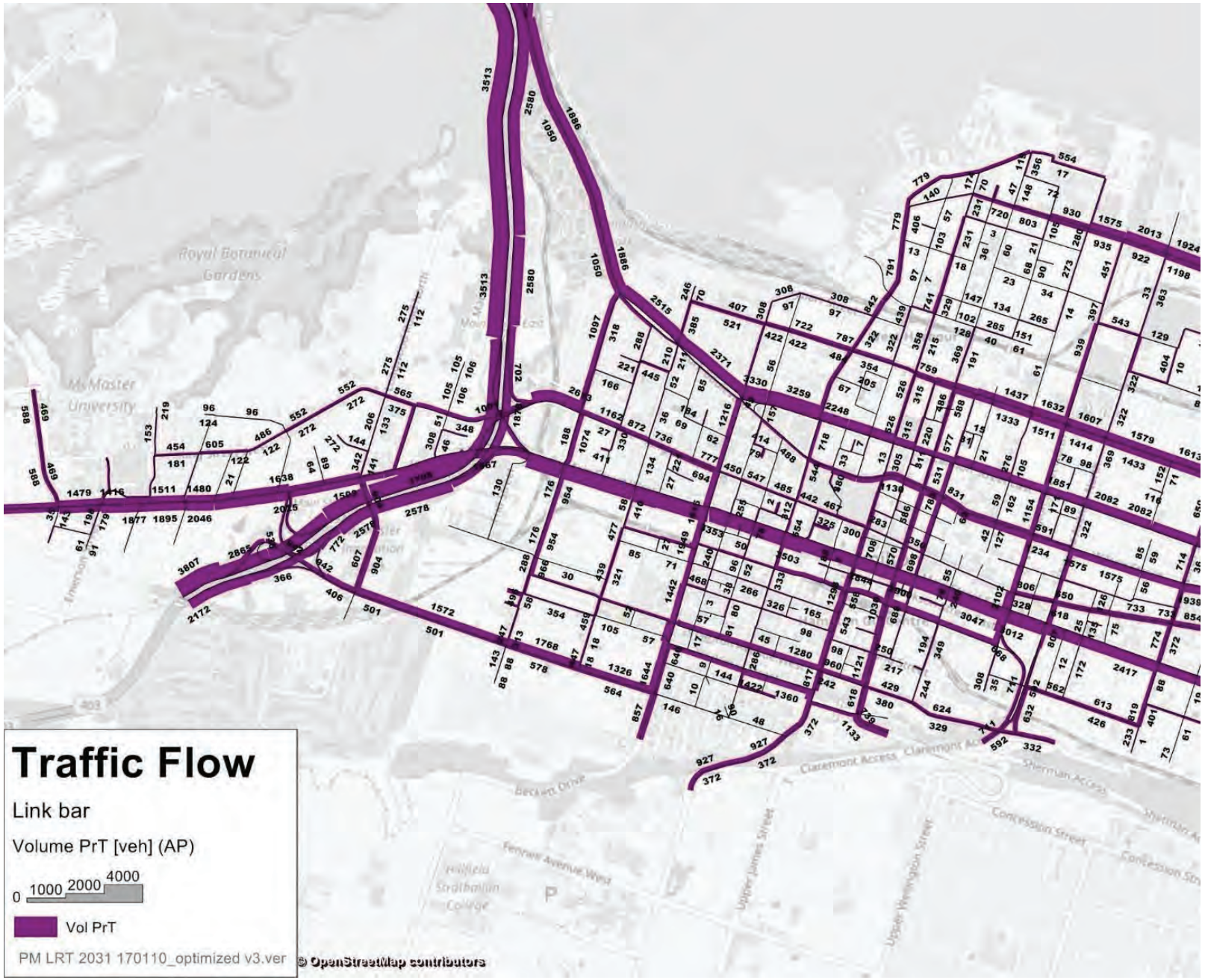
AM LRT VOLUMES

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	2179	36	44	5	0	0	0	22
Future Volume (vph)	0	0	0	13	2179	36	44	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					0.998						0.865	
Flt Protected								0.957				
Satd. Flow (prot)	0	0	0	0	6275	0	0	1753	0	0	1508	0
Flt Permitted								0.957				
Satd. Flow (perm)	0	0	0	0	6275	0	0	1753	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	2368	39	48	5	0	0	0	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2421	0	0	53	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	50.7%	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)	0	0	0	13	2179	36	44	5	0	0	0	22
Future Volume (Veh/h)	0	0	0	13	2179	36	44	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	2368	39	48	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	0.77						0.77	0.77		0.77	0.77	0.77
vC, conflicting volume	2433			13			658	2474	18	2449	2454	638
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1371			13			0	1424	18	1392	1399	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	94	100	100	100	97
cM capacity (veh/h)	374			1544			733	85	1040	70	105	801

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	409	789	789	434	53	24
Volume Left	14	0	0	0	48	0
Volume Right	0	0	0	39	0	24
cSH	1544	1700	1700	1700	426	801
Volume to Capacity	0.01	0.46	0.46	0.26	0.12	0.03
Queue Length 95th (m)	0.2	0.0	0.0	0.0	3.4	0.7
Control Delay (s)	0.3	0.0	0.0	0.0	14.7	9.6
Lane LOS	A				B	A
Approach Delay (s)	0.1				14.7	9.6
Approach LOS					B	A

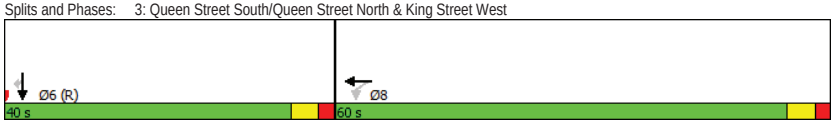
Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	50.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	72	1913	0	0	0	0	0	228	315
Future Volume (vph)	0	0	0	72	1913	0	0	0	0	0	228	315
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						0.97	0.93
Frt											0.942	0.850
Flt Protected					0.998							
Satd. Flow (prot)	0	0	0	0	5986	0	0	0	0	0	2730	1245
Flt Permitted					0.998							
Satd. Flow (perm)	0	0	0	0	5981	0	0	0	0	0	2730	1160
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)					25						5	25
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	2079	0	0	0	0	0	248	342
Shared Lane Traffic (%)												46%
Lane Group Flow (vph)	0	0	0	0	2157	0	0	0	0	0	405	185
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					8						6	
Permitted Phases				8								6
Minimum Split (s)				32.3	32.3						28.3	28.3
Total Split (s)				60.0	60.0						40.0	40.0
Total Split (%)				60.0%	60.0%						40.0%	40.0%
Maximum Green (s)				54.7	54.7						34.7	34.7
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				2.0	2.0						2.0	2.0
Lost Time Adjust (s)					-1.3						-1.3	-1.3
Total Lost Time (s)					4.0						4.0	4.0
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)					56.0						36.0	36.0
Actuated g/C Ratio					0.56						0.36	0.36
v/c Ratio					0.64						0.41	0.43

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					16.0						25.3	24.5
Queue Delay					0.0						0.0	0.0
Total Delay					16.0						25.3	24.5
LOS					B						C	C
Approach Delay					16.0						25.0	
Approach LOS					B						C	
Queue Length 50th (m)					81.8						33.2	26.5
Queue Length 95th (m)					94.2						47.5	48.9
Internal Link Dist (m)		137.8			97.6			69.7			45.6	
Turn Bay Length (m)												
Base Capacity (vph)					3360						986	433
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.64						0.41	0.43

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2: and 6:SBT, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 18.0		Intersection LOS: B	
Intersection Capacity Utilization 56.3%		ICU Level of Service B	
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	72	1913	0	0	0	0	0	228	315
Future Volume (vph)	0	0	0	72	1913	0	0	0	0	0	228	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0						4.0	4.0
Lane Util. Factor					0.86						0.91	0.91
Frpb, ped/bikes					1.00						0.97	0.93
Flpb, ped/bikes					1.00						1.00	1.00
Frt					1.00						0.94	0.85
Flt Protected					1.00						1.00	1.00
Satd. Flow (prot)					5982						2730	1160
Flt Permitted					1.00						1.00	1.00
Satd. Flow (perm)					5982						2730	1160
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	2079	0	0	0	0	0	248	342
RTOR Reduction (vph)	0	0	0	0	11	0	0	0	0	0	3	16
Lane Group Flow (vph)	0	0	0	0	2146	0	0	0	0	0	402	169
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					8						6	
Permitted Phases				8								6
Actuated Green, G (s)					54.7						34.7	34.7
Effective Green, g (s)					56.0						36.0	36.0
Actuated g/C Ratio					0.56						0.36	0.36
Clearance Time (s)					5.3						5.3	5.3
Lane Grp Cap (vph)					3349						982	417
v/s Ratio Prot											c0.15	
v/s Ratio Perm					0.36							0.15
v/c Ratio					0.64						0.41	0.41
Uniform Delay, d1					15.1						24.0	24.0
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					1.0						1.3	2.9
Delay (s)					16.1						25.3	26.9
Level of Service					B						C	C
Approach Delay (s)		0.0			16.1			0.0			25.8	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	5	50	3	19	2	21	7	2	38	4
Future Volume (vph)	10	2	5	50	3	19	2	21	7	2	38	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			0.967			0.997			0.998	
Satd. Flow (prot)	0	1773	0	0	1771	0	0	1832	0	0	1875	0
Flt Permitted		0.970			0.967			0.997			0.998	
Satd. Flow (perm)	0	1773	0	0	1771	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	54	3	21	2	23	8	2	41	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	18	0	0	78	0	0	33	0	0	47	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	18.9%	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)	10	2	5	50	3	19	2	21	7	2	38	4
Future Volume (Veh/h)	10	2	5	50	3	19	2	21	7	2	38	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	54	3	21	2	23	8	2	41	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	90	49	94	88	40	47			37		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	110	90	49	94	88	40	47			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)	841	797	1020	875	799	1026	1571			1579		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	18	78	33	47
Volume Left	11	54	2	2
Volume Right	5	21	8	4
cSH	878	907	1571	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	9.3	0.5	0.3
Lane LOS	A	A	A	A
Approach Delay (s)	9.2	9.3	0.5	0.3
Approach LOS	A	A		

Intersection Summary				
Average Delay	5.2			
Intersection Capacity Utilization	18.9%	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	19	1740	31	41	2	0	0	0	26
Future Volume (vph)	0	0	0	19	1740	31	41	2	0	0	0	26
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					0.999			0.954				
Satd. Flow (prot)	0	0	0	0	6386	0	0	1813	0	0	1644	0
Flt Permitted					0.999			0.954				
Satd. Flow (perm)	0	0	0	0	6386	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	1891	34	45	2	0	0	0	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1946	0	0	47	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 43.6%		ICU Level of Service A	
Analysis Period (min) 15			

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

Existing PM.syn
10-10-2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	19	1740	31	41	2	0	0	0	26
Future Volume (Veh/h)	0	0	0	19	1740	31	41	2	0	0	0	26
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	1891	34	45	2	0	0	0	28
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	0.84						0.84	0.84		0.84	0.84	0.84
vC, conflicting volume	1971			19			562	2032	20	1998	2015	536
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1211			19			0	1283	20	1243	1263	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			94	98	100	100	100	97
cM capacity (veh/h)	472			1585			783	131	1042	101	135	883

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	336	630	630	349	47	28
Volume Left	21	0	0	0	45	0
Volume Right	0	0	0	34	0	28
cSH	1585	1700	1700	1700	646	883
Volume to Capacity	0.01	0.37	0.37	0.21	0.07	0.03
Queue Length 95th (m)	0.3	0.0	0.0	0.0	1.9	0.8
Control Delay (s)	0.6	0.0	0.0	0.0	11.0	9.2
Lane LOS	A				B	A
Approach Delay (s)	0.1				11.0	9.2
Approach LOS					B	A

Intersection Summary					
Average Delay	0.5				
Intersection Capacity Utilization	43.6%	ICU Level of Service		A	
Analysis Period (min)	15				

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

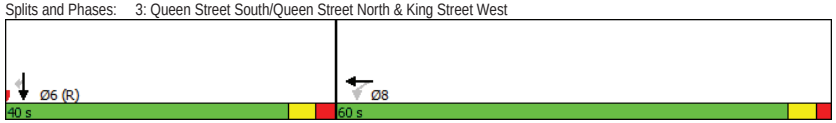
Existing PM.syn
10-10-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	170	1491	0	0	0	0	0	328	299
Future Volume (vph)	0	0	0	170	1491	0	0	0	0	0	328	299
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											0.963	0.850
Flt Protected					0.995							
Satd. Flow (prot)	0	0	0	0	5961	0	0	0	0	0	3004	1289
Flt Permitted					0.995							
Satd. Flow (perm)	0	0	0	0	5943	0	0	0	0	0	3004	1225
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)					45						14	25
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	185	1621	0	0	0	0	0	357	325
Shared Lane Traffic (%)												36%
Lane Group Flow (vph)	0	0	0	0	1806	0	0	0	0	0	474	208
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					8						6	
Permitted Phases				8								6
Minimum Split (s)				33.3	33.3						29.8	29.8
Total Split (s)				60.0	60.0						40.0	40.0
Total Split (%)				60.0%	60.0%						40.0%	40.0%
Maximum Green (s)				54.7	54.7						34.2	34.2
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				2.0	2.0						2.5	2.5
Lost Time Adjust (s)					-1.3						-1.8	-1.8
Total Lost Time (s)					4.0						4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				12.0	12.0						12.0	12.0
Flash Dont Walk (s)				16.0	16.0						12.0	12.0
Pedestrian Calls (#/hr)				0	0						0	0
Act Effct Green (s)					56.0						36.0	36.0
Actuated g/C Ratio					0.56						0.36	0.36
v/c Ratio					0.54						0.43	0.46

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					14.2						25.0	25.3
Queue Delay					0.0						0.0	0.0
Total Delay					14.2						25.0	25.3
LOS					B						C	C
Approach Delay					14.2						25.1	
Approach LOS					B						C	
Queue Length 50th (m)					61.8						38.5	30.8
Queue Length 95th (m)					72.2						54.0	54.8
Internal Link Dist (m)		137.8			97.6			69.7			45.6	
Turn Bay Length (m)												
Base Capacity (vph)					3347						1090	457
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.54						0.43	0.46

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2: and 6:SBT, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.54			
Intersection Signal Delay: 17.2		Intersection LOS: B	
Intersection Capacity Utilization 52.5%		ICU Level of Service A	
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	170	1491	0	0	0	0	0	328	299
Future Volume (vph)	0	0	0	170	1491	0	0	0	0	0	328	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0						4.0	4.0
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						0.96	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					5943						3004	1225
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					5943						3004	1225
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	185	1621	0	0	0	0	0	357	325
RTOR Reduction (vph)	0	0	0	0	20	0	0	0	0	0	9	16
Lane Group Flow (vph)	0	0	0	0	1786	0	0	0	0	0	465	192
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					8						6	
Permitted Phases				8								6
Actuated Green, G (s)					54.7						34.2	34.2
Effective Green, g (s)					56.0						36.0	36.0
Actuated g/C Ratio					0.56						0.36	0.36
Clearance Time (s)					5.3						5.8	5.8
Lane Grp Cap (vph)					3328						1081	441
v/s Ratio Prot											0.15	
v/s Ratio Perm					0.30							c0.16
v/c Ratio					0.54						0.43	0.44
Uniform Delay, d1					13.8						24.2	24.3
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					0.6						1.3	3.1
Delay (s)					14.5						25.5	27.4
Level of Service					B						C	C
Approach Delay (s)		0.0			14.5			0.0			26.1	
Approach LOS		A			B			A			C	

Intersection Summary				
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	52.5%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	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		

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		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	11	1843	24	40	6	0	0	1	21
Future Volume (vph)	0	0	0	11	1843	24	40	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	2003	26	43	7	0	0	1	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2041	0	0	50	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	45.4%	ICU Level of Service A	
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	11	1843	24	40	6	0	0	1	21
Future Volume (Veh/h)	0	0	0	11	1843	24	40	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	2003	26	43	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	0.79						0.79	0.79		0.79	0.79	0.79
vC, conflicting volume	2071			21			569	2116	25	2090	2103	556
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1025			21			0	1082	25	1048	1065	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)	513			1517			737	163	1030	130	167	831

Direction, Lane #	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	346	668	668	360	50	24
Volume Left	12	0	0	0	43	0
Volume Right	0	0	0	26	0	23
cSH	1517	1700	1700	1700	494	713
Volume to Capacity	0.01	0.39	0.39	0.21	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	13.1	10.2
Lane LOS	A				B	B
Approach Delay (s)	0.1				13.1	10.2
Approach LOS					B	B

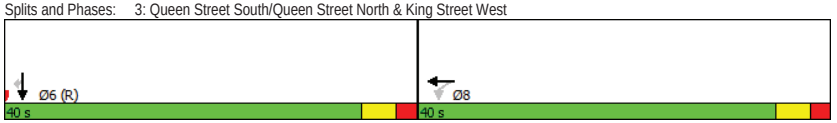
Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	45.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	1599	0	0	0	0	0	458	279
Future Volume (vph)	0	0	0	169	1599	0	0	0	0	0	458	279
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	6373	0	0	0	0	0	3359	1417
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)					40						4	31
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	184	1738	0	0	0	0	0	498	303
Shared Lane Traffic (%)												20%
Lane Group Flow (vph)	0	0	0	0	1922	0	0	0	0	0	559	242
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					8						6	
Permitted Phases				8								6
Minimum Split (s)				32.3	32.3						28.5	28.5
Total Split (s)				40.0	40.0						40.0	40.0
Total Split (%)				50.0%	50.0%						50.0%	50.0%
Maximum Green (s)				34.7	34.7						34.5	34.5
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				2.0	2.0						2.2	2.2
Lost Time Adjust (s)					-1.3						-1.8	-1.8
Total Lost Time (s)					4.0						3.7	3.7
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0						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)					36.0						36.3	36.3
Actuated g/C Ratio					0.45						0.45	0.45
v/c Ratio					0.67						0.37	0.37

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					18.3						15.1	14.3
Queue Delay					0.0						0.0	0.0
Total Delay					18.3						15.1	14.3
LOS					B						B	B
Approach Delay					18.3						14.9	
Approach LOS					B						B	
Queue Length 50th (m)					65.9						30.6	22.9
Queue Length 95th (m)					78.9						43.2	42.1
Internal Link Dist (m)		137.8			97.6			69.7			175.6	
Turn Bay Length (m)												
Base Capacity (vph)					2889						1526	659
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.67						0.37	0.37

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2: and 6:SBT, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 17.3		Intersection LOS: B	
Intersection Capacity Utilization 53.2%		ICU Level of Service A	
Analysis Period (min) 15			

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



HCM Signalized Intersection Capacity Analysis — Existing Sat.syn
3: Queen Street South/Queen Street North & King Street West — 10-10-2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	169	1599	0	0	0	0	0	458	279
Future Volume (vph)	0	0	0	169	1599	0	0	0	0	0	458	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0						3.7	3.7
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)					6375						3358	1417
Flt Permitted					1.00						1.00	1.00
Satd. Flow (perm)					6375						3358	1417
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	1738	0	0	0	0	0	498	303
RTOR Reduction (vph)	0	0	0	0	22	0	0	0	0	0	2	17
Lane Group Flow (vph)	0	0	0	0	1900	0	0	0	0	0	557	225
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					8						6	
Permitted Phases				8								6
Actuated Green, G (s)					34.7						34.5	34.5
Effective Green, g (s)					36.0						36.3	36.3
Actuated g/C Ratio					0.45						0.45	0.45
Clearance Time (s)					5.3						5.5	5.5
Lane Grp Cap (vph)					2868						1523	642
v/s Ratio Prot											c0.17	
v/s Ratio Perm					0.30							0.16
v/c Ratio					0.66						0.37	0.35
Uniform Delay, d1					17.2						14.3	14.2
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					1.2						0.7	1.5
Delay (s)					18.5						15.0	15.7
Level of Service					B						B	B
Approach Delay (s)		0.0			18.5			0.0			15.2	
Approach LOS		A			B			A			B	

Intersection Summary				
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.51			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.7	
Intersection Capacity Utilization	53.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Lanes, Volumes, Timings — 2026 Background AM.syn
1: Ray Street North & Market Street — 10-10-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	3	1	6	8	2	14	18	24	24	12	8
Future Volume (vph)	2	3	1	6	8	2	14	18	24	24	12	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		0.977			0.985			0.942			0.975	
Flt Protected		0.984			0.981			0.988			0.974	
Satd. Flow (prot)	0	1827	0	0	1836	0	0	1701	0	0	1757	0
Flt Permitted		0.984			0.981			0.988			0.974	
Satd. Flow (perm)	0	1827	0	0	1836	0	0	1701	0	0	1757	0
Link Speed (k/h)		50			40			40			40	
Link Distance (m)		83.3			136.0			94.4			96.5	
Travel Time (s)		6.0			12.2			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	7	9	2	15	20	26	26	13	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	6	0	0	18	0	0	61	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 20.8%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	3	1	6	8	2	14	18	24	24	12	8
Future Volume (Veh/h)	2	3	1	6	8	2	14	18	24	24	12	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	3	1	7	9	2	15	20	26	26	13	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	159	164	40	151	156	46	35			52		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	159	164	40	151	156	46	35			52		
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			98		
cM capacity (veh/h)	764	701	1017	781	709	1018	1572			1559		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	6	18	61	48
Volume Left	2	7	15	26
Volume Right	1	2	26	9
cSH	761	762	1572	1559
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)	9.8	9.8	1.9	4.0
Lane LOS	A	A	A	A
Approach Delay (s)	9.8	9.8	1.9	4.0
Approach LOS	A	A		

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	20.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	360	0	1109	41	0	0	0	0	0	26
Future Volume (vph)	0	0	360	0	1109	41	0	0	0	0	0	26
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			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	391	0	1205	45	0	0	0	0	0	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	391	0	1250	0	0	0	0	0	0	28
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 71.3%		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	360	0	1109	41	0	0	0	0	0	26
Future Volume (Veh/h)	0	0	360	0	1109	41	0	0	0	0	0	26
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	1205	45	0	0	0	0	0	28
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	1276			404			1270	1289	18	1454	1658	1254
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1194			404			1186	1212	18	1437	1715	1165
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	83
cM capacity (veh/h)	419			1123			99	121	1056	78	65	164

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	391	1250	28
Volume Left	0	0	0
Volume Right	391	45	28
cSH	1700	1700	164
Volume to Capacity	0.23	0.74	0.17
Queue Length 95th (m)	0.0	0.0	4.8
Control Delay (s)	0.0	0.0	31.4
Lane LOS			D
Approach Delay (s)	0.0	0.0	31.4
Approach LOS			D

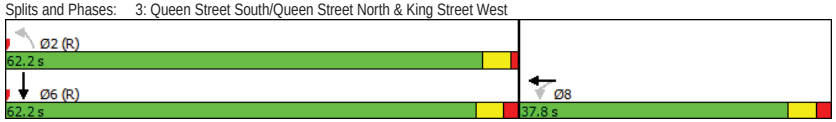
Intersection Summary					
Average Delay	0.5				
Intersection Capacity Utilization	71.3%	ICU Level of Service		C	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	89	350	0	229	0	0	0	442	617
Future Volume (vph)	0	0	0	89	350	0	229	0	0	0	442	617
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		0.95					0.96
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		0.454					
Satd. Flow (perm)	0	0	0	0	1720	0	807	0	0	0	3139	1312
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												469
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	97	380	0	249	0	0	0	480	671
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	477	0	249	0	0	0	480	671
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	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Minimum Split (s)				32.3	32.3		22.5				28.3	
Total Split (s)				37.8	37.8		62.2				62.2	
Total Split (%)				37.8%	37.8%		62.2%				62.2%	
Maximum Green (s)				32.5	32.5		57.7				56.9	
Yellow Time (s)				3.3	3.3		3.5				3.3	
All-Red Time (s)				2.0	2.0		1.0				2.0	
Lost Time Adjust (s)					-1.3		0.0				-1.3	
Total Lost Time (s)					4.0		4.5				4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				12.0	12.0		7.0				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)					33.8		57.7				58.2	100.0
Actuated g/C Ratio					0.34		0.58				0.58	1.00
v/c Ratio					0.82		0.54				0.26	0.51

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					43.8		18.3				10.8	1.4
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					43.8		18.3				10.8	1.4
LOS					D		B				B	A
Approach Delay					43.8			18.3			5.3	
Approach LOS					D			B			A	
Queue Length 50th (m)					88.4		29.0				23.7	0.0
Queue Length 95th (m)					#142.3		53.8				32.7	0.0
Internal Link Dist (m)		137.8			97.6			69.7			45.6	
Turn Bay Length (m)												
Base Capacity (vph)					581		465				1826	1312
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					0.82		0.54				0.26	0.51

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:SBT, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 16.8		Intersection LOS: B	
Intersection Capacity Utilization 72.3%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 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	89	350	0	229	0	0	0	442	617
Future Volume (vph)	0	0	0	89	350	0	229	0	0	0	442	617
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.5				4.0	2.7
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.96
Flpb, ped/bikes					0.99		0.95				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)					1719		1688				3139	1312
Flt Permitted					0.99		0.45				1.00	1.00
Satd. Flow (perm)					1719		808				3139	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	97	380	0	249	0	0	0	480	671
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	477	0	249	0	0	0	480	671
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	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Actuated Green, G (s)					32.5		57.7				56.9	100.0
Effective Green, g (s)					33.8		57.7				58.2	100.0
Actuated g/C Ratio					0.34		0.58				0.58	1.00
Clearance Time (s)					5.3		4.5				5.3	
Lane Grp Cap (vph)					581		466				1826	1312
v/s Ratio Prot											0.15	
v/s Ratio Perm					0.28		0.31					c0.51
v/c Ratio					0.82		0.53				0.26	0.51
Uniform Delay, d1					30.3		12.9				10.3	0.0
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					12.3		4.3				0.4	1.4
Delay (s)					42.7		17.3				10.7	1.4
Level of Service					D		B				B	A
Approach Delay (s)		0.0			42.7			17.3			5.3	
Approach LOS		A			D			B			A	

Intersection Summary					
HCM 2000 Control Delay		16.4	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.65			
Actuated Cycle Length (s)		100.0	Sum of lost time (s)		8.5
Intersection Capacity Utilization		72.3%	ICU Level of Service		C
Analysis Period (min)		15			
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	2	6	57	3	22	2	24	8	2	44	5
Future Volume (vph)	11	2	6	57	3	22	2	24	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		0.955			0.964			0.967			0.988	
Flt Protected		0.972			0.966			0.997			0.998	
Satd. Flow (prot)	0	1764	0	0	1769	0	0	1832	0	0	1873	0
Flt Permitted		0.972			0.966			0.997			0.998	
Satd. Flow (perm)	0	1764	0	0	1769	0	0	1832	0	0	1873	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)	12	2	7	62	3	24	2	26	9	2	48	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	21	0	0	89	0	0	37	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	19.5%	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)	11	2	6	57	3	22	2	24	8	2	44	5
Future Volume (Veh/h)	11	2	6	57	3	22	2	24	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)	12	2	7	62	3	24	2	26	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	124	102	56	107	100	44	55			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	124	102	56	107	100	44	55			41		
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	99	93	100	98	100			100		
cM capacity (veh/h)	821	785	1011	856	787	1021	1560			1573		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	89	37	55
Volume Left	12	62	2	2
Volume Right	7	24	9	5
cSH	872	892	1560	1573
Volume to Capacity	0.02	0.10	0.00	0.00
Queue Length 95th (m)	0.6	2.7	0.0	0.0
Control Delay (s)	9.2	9.5	0.4	0.3
Lane LOS	A	A	A	A
Approach Delay (s)	9.2	9.5	0.4	0.3
Approach LOS	A	A		

Intersection Summary					
Average Delay		5.3			
Intersection Capacity Utilization		19.5%	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	631	36	0	0	0	0	0	30
Future Volume (vph)	0	0	221	0	631	36	0	0	0	0	0	30
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		0.993							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1644	0	1852	0	0	0	0	0	0	1644
Flt Permitted												
Satd. Flow (perm)	0	0	1644	0	1852	0	0	0	0	0	0	1644
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	240	0	686	39	0	0	0	0	0	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	240	0	725	0	0	0	0	0	0	33
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	45.6%	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	631	36	0	0	0	0	0	30
Future Volume (Veh/h)	0	0	221	0	631	36	0	0	0	0	0	30
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	686	39	0	0	0	0	0	33
Pedestrians					1			19			46	
Lane Width (m)					3.6			0.0			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			4	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.99						0.99	0.99		0.99	0.99	0.99
vC, conflicting volume	771			259			758	790	20	872	1010	752
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	761			259			747	780	20	864	1004	741
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	92
cM capacity (veh/h)	816			1317			291	312	1063	255	231	398

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	240	725	33
Volume Left	0	0	0
Volume Right	240	39	33
cSH	1700	1700	398
Volume to Capacity	0.14	0.43	0.08
Queue Length 95th (m)	0.0	0.0	2.2
Control Delay (s)	0.0	0.0	14.9
Lane LOS			B
Approach Delay (s)	0.0	0.0	14.9
Approach LOS			B

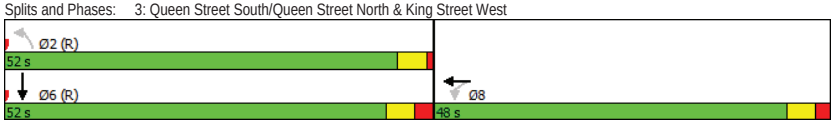
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	213	167	0	114	0	0	0	557	386
Future Volume (vph)	0	0	0	213	167	0	114	0	0	0	557	386
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					0.96
Frt												0.850
Flt Protected					0.973		0.950					
Satd. Flow (prot)	0	0	0	0	1687	0	1770	0	0	0	3343	1417
Flt Permitted					0.973		0.359					
Satd. Flow (perm)	0	0	0	0	1660	0	653	0	0	0	3343	1367
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												420
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	232	182	0	124	0	0	0	605	420
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	414	0	124	0	0	0	605	420
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	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Minimum Split (s)				33.3	33.3		22.5				29.8	
Total Split (s)				48.0	48.0		52.0				52.0	
Total Split (%)				48.0%	48.0%		52.0%				52.0%	
Maximum Green (s)				42.7	42.7		47.5				46.2	
Yellow Time (s)				3.3	3.3		3.5				3.3	
All-Red Time (s)				2.0	2.0		1.0				2.5	
Lost Time Adjust (s)					-1.3		0.0				-1.8	
Total Lost Time (s)					4.0		4.5				4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				12.0	12.0		7.0				12.0	
Flash Dont Walk (s)				16.0	16.0		11.0				12.0	
Pedestrian Calls (#/hr)				0	0		0				0	
Act Effct Green (s)					44.0		47.5				48.0	100.0
Actuated g/C Ratio					0.44		0.48				0.48	1.00
v/c Ratio					0.57		0.40				0.38	0.31

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					24.7		21.9				17.4	0.6
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					24.7		21.9				17.4	0.6
LOS					C		C				B	A
Approach Delay					24.7			21.9			10.5	
Approach LOS					C			C			B	
Queue Length 50th (m)					61.3		15.8				39.7	0.0
Queue Length 95th (m)					92.4		32.2				53.2	0.0
Internal Link Dist (m)		137.8			97.6			69.7			45.6	
Turn Bay Length (m)												
Base Capacity (vph)					730		310				1604	1367
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					0.57		0.40				0.38	0.31

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:SBT, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 15.2		Intersection LOS: B	
Intersection Capacity Utilization 64.0%		ICU Level of Service B	
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	213	167	0	114	0	0	0	557	386
Future Volume (vph)	0	0	0	213	167	0	114	0	0	0	557	386
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.5				4.0	2.2
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.96
Flpb, ped/bikes					0.98		0.98				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)					1660		1728				3343	1367
Flt Permitted					0.97		0.36				1.00	1.00
Satd. Flow (perm)					1660		653				3343	1367
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	232	182	0	124	0	0	0	605	420
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	414	0	124	0	0	0	605	420
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		Perm				NA	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Actuated Green, G (s)					42.7		47.5				46.2	100.0
Effective Green, g (s)					44.0		47.5				48.0	100.0
Actuated g/C Ratio					0.44		0.48				0.48	1.00
Clearance Time (s)					5.3		4.5				5.8	
Lane Grp Cap (vph)					730		310				1604	1367
v/s Ratio Prot											0.18	
v/s Ratio Perm					0.25		c0.19					0.31
v/c Ratio					0.57		0.40				0.38	0.31
Uniform Delay, d1					20.9		17.0				16.5	0.0
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					3.2		3.8				0.7	0.6
Delay (s)					24.1		20.8				17.2	0.6
Level of Service					C		C				B	A
Approach Delay (s)		0.0			24.1			20.8			10.4	
Approach LOS		A			C			C			B	

Intersection Summary					
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.48				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		8.5	
Intersection Capacity Utilization	64.0%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	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	1739	0	0	1783	0	0	1889	0
Flt Permitted		0.994			0.980			0.994			0.994	
Satd. Flow (perm)	0	1889	0	0	1739	0	0	1783	0	0	1889	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	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	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	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		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	77	23	76	72	42	19			44		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	80	77	23	76	72	42	19			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)	890	807	1052	897	808	1027	1591			1571		

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	815	941	1591	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			3.4		
Intersection Capacity Utilization			15.8%	ICU Level of Service	A
Analysis Period (min)			15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	221	0	642	28	0	0	0	0	0	24
Future Volume (vph)	0	0	221	0	642	28	0	0	0	0	0	24
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		0.994							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1611	0	1853	0	0	0	0	0	0	1644
Flt Permitted												
Satd. Flow (perm)	0	0	1611	0	1853	0	0	0	0	0	0	1644
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	240	0	698	30	0	0	0	0	0	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	240	0	728	0	0	0	0	0	0	26
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 45.6%		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	642	28	0	0	0	0	0	24
Future Volume (Veh/h)	0	0	221	0	642	28	0	0	0	0	0	24
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	698	30	0	0	0	0	0	26
Pedestrians					4			21			42	
Lane Width (m)					3.6			0.0			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			4	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked												
vC, conflicting volume	770			261			760	791	25	879	1016	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	770			261			760	791	25	879	1016	755
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	6.2
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			100			100	100	100	100	100	93
cM capacity (veh/h)	815			1264			296	313	1053	253	231	397

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	240	728	26
Volume Left	0	0	0
Volume Right	240	30	26
cSH	1700	1700	397
Volume to Capacity	0.14	0.43	0.07
Queue Length 95th (m)	0.0	0.0	1.7
Control Delay (s)	0.0	0.0	14.7
Lane LOS			B
Approach Delay (s)	0.0	0.0	14.7
Approach LOS			B

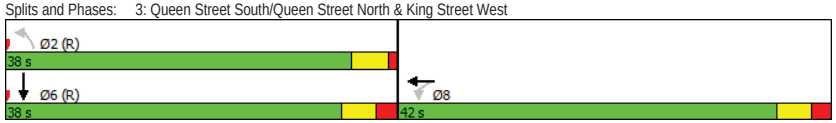
Intersection Summary					
Average Delay			0.4		
Intersection Capacity Utilization			45.6%	ICU Level of Service	A
Analysis Period (min)			15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	210	192	0	76	0	0	0	251	402
Future Volume (vph)	0	0	0	210	192	0	76	0	0	0	251	402
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		0.98					0.97
Frt												0.850
Flt Protected					0.975		0.950					
Satd. Flow (prot)	0	0	0	0	1835	0	1770	0	0	0	3574	1599
Flt Permitted					0.975		0.579					
Satd. Flow (perm)	0	0	0	0	1812	0	1061	0	0	0	3574	1556
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												437
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	228	209	0	83	0	0	0	273	437
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	437	0	83	0	0	0	273	437
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	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Minimum Split (s)				32.3	32.3		22.5				28.5	
Total Split (s)				42.0	42.0		38.0				38.0	
Total Split (%)				52.5%	52.5%		47.5%				47.5%	
Maximum Green (s)				36.7	36.7		33.5				32.5	
Yellow Time (s)				3.3	3.3		3.5				3.3	
All-Red Time (s)				2.0	2.0		1.0				2.2	
Lost Time Adjust (s)					-1.3		0.0				-1.8	
Total Lost Time (s)					4.0		4.5				3.7	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0				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)					38.0		33.5				34.3	80.0
Actuated g/C Ratio					0.48		0.42				0.43	1.00
v/c Ratio					0.51		0.19				0.18	0.28

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					17.1		16.1				14.5	0.5
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					17.1		16.1				14.5	0.5
LOS					B		B				B	A
Approach Delay					17.1			16.1			5.9	
Approach LOS					B			B			A	
Queue Length 50th (m)					46.1		8.1				13.7	0.0
Queue Length 95th (m)					72.1		17.7				21.5	0.0
Internal Link Dist (m)		137.8			97.6			69.7			175.6	
Turn Bay Length (m)												
Base Capacity (vph)					860		444				1532	1556
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					0.51		0.19				0.18	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:SBT, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 10.6		Intersection LOS: B	
Intersection Capacity Utilization 62.2%		ICU Level of Service B	
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	210	192	0	76	0	0	0	251	402
Future Volume (vph)	0	0	0	210	192	0	76	0	0	0	251	402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.5				3.7	2.2
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.97
Flpb, ped/bikes					0.99		0.98				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)					1811		1740				3574	1556
Flt Permitted					0.97		0.58				1.00	1.00
Satd. Flow (perm)					1811		1061				3574	1556
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	228	209	0	83	0	0	0	273	437
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	437	0	83	0	0	0	273	437
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		Perm				NA	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Actuated Green, G (s)					36.7		33.5				32.5	80.0
Effective Green, g (s)					38.0		33.5				34.3	80.0
Actuated g/C Ratio					0.48		0.42				0.43	1.00
Clearance Time (s)					5.3		4.5				5.5	
Lane Grp Cap (vph)					860		444				1532	1556
v/s Ratio Prot											0.08	
v/s Ratio Perm					0.24		0.08					c0.28
v/c Ratio					0.51		0.19				0.18	0.28
Uniform Delay, d1					14.5		14.7				14.1	0.0
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					2.1		0.9				0.3	0.5
Delay (s)					16.7		15.6				14.4	0.5
Level of Service					B		B				B	A
Approach Delay (s)		0.0			16.7			15.6			5.8	
Approach LOS		A			B			B			A	

Intersection Summary					
HCM 2000 Control Delay		10.3	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.42			
Actuated Cycle Length (s)		80.0	Sum of lost time (s)		8.5
Intersection Capacity Utilization		62.2%	ICU Level of Service		B
Analysis Period (min)		15			
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	3	1	29	8	2	14	23	70	28	12	8
Future Volume (vph)	2	3	1	29	8	2	14	23	70	28	12	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		0.977			0.994			0.912			0.977	
Flt Protected		0.984			0.964			0.994			0.972	
Satd. Flow (prot)	0	1827	0	0	1821	0	0	1679	0	0	1760	0
Flt Permitted		0.984			0.964			0.994			0.972	
Satd. Flow (perm)	0	1827	0	0	1821	0	0	1679	0	0	1760	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	3	1	32	9	2	15	25	76	30	13	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	6	0	0	43	0	0	116	0	0	52	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	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	3	1	29	8	2	14	23	70	28	12	8
Future Volume (Veh/h)	2	3	1	29	8	2	14	23	70	28	12	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	3	1	32	9	2	15	25	76	30	13	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	197	228	40	189	194	76	35			107		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	197	228	40	189	194	76	35			107		
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	96	99	100	99			98		
cM capacity (veh/h)	719	645	1017	736	673	980	1572			1489		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	6	43	116	52
Volume Left	2	32	15	30
Volume Right	1	2	76	9
cSH	713	730	1572	1489
Volume to Capacity	0.01	0.06	0.01	0.02
Queue Length 95th (m)	0.2	1.5	0.2	0.5
Control Delay (s)	10.1	10.2	1.0	4.4
Lane LOS	B	B	A	A
Approach Delay (s)	10.1	10.2	1.0	4.4
Approach LOS	B	B		

Intersection Summary				
Average Delay		3.9		
Intersection Capacity Utilization		23.2%	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)	0	0	360	0	1258	92	0	0	0	0	0	49
Future Volume (vph)	0	0	360	0	1258	92	0	0	0	0	0	49
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	391	0	1367	100	0	0	0	0	0	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	391	0	1467	0	0	0	0	0	0	53
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	82.3%	ICU Level of Service	E
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	1258	92	0	0	0	0	0	49
Future Volume (Veh/h)	0	0	360	0	1258	92	0	0	0	0	0	49
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	1367	100	0	0	0	0	0	53
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	0.69						0.69	0.69		0.69	0.69	0.69
vC, conflicting volume	1493			404			1484	1506	18	1644	1847	1444
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1490			404			1477	1509	18	1708	2003	1419
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	51
cM capacity (veh/h)	304			1123			36	74	1056	47	41	109

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	391	1467	53
Volume Left	0	0	0
Volume Right	391	100	53
cSH	1700	1700	109
Volume to Capacity	0.23	0.86	0.49
Queue Length 95th (m)	0.0	0.0	17.4
Control Delay (s)	0.0	0.0	66.0
Lane LOS			F
Approach Delay (s)	0.0	0.0	66.0
Approach LOS			F

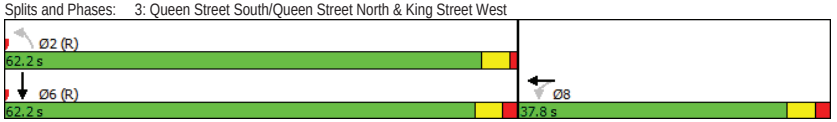
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	89	366	0	277	0	0	0	457	678
Future Volume (vph)	0	0	0	89	366	0	277	0	0	0	457	678
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					0.96
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		0.445					
Satd. Flow (perm)	0	0	0	0	1720	0	792	0	0	0	3139	1312
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												420
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	97	398	0	301	0	0	0	497	737
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	495	0	301	0	0	0	497	737
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	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Minimum Split (s)				32.3	32.3		22.5				28.3	
Total Split (s)				37.8	37.8		62.2				62.2	
Total Split (%)				37.8%	37.8%		62.2%				62.2%	
Maximum Green (s)				32.5	32.5		57.7				56.9	
Yellow Time (s)				3.3	3.3		3.5				3.3	
All-Red Time (s)				2.0	2.0		1.0				2.0	
Lost Time Adjust (s)					-1.3		0.0				-1.3	
Total Lost Time (s)					4.0		4.5				4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				12.0	12.0		7.0				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)					33.8		57.7				58.2	100.0
Actuated g/C Ratio					0.34		0.58				0.58	1.00
v/c Ratio					0.85		0.66				0.27	0.56

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					46.6		23.1				10.9	1.7
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					46.6		23.1				10.9	1.7
LOS					D		C				B	A
Approach Delay					46.6			23.1			5.4	
Approach LOS					D			C			A	
Queue Length 50th (m)					93.0		39.2				24.7	0.0
Queue Length 95th (m)					#150.8		74.0				34.0	0.0
Internal Link Dist (m)		30.2			97.6			69.7			43.5	
Turn Bay Length (m)												
Base Capacity (vph)					581		456				1826	1312
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		0.66				0.27	0.56

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:SBT, Start of Green			
Natural Cycle: 70			
Control Type: Pretimed			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 18.1		Intersection LOS: B	
Intersection Capacity Utilization 75.4%		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	89	366	0	277	0	0	0	457	678
Future Volume (vph)	0	0	0	89	366	0	277	0	0	0	457	678
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.5				4.0	2.7
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.96
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)					1720		1690				3139	1312
Flt Permitted					0.99		0.44				1.00	1.00
Satd. Flow (perm)					1720		791				3139	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	97	398	0	301	0	0	0	497	737
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	495	0	301	0	0	0	497	737
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	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Actuated Green, G (s)					32.5		57.7				56.9	100.0
Effective Green, g (s)					33.8		57.7				58.2	100.0
Actuated g/C Ratio					0.34		0.58				0.58	1.00
Clearance Time (s)					5.3		4.5				5.3	
Lane Grp Cap (vph)					581		456				1826	1312
v/s Ratio Prot											0.16	
v/s Ratio Perm					0.29		c0.38					0.56
v/c Ratio					0.85		0.66				0.27	0.56
Uniform Delay, d1					30.8		14.5				10.4	0.0
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					14.6		7.3				0.4	1.7
Delay (s)					45.4		21.8				10.7	1.7
Level of Service					D		C				B	A
Approach Delay (s)		0.0			45.4			21.8			5.4	
Approach LOS		A			D			C			A	

Intersection Summary				
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.5	
Intersection Capacity Utilization	75.4%	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	1327	18	0	23
Future Volume (vph)	0	0	1327	18	0	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			0.998			0.865
Flt Protected						
Satd. Flow (prot)	0	0	1859	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	1859	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	1442	20	0	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1462	0	0	25
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	80.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	1327	18	0	23
Future Volume (Veh/h)	0	0	1327	18	0	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)	0	0	1442	20	0	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)			103			
pX, platoon unblocked	0.67				0.67	0.67
vC, conflicting volume	1462				1452	1452
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1443				1428	1428
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	77
cM capacity (veh/h)	315				100	111

Direction, Lane #	WB 1	SB 1
Volume Total	1462	25
Volume Left	0	0
Volume Right	20	25
cSH	1700	111
Volume to Capacity	0.86	0.23
Queue Length 95th (m)	0.0	6.5
Control Delay (s)	0.0	46.6
Lane LOS		E
Approach Delay (s)	0.0	46.6
Approach LOS		E

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		80.9%	ICU Level of Service D
Analysis Period (min)		15	

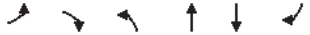
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	1321	0	0	24
Future Volume (vph)	0	0	1321	0	0	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	0	1863	0	0	1611
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	1436	0	0	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1436	0	0	26
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 79.5%			ICU Level of Service D
Analysis Period (min) 15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑			↱
Traffic Volume (veh/h)	0	0	1321	0	0	24
Future Volume (Veh/h)	0	0	1321	0	0	24
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	1436	0	0	26
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	0.66				0.66	0.66
vC, conflicting volume	1436				1436	1436
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1403				1403	1403
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	77
cM capacity (veh/h)	322				102	113

Direction, Lane #	WB 1	SB 1
Volume Total	1436	26
Volume Left	0	0
Volume Right	0	26
cSH	1700	113
Volume to Capacity	0.84	0.23
Queue Length 95th (m)	0.0	6.6
Control Delay (s)	0.0	46.0
Lane LOS		E
Approach Delay (s)	0.0	46.0
Approach LOS		E

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		79.5%	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	1105	42
Future Volume (vph)	0	30	0	0	1105	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			0.994	
Flt Protected						
Satd. Flow (prot)	0	1611	0	0	5055	0
Flt Permitted						
Satd. Flow (perm)	0	1611	0	0	5055	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	61.4			67.5	78.4	
Travel Time (s)	4.4			4.9	5.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	33	0	0	1201	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	33	0	0	1247	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	32.3%	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	1105	42
Future Volume (Veh/h)	0	30	0	0	1105	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	1201	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	1224	423	1247			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1224	423	1247			
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)	171	579	554			

Direction, Lane #	EB 1	SB 1	SB 2	SB 3
Volume Total	33	480	480	286
Volume Left	0	0	0	0
Volume Right	33	0	0	46
cSH	579	1700	1700	1700
Volume to Capacity	0.06	0.28	0.28	0.17
Queue Length 95th (m)	1.4	0.0	0.0	0.0
Control Delay (s)	11.6	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	11.6	0.0		
Approach LOS	B			

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		32.3%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	75	27	0	16	23	46
Future Volume (vph)	75	27	0	16	23	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.965				0.910	
Flt Protected					0.984	
Satd. Flow (prot)	1798	0	0	1863	1668	0
Flt Permitted					0.984	
Satd. Flow (perm)	1798	0	0	1863	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)	82	29	0	17	25	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	111	0	0	17	75	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 16.4%			ICU Level of Service A
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	75	27	0	16	23	46
Future Volume (Veh/h)	75	27	0	16	23	46
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)	82	29	0	17	25	50
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			111		114	96
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			111		114	96
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		97	95
cM capacity (veh/h)			1479		883	960

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	111	17	75
Volume Left	0	0	25
Volume Right	29	0	50
cSH	1700	1479	933
Volume to Capacity	0.07	0.00	0.08
Queue Length 95th (m)	0.0	0.0	2.1
Control Delay (s)	0.0	0.0	9.2
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.2
Approach LOS			A

Intersection Summary				
Average Delay		3.4		
Intersection Capacity Utilization		16.4%	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)	11	2	6	86	3	22	2	31	118	12	44	5
Future Volume (vph)	11	2	6	86	3	22	2	31	118	12	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		0.955			0.973			0.895			0.990	
Flt Protected		0.972			0.963			0.999			0.990	
Satd. Flow (prot)	0	1764	0	0	1780	0	0	1699	0	0	1862	0
Flt Permitted		0.972			0.963			0.999			0.990	
Satd. Flow (perm)	0	1764	0	0	1780	0	0	1699	0	0	1862	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)	12	2	7	93	3	24	2	34	128	13	48	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	21	0	0	120	0	0	164	0	0	66	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 27.0%		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)	11	2	6	86	3	22	2	31	118	12	44	5
Future Volume (Veh/h)	11	2	6	86	3	22	2	31	118	12	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)	12	2	7	93	3	24	2	34	128	13	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	213	250	56	196	189	111	55			168		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	213	250	56	196	189	111	55			168		
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	87	100	97	100			99		
cM capacity (veh/h)	712	645	1011	744	697	937	1560			1415		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	120	164	66
Volume Left	12	93	2	13
Volume Right	7	24	128	5
cSH	781	774	1560	1415
Volume to Capacity	0.03	0.15	0.00	0.01
Queue Length 95th (m)	0.7	4.4	0.0	0.2
Control Delay (s)	9.7	10.5	0.1	1.5
Lane LOS	A	B	A	A
Approach Delay (s)	9.7	10.5	0.1	1.5
Approach LOS	A	B		

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	27.0%	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	221	0	762	153	0	0	0	0	0	59
Future Volume (vph)	0	0	221	0	762	153	0	0	0	0	0	59
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		0.977							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1644	0	1826	0	0	0	0	0	0	1644
Flt Permitted												
Satd. Flow (perm)	0	0	1644	0	1826	0	0	0	0	0	0	1644
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	240	0	828	166	0	0	0	0	0	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	240	0	994	0	0	0	0	0	0	64
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 60.3%		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	762	153	0	0	0	0	0	59
Future Volume (Veh/h)	0	0	221	0	762	153	0	0	0	0	0	59
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	828	166	0	0	0	0	0	64
Pedestrians					1			19			46	
Lane Width (m)					3.6			0.0			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			4	
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	1040			259			994	1059	20	1078	1216	957
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1009			259			960	1030	20	1050	1197	921
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	79
cM capacity (veh/h)	626			1317			170	212	1063	181	169	298

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	240	994	64
Volume Left	0	0	0
Volume Right	240	166	64
cSH	1700	1700	298
Volume to Capacity	0.14	0.58	0.21
Queue Length 95th (m)	0.0	0.0	6.4
Control Delay (s)	0.0	0.0	20.3
Lane LOS			C
Approach Delay (s)	0.0	0.0	20.3
Approach LOS			C

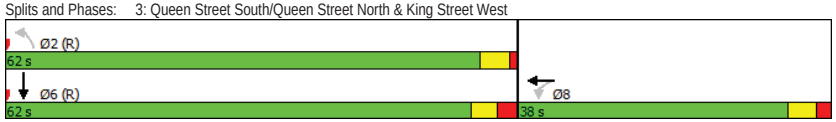
Intersection Summary					
Average Delay	1.0				
Intersection Capacity Utilization	60.3%	ICU Level of Service		B	
Analysis Period (min)	15				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	213	195	0	258	0	0	0	580	466
Future Volume (vph)	0	0	0	213	195	0	258	0	0	0	580	466
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					0.96
Frt												0.850
Flt Protected					0.975		0.950					
Satd. Flow (prot)	0	0	0	0	1691	0	1770	0	0	0	3343	1417
Flt Permitted					0.975		0.373					
Satd. Flow (perm)	0	0	0	0	1666	0	678	0	0	0	3343	1367
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												461
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	232	212	0	280	0	0	0	630	507
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	444	0	280	0	0	0	630	507
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	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Minimum Split (s)				33.3	33.3		22.5				29.8	
Total Split (s)				38.0	38.0		62.0				62.0	
Total Split (%)				38.0%	38.0%		62.0%				62.0%	
Maximum Green (s)				32.7	32.7		57.5				56.2	
Yellow Time (s)				3.3	3.3		3.5				3.3	
All-Red Time (s)				2.0	2.0		1.0				2.5	
Lost Time Adjust (s)					-1.3		0.0				-1.8	
Total Lost Time (s)					4.0		4.5				4.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				12.0	12.0		7.0				12.0	
Flash Dont Walk (s)				16.0	16.0		11.0				12.0	
Pedestrian Calls (#/hr)				0	0		0				0	
Act Effct Green (s)					34.0		57.5				58.0	100.0
Actuated g/C Ratio					0.34		0.58				0.58	1.00
v/c Ratio					0.78		0.72				0.33	0.37

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					41.2		28.4				11.4	0.8
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					41.2		28.4				11.4	0.8
LOS					D		C				B	A
Approach Delay					41.2			28.4			6.7	
Approach LOS					D			C			A	
Queue Length 50th (m)					80.7		38.7				32.6	0.0
Queue Length 95th (m)					#129.7		#88.0				43.5	0.0
Internal Link Dist (m)		28.4			97.6			69.7			42.0	
Turn Bay Length (m)												
Base Capacity (vph)					566		389				1938	1367
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					0.78		0.72				0.33	0.37

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Pretimed			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 18.2		Intersection LOS: B	
Intersection Capacity Utilization 73.0%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

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

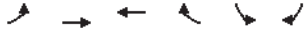


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	213	195	0	258	0	0	0	580	466
Future Volume (vph)	0	0	0	213	195	0	258	0	0	0	580	466
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.5				4.0	2.2
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.96
Flpb, ped/bikes					0.98		0.98				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)					1665		1727				3343	1367
Flt Permitted					0.97		0.37				1.00	1.00
Satd. Flow (perm)					1665		679				3343	1367
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	232	212	0	280	0	0	0	630	507
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	444	0	280	0	0	0	630	507
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		Perm				NA	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Actuated Green, G (s)					32.7		57.5				56.2	100.0
Effective Green, g (s)					34.0		57.5				58.0	100.0
Actuated g/C Ratio					0.34		0.58				0.58	1.00
Clearance Time (s)					5.3		4.5				5.8	
Lane Grp Cap (vph)					566		390				1938	1367
v/s Ratio Prot											0.19	
v/s Ratio Perm					0.27		c0.41					0.37
v/c Ratio					0.78		0.72				0.33	0.37
Uniform Delay, d1					29.7		15.4				10.9	0.0
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					10.4		10.8				0.4	0.8
Delay (s)					40.2		26.2				11.3	0.8
Level of Service					D		C				B	A
Approach Delay (s)		0.0			40.2			26.2			6.6	
Approach LOS		A			D			C			A	

Intersection Summary				
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.5	
Intersection Capacity Utilization	73.0%	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	886	62	0	29
Future Volume (vph)	0	0	886	62	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.991			0.865
Flt Protected						
Satd. Flow (prot)	0	0	1846	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	0	1846	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	963	67	0	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1030	0	0	32
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	60.4%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	886	62	0	29
Future Volume (Veh/h)	0	0	886	62	0	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	963	67	0	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			101			
pX, platoon unblocked	0.92				0.92	0.92
vC, conflicting volume	1030				996	996
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	991				955	955
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	89
cM capacity (veh/h)	645				265	290

Direction, Lane #	WB 1	SB 1
Volume Total	1030	32
Volume Left	0	0
Volume Right	67	32
cSH	1700	290
Volume to Capacity	0.61	0.11
Queue Length 95th (m)	0.0	2.9
Control Delay (s)	0.0	19.0
Lane LOS		C
Approach Delay (s)	0.0	19.0
Approach LOS		C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑			↱
Traffic Volume (vph)	0	0	919	0	0	29
Future Volume (vph)	0	0	919	0	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
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	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	999	0	0	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	999	0	0	32
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	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑			↱
Traffic Volume (veh/h)	0	0	919	0	0	29
Future Volume (Veh/h)	0	0	919	0	0	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	999	0	0	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			52			
pX, platoon unblocked	0.92				0.92	0.92
vC, conflicting volume	999				999	999
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	957				957	957
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	89
cM capacity (veh/h)	663				264	288

Direction, Lane #	WB 1	SB 1
Volume Total	999	32
Volume Left	0	0
Volume Right	0	32
cSH	1700	288
Volume to Capacity	0.59	0.11
Queue Length 95th (m)	0.0	3.0
Control Delay (s)	0.0	19.0
Lane LOS		C
Approach Delay (s)	0.0	19.0
Approach LOS		C

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

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	45	0	0	1001	47
Future Volume (vph)	0	45	0	0	1001	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			0.993	
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)	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	1088	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	49	0	0	1139	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	30.4%	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	1001	47
Future Volume (Veh/h)	0	45	0	0	1001	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	1088	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	1114	388	1139			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1114	388	1139			
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	92	100			
cM capacity (veh/h)	202	610	609			

Direction, Lane #	EB 1	SB 1	SB 2	SB 3
Volume Total	49	435	435	269
Volume Left	0	0	0	0
Volume Right	49	0	0	51
cSH	610	1700	1700	1700
Volume to Capacity	0.08	0.26	0.26	0.16
Queue Length 95th (m)	2.1	0.0	0.0	0.0
Control Delay (s)	11.4	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	11.4	0.0		
Approach LOS	B			

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		30.4%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	51	94	0	165	29	58
Future Volume (vph)	51	94	0	165	29	58
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	0.912				0.910	
Flt Protected					0.983	
Satd. Flow (prot)	1699	0	0	1863	1666	0
Flt Permitted					0.983	
Satd. Flow (perm)	1699	0	0	1863	1666	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)	55	102	0	179	32	63
Shared Lane Traffic (%)						
Lane Group Flow (vph)	157	0	0	179	95	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	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	51	94	0	165	29	58
Future Volume (Veh/h)	51	94	0	165	29	58
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)	55	102	0	179	32	63
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			157		285	106
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			157		285	106
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		95	93
cM capacity (veh/h)			1423		705	948

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	157	179	95
Volume Left	0	0	32
Volume Right	102	0	63
cSH	1700	1423	850
Volume to Capacity	0.09	0.00	0.11
Queue Length 95th (m)	0.0	0.0	3.0
Control Delay (s)	0.0	0.0	9.8
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.8
Approach LOS			A

Intersection Summary			
Average Delay	2.2		
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)	1	7	0	29	2	7	5	35	64	7	13	0
Future Volume (vph)	1	7	0	29	2	7	5	35	64	7	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					0.974			0.916				
Flt Protected		0.994			0.963			0.998			0.982	
Satd. Flow (prot)	0	1889	0	0	1780	0	0	1712	0	0	1866	0
Flt Permitted		0.994			0.963			0.998			0.982	
Satd. Flow (perm)	0	1889	0	0	1780	0	0	1712	0	0	1866	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	32	2	8	5	38	70	8	14	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	0	42	0	0	113	0	0	22	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	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	7	0	29	2	7	5	35	64	7	13	0
Future Volume (Veh/h)	1	7	0	29	2	7	5	35	64	7	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	32	2	8	5	38	70	8	14	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	130	158	23	126	123	81	19			113		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	130	158	23	126	123	81	19			113		
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	96	100	99	100			99		
cM capacity (veh/h)	822	725	1052	828	755	978	1591			1483		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	42	113	22
Volume Left	1	32	5	8
Volume Right	0	8	70	0
cSH	735	849	1591	1483
Volume to Capacity	0.01	0.05	0.00	0.01
Queue Length 95th (m)	0.3	1.2	0.1	0.1
Control Delay (s)	10.0	9.5	0.3	2.7
Lane LOS	A	A	A	A
Approach Delay (s)	10.0	9.5	0.3	2.7
Approach LOS	A	A		

Intersection Summary				
Average Delay		3.2		
Intersection Capacity Utilization		23.2%	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)	0	0	221	0	752	91	0	0	0	0	0	47
Future Volume (vph)	0	0	221	0	752	91	0	0	0	0	0	47
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		0.985							0.865
Flt Protected												
Satd. Flow (prot)	0	0	1611	0	1839	0	0	0	0	0	0	1644
Flt Permitted												
Satd. Flow (perm)	0	0	1611	0	1839	0	0	0	0	0	0	1644
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	240	0	817	99	0	0	0	0	0	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	240	0	916	0	0	0	0	0	0	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		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	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	221	0	752	91	0	0	0	0	0	47
Future Volume (Veh/h)	0	0	221	0	752	91	0	0	0	0	0	47
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	817	99	0	0	0	0	0	51
Pedestrians					4			21			42	
Lane Width (m)					3.6			0.0			3.6	
Walking Speed (m/s)					1.2			1.2			1.2	
Percent Blockage					0			0			4	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					162							
pX, platoon unblocked	0.99						0.99	0.99		0.99	0.99	0.99
vC, conflicting volume	958			261			938	979	25	1032	1170	908
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	950			261			930	971	25	1025	1164	900
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	6.2
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			100			100	100	100	100	100	84
cM capacity (veh/h)	687			1264			202	242	1053	198	186	323

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	240	916	51
Volume Left	0	0	0
Volume Right	240	99	51
cSH	1700	1700	323
Volume to Capacity	0.14	0.54	0.16
Queue Length 95th (m)	0.0	0.0	4.4
Control Delay (s)	0.0	0.0	18.2
Lane LOS			C
Approach Delay (s)	0.0	0.0	18.2
Approach LOS			C

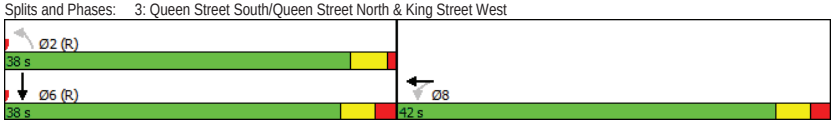
Intersection Summary					
Average Delay		0.8			
Intersection Capacity Utilization		55.5%	ICU Level of Service		B
Analysis Period (min)		15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	210	213	0	129	0	0	0	276	472
Future Volume (vph)	0	0	0	210	213	0	129	0	0	0	276	472
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		0.98					0.97
Frt												0.850
Flt Protected					0.976		0.950					
Satd. Flow (prot)	0	0	0	0	1836	0	1770	0	0	0	3574	1599
Flt Permitted					0.976		0.557					
Satd. Flow (perm)	0	0	0	0	1814	0	1021	0	0	0	3574	1556
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												513
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	228	232	0	140	0	0	0	300	513
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	460	0	140	0	0	0	300	513
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	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Minimum Split (s)				32.3	32.3		22.5				28.5	
Total Split (s)				42.0	42.0		38.0				38.0	
Total Split (%)				52.5%	52.5%		47.5%				47.5%	
Maximum Green (s)				36.7	36.7		33.5				32.5	
Yellow Time (s)				3.3	3.3		3.5				3.3	
All-Red Time (s)				2.0	2.0		1.0				2.2	
Lost Time Adjust (s)					-1.3		0.0				-1.8	
Total Lost Time (s)					4.0		4.5				3.7	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)				7.0	7.0		7.0				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)					38.0		33.5				34.3	80.0
Actuated g/C Ratio					0.48		0.42				0.43	1.00
v/c Ratio					0.53		0.33				0.20	0.33

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay					17.6		18.4				14.7	0.6
Queue Delay					0.0		0.0				0.0	0.0
Total Delay					17.6		18.4				14.7	0.6
LOS					B		B				B	A
Approach Delay					17.6			18.4			5.8	
Approach LOS					B			B			A	
Queue Length 50th (m)					49.3		14.6				15.2	0.0
Queue Length 95th (m)					76.7		28.9				23.4	0.0
Internal Link Dist (m)		28.4			97.6			69.7			41.9	
Turn Bay Length (m)												
Base Capacity (vph)					861		427				1532	1556
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					0.53		0.33				0.20	0.33

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:SBT, Start of Green			
Natural Cycle: 65			
Control Type: Pretimed			
Maximum v/c Ratio: 0.53			
Intersection Signal Delay: 10.9		Intersection LOS: B	
Intersection Capacity Utilization 66.2%		ICU Level of Service C	
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	210	213	0	129	0	0	0	276	472
Future Volume (vph)	0	0	0	210	213	0	129	0	0	0	276	472
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.5				3.7	2.2
Lane Util. Factor					1.00		1.00				0.95	1.00
Frpb, ped/bikes					1.00		1.00				1.00	0.97
Flpb, ped/bikes					0.99		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)					1814		1742				3574	1556
Flt Permitted					0.98		0.56				1.00	1.00
Satd. Flow (perm)					1814		1021				3574	1556
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	228	232	0	140	0	0	0	300	513
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	460	0	140	0	0	0	300	513
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		Perm				NA	Free
Protected Phases					8						6	
Permitted Phases				8			2					Free
Actuated Green, G (s)					36.7		33.5				32.5	80.0
Effective Green, g (s)					38.0		33.5				34.3	80.0
Actuated g/C Ratio					0.48		0.42				0.43	1.00
Clearance Time (s)					5.3		4.5				5.5	
Lane Grp Cap (vph)					861		427				1532	1556
v/s Ratio Prot											0.08	
v/s Ratio Perm					0.25		0.14					c0.33
v/c Ratio					0.53		0.33				0.20	0.33
Uniform Delay, d1					14.8		15.7				14.2	0.0
Progression Factor					1.00		1.00				1.00	1.00
Incremental Delay, d2					2.4		2.0				0.3	0.6
Delay (s)					17.1		17.7				14.5	0.6
Level of Service					B		B				B	A
Approach Delay (s)		0.0			17.1			17.7			5.7	
Approach LOS		A			B			B			A	

Intersection Summary				
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.46			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5	
Intersection Capacity Utilization	66.2%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	820	18	0	23
Future Volume (vph)	0	0	820	18	0	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			0.997			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)		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	891	20	0	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	911	0	0	25
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	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	820	18	0	23
Future Volume (Veh/h)	0	0	820	18	0	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)	0	0	891	20	0	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)			101			
pX, platoon unblocked	0.96				0.96	0.96
vC, conflicting volume	911				901	901
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	889				879	879
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	93
cM capacity (veh/h)	735				307	334

Direction, Lane #	WB 1	SB 1
Volume Total	911	25
Volume Left	0	0
Volume Right	20	25
cSH	1700	334
Volume to Capacity	0.54	0.07
Queue Length 95th (m)	0.0	1.9
Control Delay (s)	0.0	16.6
Lane LOS		C
Approach Delay (s)	0.0	16.6
Approach LOS		C

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	815	0	0	24
Future Volume (vph)	0	0	815	0	0	24
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)		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	886	0	0	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	886	0	0	26
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	52.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations			↑			↱
Traffic Volume (veh/h)	0	0	815	0	0	24
Future Volume (Veh/h)	0	0	815	0	0	24
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	886	0	0	26
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	0.96				0.96	0.96
vC, conflicting volume	886				886	886
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	857				857	857
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	92
cM capacity (veh/h)	748				313	341

Direction, Lane #	WB 1	SB 1
Volume Total	886	26
Volume Left	0	0
Volume Right	0	26
cSH	1700	341
Volume to Capacity	0.52	0.08
Queue Length 95th (m)	0.0	2.0
Control Delay (s)	0.0	16.4
Lane LOS		C
Approach Delay (s)	0.0	16.4
Approach LOS		C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	52.9%	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	699	62
Future Volume (vph)	0	49	0	0	699	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			0.988	
Flt Protected						
Satd. Flow (prot)	0	1611	0	0	5024	0
Flt Permitted						
Satd. Flow (perm)	0	1611	0	0	5024	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	760	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	53	0	0	827	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 24.9%		ICU Level of Service A	
Analysis Period (min) 15			

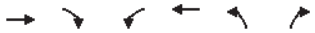
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	49	0	0	699	62
Future Volume (Veh/h)	0	49	0	0	699	62
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	53	0	0	760	67
Pedestrians						
Lane Width (m)						
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	794	287	827			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	794	287	827			
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	93	100			
cM capacity (veh/h)	326	710	800			

Direction, Lane #	EB 1	SB 1	SB 2	SB 3
Volume Total	53	304	304	219
Volume Left	0	0	0	0
Volume Right	53	0	0	67
cSH	710	1700	1700	1700
Volume to Capacity	0.07	0.18	0.18	0.13
Queue Length 95th (m)	1.9	0.0	0.0	0.0
Control Delay (s)	10.5	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	10.5	0.0		
Approach LOS	B			

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	51	27	0	15	23	46
Future Volume (vph)	51	27	0	15	23	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.953				0.910	
Flt Protected					0.984	
Satd. Flow (prot)	1775	0	0	1863	1668	0
Flt Permitted					0.984	
Satd. Flow (perm)	1775	0	0	1863	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)	55	29	0	16	25	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	84	0	0	16	75	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	15.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	51	27	0	15	23	46
Future Volume (Veh/h)	51	27	0	15	23	46
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)	55	29	0	16	25	50
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			84		86	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			84		86	70
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		97	95
cM capacity (veh/h)			1513		916	993

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	84	16	75
Volume Left	0	0	25
Volume Right	29	0	50
cSH	1700	1513	966
Volume to Capacity	0.05	0.00	0.08
Queue Length 95th (m)	0.0	0.0	2.0
Control Delay (s)	0.0	0.0	9.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	15.1%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix G

SimTraffic Results

Intersection: 1: Ray Street North & Market Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.8	10.7	6.8	9.0
Average Queue (m)	1.6	5.8	0.3	0.8
95th Queue (m)	7.0	12.5	2.9	5.1
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)	11.2	22.2	29.3
Average Queue (m)	0.9	3.7	11.4
95th Queue (m)	6.1	14.4	23.7
Link Distance (m)	111.0	9.4	76.4
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		6	
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)	126.5	72.2	52.4	43.8	64.1
Average Queue (m)	82.8	34.8	25.7	15.0	53.8
95th Queue (m)	128.6	60.8	49.3	36.1	59.8
Link Distance (m)	114.3	88.1	49.5	49.5	49.5
Upstream Blk Time (%)	7	0	1	0	49
Queuing Penalty (veh)	0	0	4	0	184
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)	33.0	21.7
Average Queue (m)	8.9	9.7
95th Queue (m)	26.3	22.8
Link Distance (m)	31.3	19.7
Upstream Blk Time (%)	0	13
Queuing Penalty (veh)	4	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: King Street West & Driveway B

Movement	WB	SB
Directions Served	TR	R
Maximum Queue (m)	53.8	21.6
Average Queue (m)	19.1	7.3
95th Queue (m)	56.1	17.8
Link Distance (m)	27.4	21.1
Upstream Blk Time (%)	12	2
Queuing Penalty (veh)	157	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)	14.6	67.8	78.4	84.2
Average Queue (m)	5.8	6.7	67.5	74.4
95th Queue (m)	13.5	37.2	97.1	87.9
Link Distance (m)	45.3	69.2	69.2	69.2
Upstream Blk Time (%)		0	35	92
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Driveway D & Market Street

Movement	NB
Directions Served	LR
Maximum Queue (m)	18.4
Average Queue (m)	8.4
95th Queue (m)	15.3
Link Distance (m)	33.1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 355

Intersection: 1: Ray Street North & Market Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	10.6	17.3	4.9	8.9
Average Queue (m)	3.6	9.5	0.2	0.7
95th Queue (m)	10.7	14.7	2.9	4.5
Link Distance (m)	67.7	39.7	76.3	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	EB	WB	SB
Directions Served	R	TR	R
Maximum Queue (m)	3.6	6.1	24.7
Average Queue (m)	0.2	0.4	10.7
95th Queue (m)	2.1	3.3	21.3
Link Distance (m)	111.0	9.4	76.3
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		1	
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)	123.3	83.3	53.3	50.7	57.9
Average Queue (m)	76.3	39.9	37.0	26.3	36.9
95th Queue (m)	121.5	70.5	55.8	49.0	68.2
Link Distance (m)	114.3	88.1	49.4	49.4	49.4
Upstream Blk Time (%)	4	0	2	0	9
Queuing Penalty (veh)	0	0	6	1	32
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)	19.7	22.3
Average Queue (m)	3.0	7.5
95th Queue (m)	12.5	17.7
Link Distance (m)	30.8	28.0
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	TR	R
Maximum Queue (m)	43.3	18.5
Average Queue (m)	4.4	6.1
95th Queue (m)	25.5	15.3
Link Distance (m)	30.4	21.8
Upstream Blk Time (%)	1	0
Queuing Penalty (veh)	12	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)	22.2	20.1	10.8	69.3
Average Queue (m)	8.6	2.1	0.4	13.4
95th Queue (m)	18.0	11.3	10.6	47.9
Link Distance (m)	39.6	155.6	155.6	155.6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Driveway D & Market Street

Movement	NB
Directions Served	LR
Maximum Queue (m)	21.4
Average Queue (m)	10.0
95th Queue (m)	17.5
Link Distance (m)	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: 51

Intersection: 1: Ray Street North & Market Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.3	10.0	1.7	5.4
Average Queue (m)	2.1	6.0	0.1	0.3
95th Queue (m)	8.1	12.5	1.2	2.9
Link Distance (m)	71.0	39.8	76.3	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	EB	WB	SB
Directions Served	R	TR	R
Maximum Queue (m)	4.2	8.0	17.0
Average Queue (m)	0.2	0.4	8.1
95th Queue (m)	2.4	3.6	16.2
Link Distance (m)	111.0	9.5	76.3
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		1	
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)	88.5	42.6	41.6	31.1	51.3
Average Queue (m)	45.5	19.5	23.3	11.6	15.2
95th Queue (m)	73.3	36.2	37.9	26.4	49.4
Link Distance (m)	114.3	88.1	49.3	49.3	49.3
Upstream Blk Time (%)	0		0	0	1
Queuing Penalty (veh)	0		0	0	3
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)	14.1	17.4
Average Queue (m)	1.2	6.0
95th Queue (m)	7.4	14.8
Link Distance (m)	31.3	34.9
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	SB
Directions Served	TR	R
Maximum Queue (m)	43.7	15.3
Average Queue (m)	2.8	5.1
95th Queue (m)	19.8	13.1
Link Distance (m)	30.4	37.9
Upstream Blk Time (%)	1	
Queuing Penalty (veh)	5	
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)	18.8	0.8	29.9
Average Queue (m)	8.2	0.0	2.1
95th Queue (m)	15.8	0.8	13.4
Link Distance (m)	37.6	128.9	128.9
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Driveway D & Market Street

Movement	NB
Directions Served	LR
Maximum Queue (m)	20.6
Average Queue (m)	8.8
95th Queue (m)	15.8
Link Distance (m)	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: 9