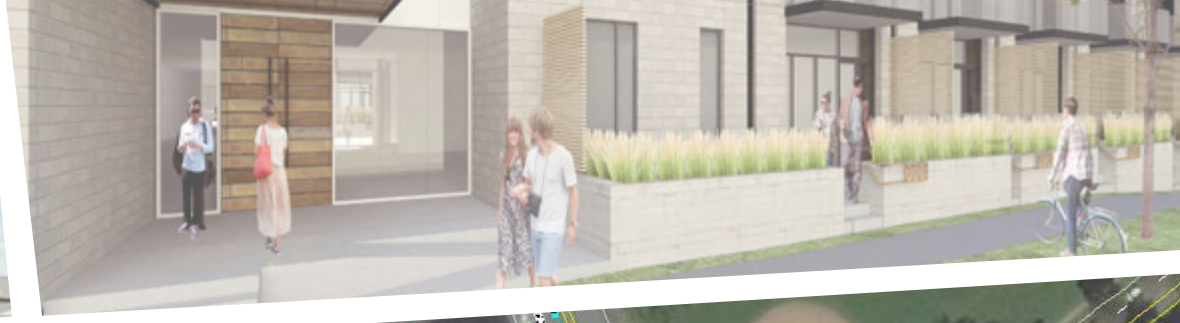



# Traffic Impact Study

For 6030 Pepperell Street

**August 2015**

Submitted by:
Ekistics Planning & Design

1 Starr Lane,
Dartmouth, NS, B2Y-4V7
ph: 902.461.2525

EKISTICS PLANNING & DESIGN

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## APPENDICIES

# 1. INTRODUCTION

This Transportation Impact Study follows HRM's Guidelines for the Preparation of Transportation Impact Studies, 8th Edition and general Traffic and Transportation Engineering principles for such studies. It is intended to address the transportation impacts that may be expected on the road and active transportation networks resulting from the:

*HRM: Transportation Impact Studies are prepared to ensure developments are consistent with the objectives and policies of the Municipal Planning Strategies / Municipal Development Plans and the Regional Plan*

- Construction of a 12 story residential condominium development as described in the table below:

| | |
|---|---|
| **Proposed Development** | 6030 Pepperell Street, Halifax, Nova Scotia |
| **Owner** | DEXEL Developments |
| **Location** | Southwest corner of:<br>Robie Street and Pepperell Street |
| **Building Details** | 160 Residential Units<br>3,000 Commercial / Retail Space |
| **Parking** | 226 Car Spaces, 75 Bicycle Spaces |

**Table 1-1:**

**Project Summary**

**Figure 1-1:**

**Building Rendering**

# 2. EXISTING CONDITIONS

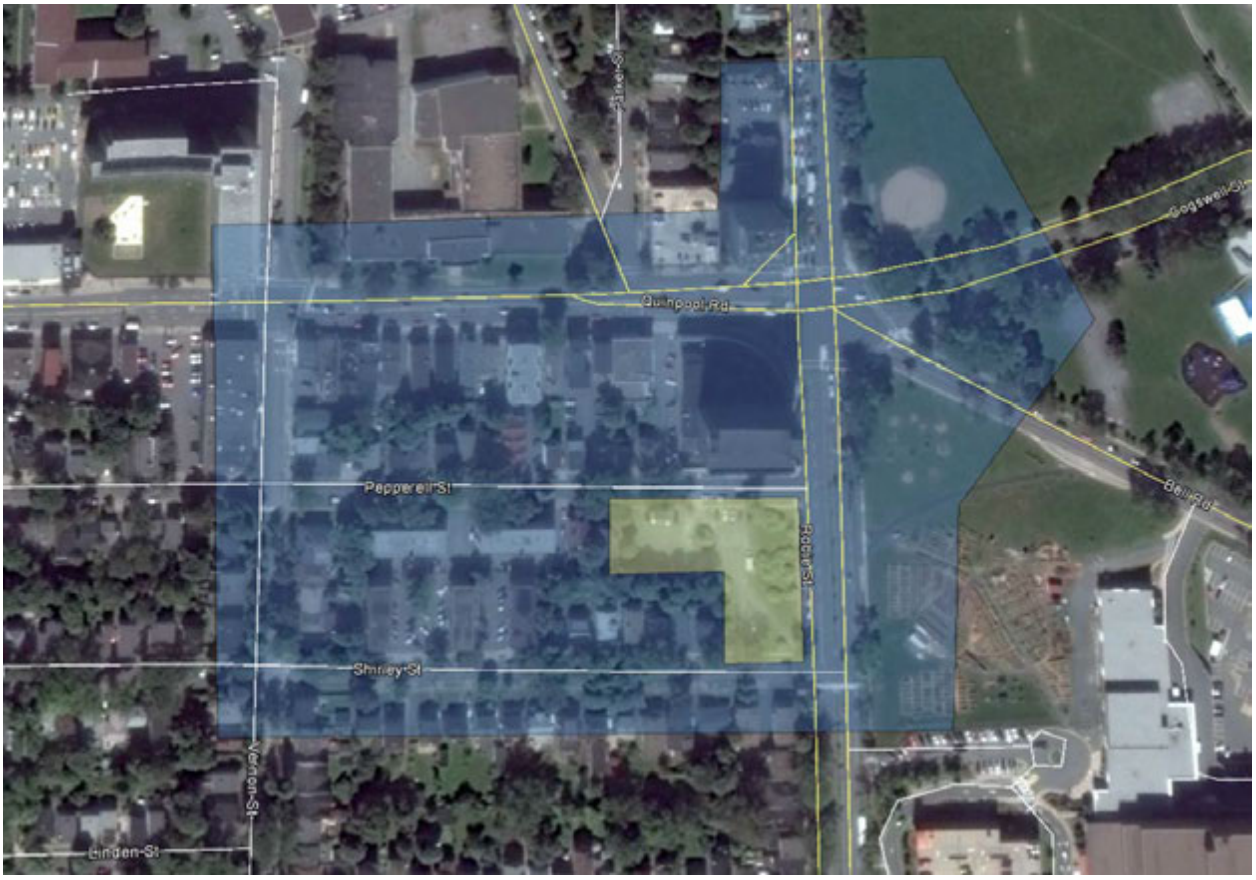
## 2.1 Study Area

*The Study Areas is defined by the area (roads, intersections and AT network) that may be reasonably expected to be impacted by the proposed development.*

The proposed building is located in the southwest quadrant of the Pepperell Street intersection with Robie Street, and the study area of concern for this study extends to the limits shown by the blue area in the following Figure.

The Atlantica Hotel is located immediately to the north of the site and the Halifax Commons are located to the north east of the site. Areas to the west and south are primarily residential in nature.

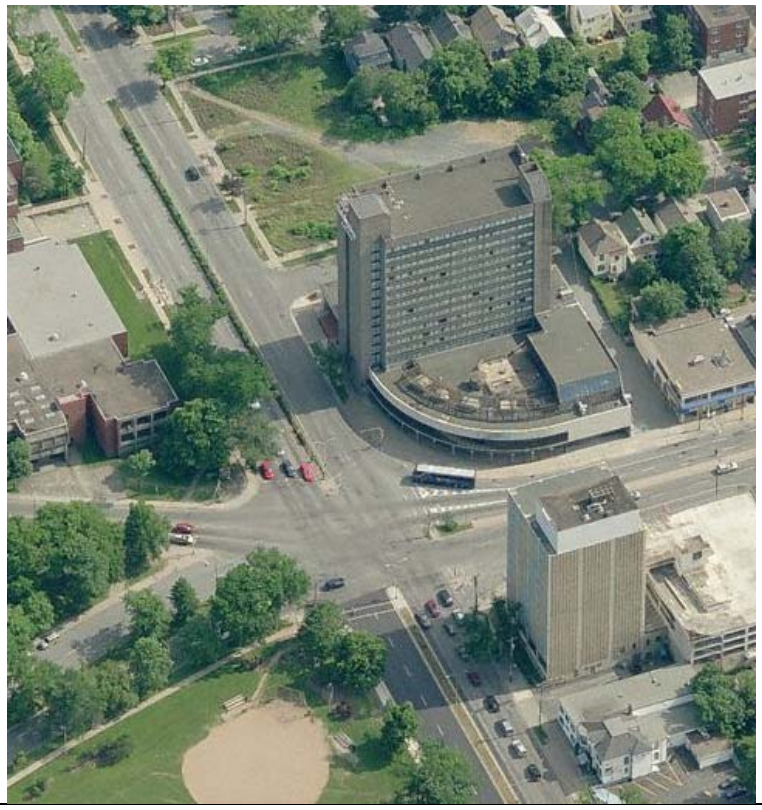
**Figure 2-1: Study Area**



## 2.2 Roadways

The following sections provide a brief summary of each of the key roadways in the study area that are relevant to this study.

| | |
|---|---|
| **Robie Street** | Robie Street is classified as an Arterial roadway and consists of 3 lanes in the northbound direction approaching the "Willow Tree" intersection and two southbound lanes separated by a grassed median. There are sidewalks on both sides of the roadway and access to various side streets, though the center median provides a level of access control along Robie Street.<br>  |
| **Pepperell Street** | Pepperell Street is a two lane local roadway with sidewalks on both sides of the roadway and includes access to numerous residential properties and small apartment complexes as well as to the Atlantica Hotel. Access to Robie Street from Pepperell Street is limited to right-in, right-out movements.<br>  |
| **Shirley Street** | Shirley Street is two lane local roadway very similar to Pepperell Street with sidewalks on both sides of the street. The roadway also provides access to various residential properties and small apartment complexes and has direct access to and from Robie Street.<br>  |

| | |
|---|---|
| **Willow Tree Intersection** | The "Willow Tree" Intersection is a complex signalized intersection connecting Robie Street with Quinpool Road, Bell Road and Cogswell Street. It is located immediately to the north of the site (towards the bottom of the picture below) and generally accommodates 2 or 3 lane approach and exit lanes on each leg of the intersection.<br>  |

## 2.3 Active Transportation (AT)

Peninsular Halifax has documented high cyclist and pedestrian activity (and other AT modes) and this study area is no exception with many local AT origins and destinations. This includes the Halifax Commons, the new public garden areas just east of Robie Street, Citadel High School, Citadel Hill, the Quinpool commercial corridor, and more.

As a result, accommodating AT movements past/through the site, as well as connectivity to existing routes, is an important consideration for this development. The majority of routes and intersection crossings are already in place for this development and access points for the development easily connect to existing sidewalk infrastructure. AT elements should be carefully considered as design progresses:

- Connectivity across Robie Street at the existing signalized cross walk immediately south of Shirley Street, as well as at the Willow Tree intersection. Volumes counts suggest that over 100 pedestrian per hour cross many of the crosswalks adjacent to the site therefore detailed design should pay close attention to the movement of pedestrians to and from the development. Maintaining and enhancing access to

the existing sidewalk network surrounding the building should adequately address this need; and,

- Bike access to and from the building, particularly along Pepperell and Shirley Streets to the main building entrances.

## 2.4 Vehicle Traffic

Recent and historical traffic counts were provided from HRM for all intersections in the study area and the counts were supplemented by one automated traffic counts carried out at the intersections of Robie Street and Shirley Street (including the pedestrian cross walk). The baseline counts used in this analysis are provided in Appendix A of this report.

## 2.5 Transit

The existing Halifax Transit map shows close to 20 routes that run in close proximity to the development including 10 routes which run along Robie Street and Quinpool Street, directly adjacent to the development. In addition, there are transit stops on both sides of Robie street between Pepperel and Shirley Street which makes this development higher accessible for transit use.

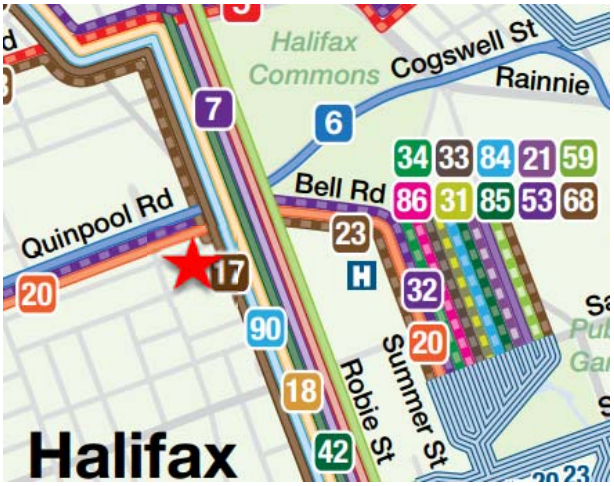



Figure 2-2: Transit Routes

## 2.6 Truck Routes

Halifax's By-Law T-400 "Respecting the Establishment of Truck Routes for Certain Trucking Motor Vehicles within the HRM" identifies Bell Road, Robie Street, Cogswell Street, and Quinpool Road as "Full Time" truck routes. In addition, Windsor Street and Oxford Street are defined as Daylight routes between the hours of 7 AM and 9 PM. These routes provide more than adequate access to the new development, though we expect that delivery requirements will be minimal at the site.


Figure 2-3: Truck Routes

# 3. FUTURE CONDITIONS

## 3.1 Context

### 3.1.1 Analysis Time Horizon

Based on recommended HRM guidelines, the base year for this study has been established as 2015 and would typically address a 5-year time horizon (2020). As per guidance in the HRM TIS documents, low volume development such as this (see trip generation rates below) typically do not require as rigorous analysis, therefore we have not included a detailed analysis of future conditions for this site.

### 3.1.2 Background Traffic

Traditional background traffic growth rates used for traffic impact studies throughout HRM have been in the 1 – 2% range though actual growth is frequently less than this and even negative in some cases. Recent transportation work for the Dartmouth Cove Transportation Analysis used a 0.5% background traffic growth rate based on recommendations from HRM. For this study, a 1% background traffic growth rate would be considered reasonable.

### 3.1.3 Analysis Period

This area of Halifax is highly commuter oriented therefore, the weekday AM and PM peak hours are considered to be the critical periods for the analysis.

## 3.2 The Development Traffic

### 3.2.1 Trip Generation

The addition of new traffic related to the development is summarized in the table below and a more detailed summary of the trip generation rates are provided in Appendix B of this report.

**Table 3-1: Trip Generation Table**

| | ITE Land Use Type | AM Peak | | | PM Peak | | |
|---|---|---|---|---|---|---|---|
| | | Enter | Exit | Total | Enter | Exit | Total |
| **North Building** | | | | | | | |
| Condominiums | ITE 232 | 8 | 36 | 44 | 30 | 19 | 49 |
| **TOTAL** | | **8** | **36** | **44** | **30** | **19** | **49** |

The trip generation rates shown above have been reduced by 20% to account for the higher than expected modal share use from Active Transportation and Transit users, which we consider to be a conservative assumption.

### 3.2.2 Trip Distribution and Assignment

It is assumed that traffic will distribute itself through the network in a similar manner to the existing traffic. The general trip distribution assumption based on existing conditions is shown in the Figure below, though the actual assignment of traffic to and from the site access driveway on Pepperell Street must respect the various turn restrictions that are currently in place at the Willow Tree as well as at the intersections of Pepperell and Shirley at Robie Street. Otherwise, there does not appear to be any incentives for traffic to alter current travel patterns.

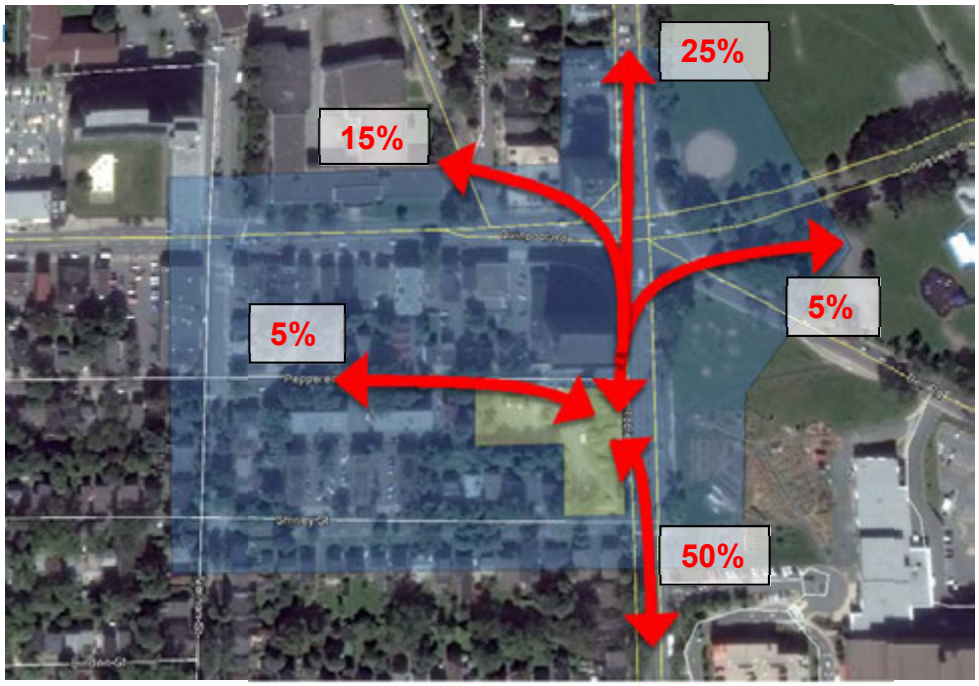



**Figure 3-1:**

**Trip Distribution**

# 4. ANALYSIS

## 4.1 Transportation Modelling

A microscopic traffic model was prepared using the Synchro/SimTraffic platform for the AM and PM peak hours of analysis. That said, the volumes being added to the existing roadway network are extremely small relative to the existing traffic on the roadway.


For example, during the AM peak hour, we would expect to see approximately 18 eastbound and 18 westbound vehicles exiting from the development and 8 vehicles entering the site. This equates to about 1 vehicle every 2 – 3 minutes. If this traffic is added to through the Willow Tree intersection, the new volumes represent approximately 18 of 1535 total vehicles through the intersection during the AM peak hour, or about 0.5%. At the intersection of Robie and Jubilee, the new traffic would represent about 0.9% of total traffic. Based on these numbers, any further analysis of impact is pointless as these volumes are essential not detectable in the overall network.

For reference, we have included the output for the existing conditions at each of the key intersections in the network for the AM and PM peak hours.

# 5. CONCLUSIONS

This development appears to be well suited to this location from a transportation perspective by integrating into a predominately residential neighbourhood that is already characterized by apartment complexes and the Atlantica Hotel. It is near the intersection of essentially 6 major transportation routes (2 directions on Robie, Quinpool, Cogswell, Bell, and Windsor) meaning traffic can conveniently navigate to various parts of the city and consequently, traffic related to the development is expected to distribute itself widely throughout the network.

The development is well placed to take advantage of the high levels of local employers and institutions (hospitals, schools, downtown Halifax business area, etc.), all of which are directly connected to a robust Active Transportation and Halifax Transit network immediately adjacent to the site.

We expect that the impacts from this proposed development will negligible on Pepperell Street and undetectable on all other roads in the area. The level of new traffic from this site does not warrant any modifications to existing roadway or active transportation infrastructure (with the exception of a few modifications to existing driveway curb cuts, including the removal of unused driveways and the addition of the new parkade entrance).

In summary, this development is expected to effectively integrate into the community with very minimal impacts to the existing transportation network.

# APPENDIX A

## Traffic Counts

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 12-TM-102

# MANUAL TRAFFIC COUNTS

INTERSECTION: QUINGATE PLACE AT QUINPOOL ROAD AT VERNON STREET

WEATHER: SUNNY
RECORDER: TH

| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| FRIDAY | 15 | JUNE | 2012 |

| STREET: | | QUINPOOL ROAD | | | QUINPOOL ROAD | | | QUINGATE PLACE | | | VERNON STREET | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
| 15 MIN INTERVALS | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 08:00:00 AM | 08:15:00 AM | 24 | 60 | 12 | 1 | 273 | 21 | 14 | 0 | 3 | 6 | 1 | 6 | 421 |
| 08:15:00 AM | 08:30:00 AM | 21 | 81 | 11 | 1 | 250 | 30 | 9 | 0 | 1 | 9 | 0 | 13 | 426 |
| 08:30:00 AM | 08:45:00 AM | 25 | 93 | 16 | 6 | 234 | 28 | 28 | 0 | 3 | 14 | 0 | 19 | 466 |
| 08:45:00 AM | 09:00:00 AM | 26 | 86 | 10 | 3 | 201 | 24 | 11 | 0 | 2 | 12 | 0 | 11 | 386 |
| TOTAL | | 96 | 320 | 49 | 11 | 958 | 103 | 62 | 0 | 9 | 41 | 1 | 49 | 1699 |
| PEAK | | | 465 | | | 1072 | | | 71 | | | 91 | | |
| 15 MIN PEAK | | | 536 | | | 1180 | | | 124 | | | 132 | | |
| PEAK HOUR FACTOR | | | 0.87 | | | 0.91 | | | 0.57 | | | 0.69 | | PEAK HR |
| TWO WAY TOTALS | | | 1534 | | | 1442 | | | 132 | | | 290 | | FACTOR |
| | | | | | | | | | | | | | | 0.91 |
| | | | | | | | | | | | | | | 1546 |

| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| MONDAY | 25 | JUNE | 2012 |

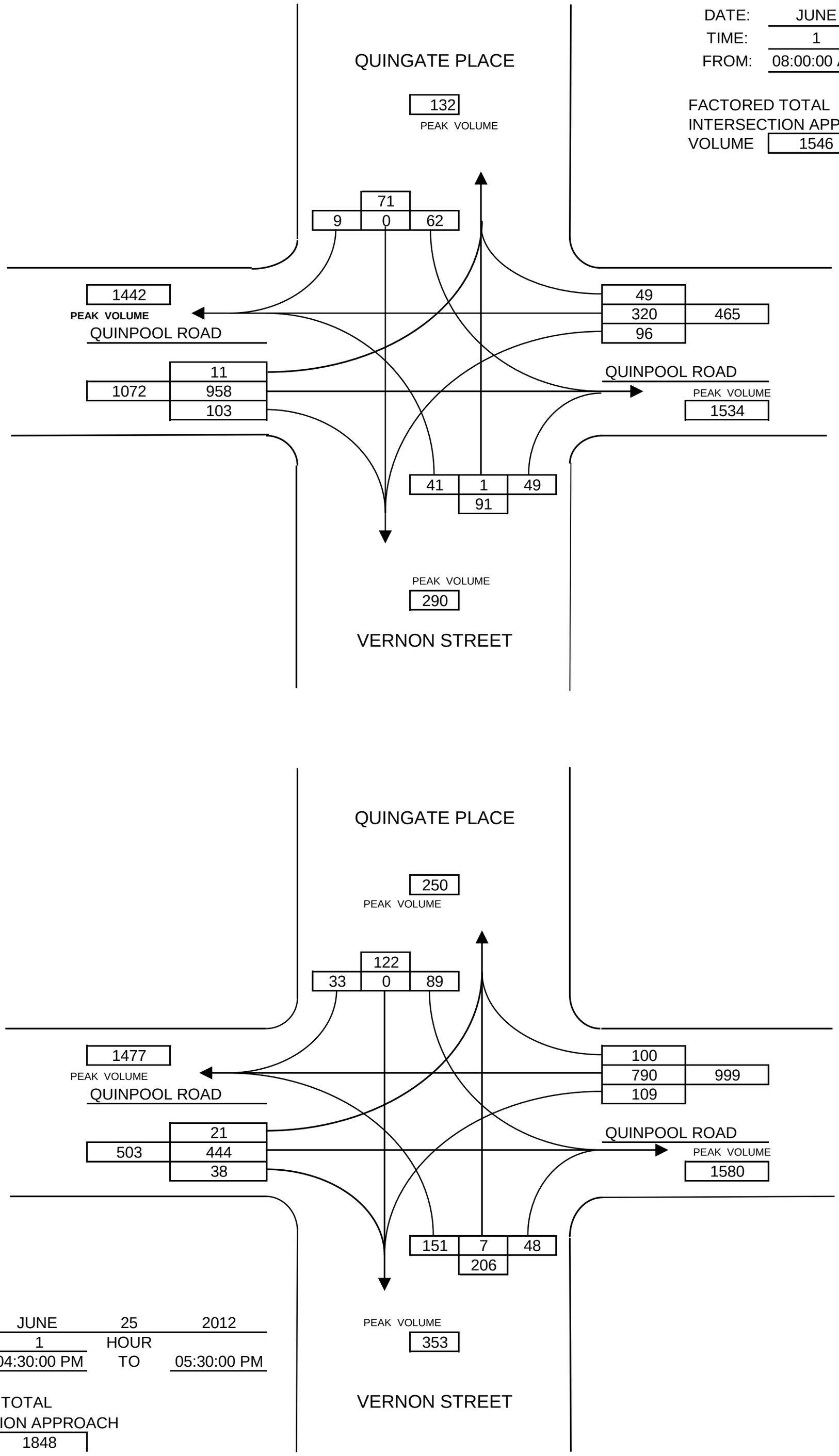
| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 MIN INTERVALS | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 04:30:00 PM | 04:45:00 PM | 25 | 200 | 24 | 4 | 94 | 8 | 21 | 0 | 9 | 43 | 3 | 16 | 447 |
| 04:45:00 PM | 05:00:00 PM | 19 | 196 | 26 | 7 | 106 | 7 | 18 | 0 | 9 | 42 | 0 | 12 | 442 |
| 05:00:00 PM | 05:15:00 PM | 38 | 197 | 26 | 5 | 126 | 10 | 23 | 0 | 7 | 31 | 2 | 9 | 474 |
| 05:15:00 PM | 05:30:00 PM | 27 | 197 | 24 | 5 | 118 | 13 | 27 | 0 | 8 | 35 | 2 | 11 | 467 |
| TOTAL | | 109 | 790 | 100 | 21 | 444 | 38 | 89 | 0 | 33 | 151 | 7 | 48 | 1830 |
| PEAK | | | 999 | | | 503 | | | 122 | | | 206 | | |
| 15 MIN PEAK | | | 1044 | | | 564 | | | 140 | | | 248 | | |
| PEAK HOUR FACTOR | | | 0.96 | | | 0.89 | | | 0.87 | | | 0.83 | | PEAK HR |
| TWO WAY TOTALS | | | 1580 | | | 1477 | | | 250 | | | 353 | | FACTOR |
| | | | | | | | | | | | | | | 1.01 |
| | | | | | | | | | | | | | | 1848 |

# VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : QUINGATE PLACE AT QUINPOOL ROAD AT VERNON STREET

DATE: JUNE 15 2012
TIME: 1 HOUR
FROM: 08:00:00 AM TO 09:00:00 AM

FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 1546




DATE: JUNE 25 2012
TIME: 1 HOUR
FROM: 04:30:00 PM TO 05:30:00 PM

FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 1848

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 13-TM-112

# MANUAL TRAFFIC COUNTS

INTERSECTION: CHERRY STREET AT ROBIE STREET

| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| THURS. | 1 | AUG | 13 |

WEATHER: CLEAR, 17°C
RECORDER: CE

| STREET: | | QE2 PARKING | | | CHERRY STREET | | | ROBIE STREET | | | ROBIE STREET | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
| 15 MINUTES | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 07:00 AM | 07:15 AM | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 187 | 0 | 0 | 94 | 0 | 306 |
| 07:15 AM | 07:30 AM | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 189 | 0 | 0 | 93 | 0 | 308 |
| 07:30 AM | 07:45 AM | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 194 | 0 | 0 | 91 | 0 | 305 |
| 07:45 AM | 08:00 AM | 0 | 0 | 28 | 0 | 0 | 1 | 0 | 215 | 2 | 0 | 77 | 0 | 323 |
| TOTAL | | 0 | 0 | 99 | 0 | 0 | 1 | 0 | 785 | 2 | 0 | 355 | 0 | 1242 |
| PEAK | | | 99 | | | 1 | | | 787 | | | 355 | | |
| 15 MIN PEAK | | | 28 | | | 1 | | | 217 | | | 94 | | |
| PEAK HOUR FACTOR | | | 3.54 | | | 1 | | | 3.63 | | | 3.78 | | PEAK HR |
| TWO WAY TOTALS | | | 99 | | | 3 | | | 1241 | | | 1141 | | FACTOR |
| | | | | | | | | | | | | | | 1.02 |
| | | | | | | | | | | | | | | 1267 |

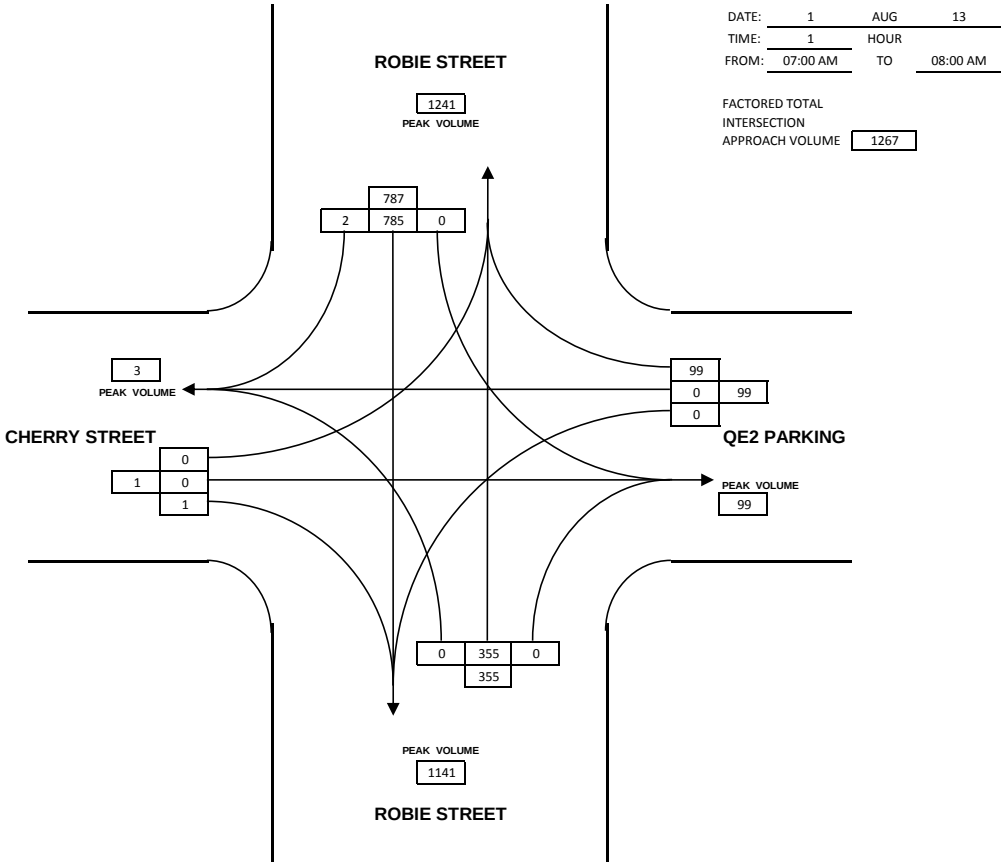
| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| THURS. | 1 | AUG | 13 |

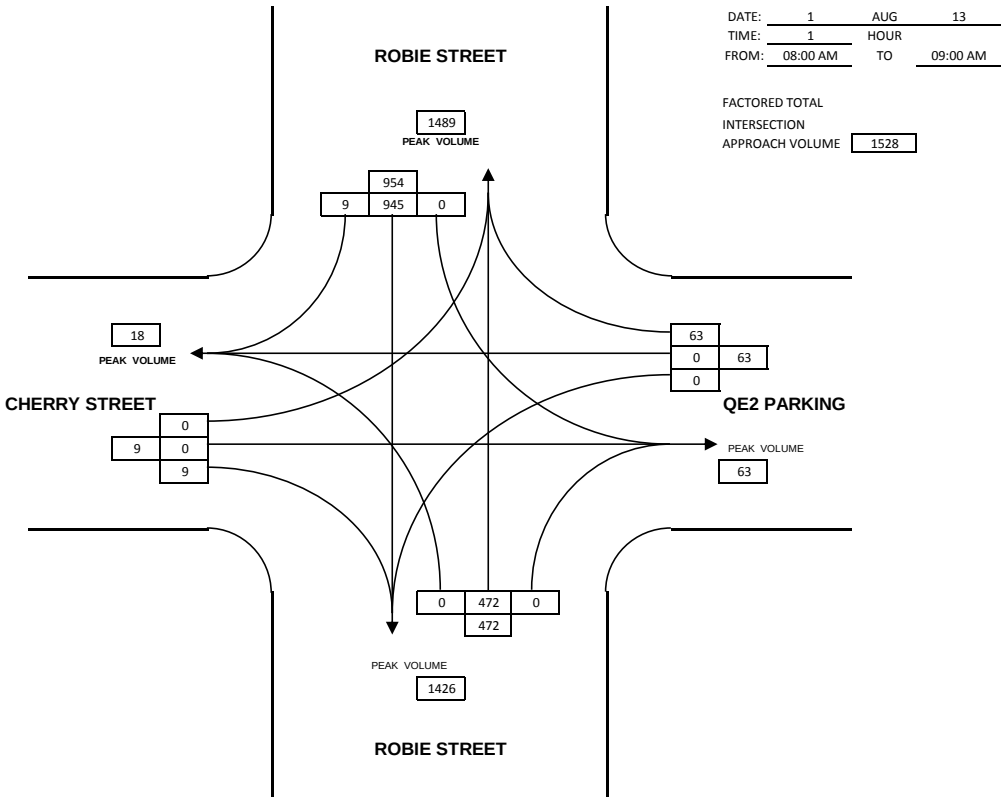
WEATHER: CLEAR, 17°C
RECORDER: CE

| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 MINUTES | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 08:00 AM | 08:15 AM | 0 | 0 | 17 | 0 | 0 | 1 | 0 | 220 | 1 | 0 | 113 | 0 | 352 |
| 08:15 AM | 08:30 AM | 0 | 0 | 12 | 0 | 0 | 2 | 0 | 236 | 2 | 0 | 112 | 0 | 364 |
| 08:30 AM | 08:45 AM | 0 | 0 | 17 | 0 | 0 | 2 | 0 | 261 | 5 | 0 | 122 | 0 | 407 |
| 08:45 AM | 09:00 AM | 0 | 0 | 17 | 0 | 0 | 4 | 0 | 228 | 1 | 0 | 125 | 0 | 375 |
| TOTAL | | 0 | 0 | 63 | 0 | 0 | 9 | 0 | 945 | 9 | 0 | 472 | 0 | 1498 |
| PEAK | | | 63 | | | 9 | | | 954 | | | 472 | | |
| 15 MIN PEAK | | | 17 | | | 4 | | | 266 | | | 125 | | |
| PEAK HOUR FACTOR | | | 3.71 | | | 2.25 | | | 3.59 | | | 3.78 | | PEAK HR |
| TWO WAY TOTALS | | | 63 | | | 18 | | | 1489 | | | 1426 | | FACTOR |
| | | | | | | | | | | | | | | 1.02 |
| | | | | | | | | | | | | | | 1528 |

# VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : CHERRY STREET AT ROBIE STREET



HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 13-TM-112

# MANUAL TRAFFIC COUNTS

INTERSECTION: CHERRY STREET AT ROBIE STREET

| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| THURS. | 25 | JUL | 13 |

WEATHER: OVERCAST, 22°C
RECORDER: CE

| STREET: | | QE2 PARKING | | | CHERRY STREET | | | ROBIE STREET | | | ROBIE STREET | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
| 15 MINUTES | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 04:00 PM | 04:15 PM | 0 | 0 | 25 | 0 | 0 | 1 | 0 | 140 | 2 | 0 | 238 | 0 | 406 |
| 04:15 PM | 04:30 PM | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 135 | 3 | 0 | 242 | 0 | 408 |
| 04:30 PM | 04:45 PM | 0 | 0 | 27 | 0 | 0 | 2 | 0 | 138 | 4 | 0 | 245 | 0 | 416 |
| 04:45 PM | 05:00 PM | 0 | 0 | 32 | 0 | 0 | 2 | 0 | 152 | 3 | 0 | 243 | 0 | 432 |
| TOTAL | | 0 | 0 | 112 | 0 | 0 | 5 | 0 | 565 | 12 | 0 | 968 | 0 | 1662 |
| PEAK | | | 112 | | | 5 | | | 577 | | | 968 | | |
| 15 MIN PEAK | | | 32 | | | 2 | | | 155 | | | 245 | | |
| PEAK HOUR FACTOR | | | 3.5 | | | 2.5 | | | 3.72 | | | 3.95 | | PEAK HR |
| TWO WAY TOTALS | | | 112 | | | 17 | | | 1657 | | | 1538 | | FACTOR |
| | | | | | | | | | | | | | | 0.99 |
| | | | | | | | | | | | | | | 1645 |

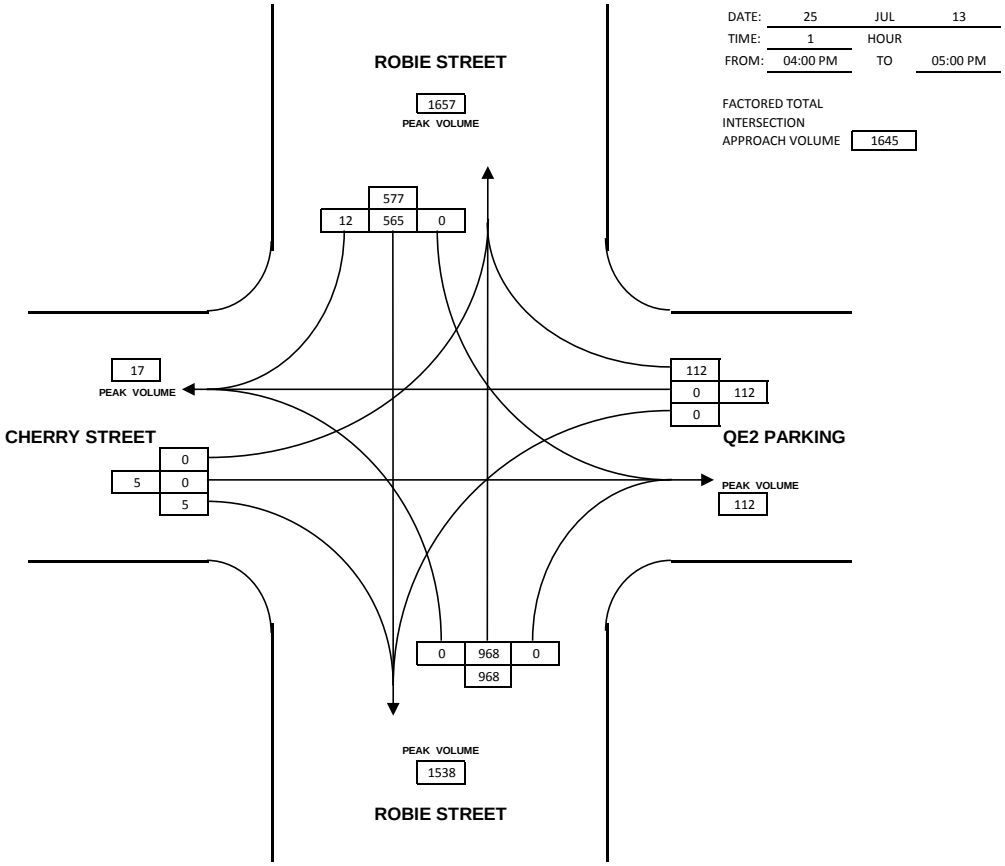
| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| THURS. | 25 | JUL | 13 |

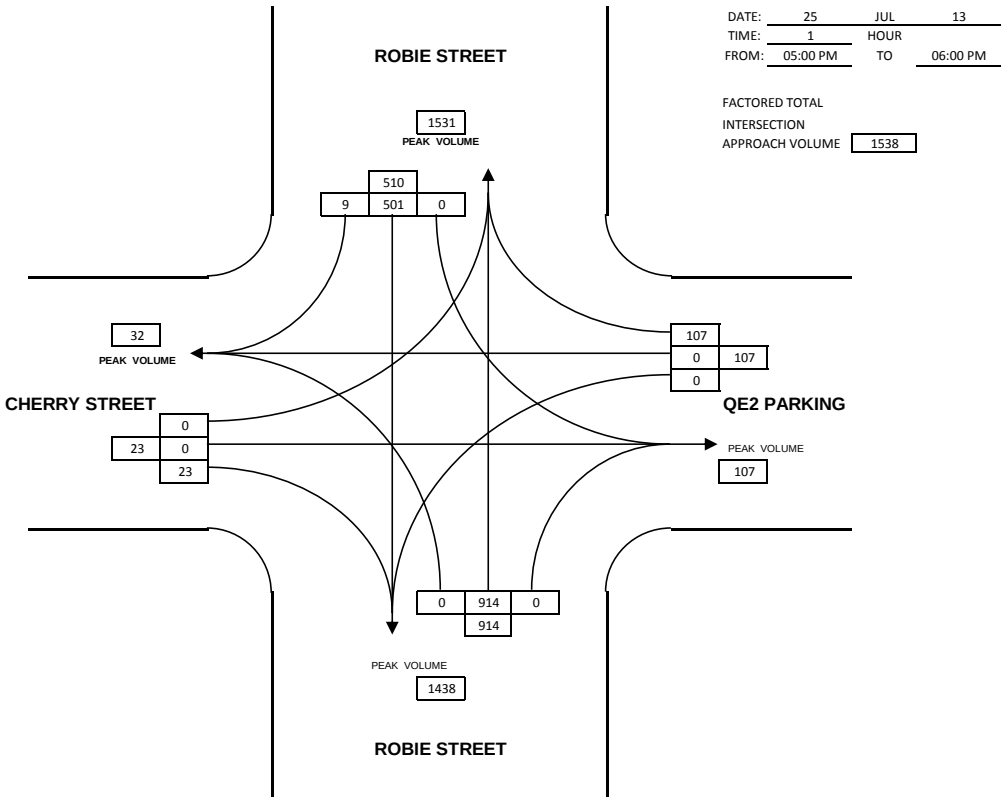
WEATHER: OVERCAST, 22°C
RECORDER: CE

| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 MINUTES | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 05:00 PM | 05:15 PM | 0 | 0 | 32 | 0 | 0 | 6 | 0 | 124 | 2 | 0 | 231 | 0 | 395 |
| 05:15 PM | 05:30 PM | 0 | 0 | 30 | 0 | 0 | 8 | 0 | 131 | 3 | 0 | 233 | 0 | 405 |
| 05:30 PM | 05:45 PM | 0 | 0 | 24 | 0 | 0 | 4 | 0 | 121 | 1 | 0 | 228 | 0 | 378 |
| 05:45 PM | 06:00 PM | 0 | 0 | 21 | 0 | 0 | 5 | 0 | 125 | 3 | 0 | 222 | 0 | 376 |
| TOTAL | | 0 | 0 | 107 | 0 | 0 | 23 | 0 | 501 | 9 | 0 | 914 | 0 | 1554 |
| PEAK | | | 107 | | | 23 | | | 510 | | | 914 | | |
| 15 MIN PEAK | | | 32 | | | 8 | | | 134 | | | 233 | | |
| PEAK HOUR FACTOR | | | 3.34 | | | 2.88 | | | 3.81 | | | 3.92 | | PEAK HR |
| TWO WAY TOTALS | | | 107 | | | 32 | | | 1531 | | | 1438 | | FACTOR |
| | | | | | | | | | | | | | | 0.99 |
| | | | | | | | | | | | | | | 1538 |

# VEHICULAR GRAPHIC SUMMARY SHEET

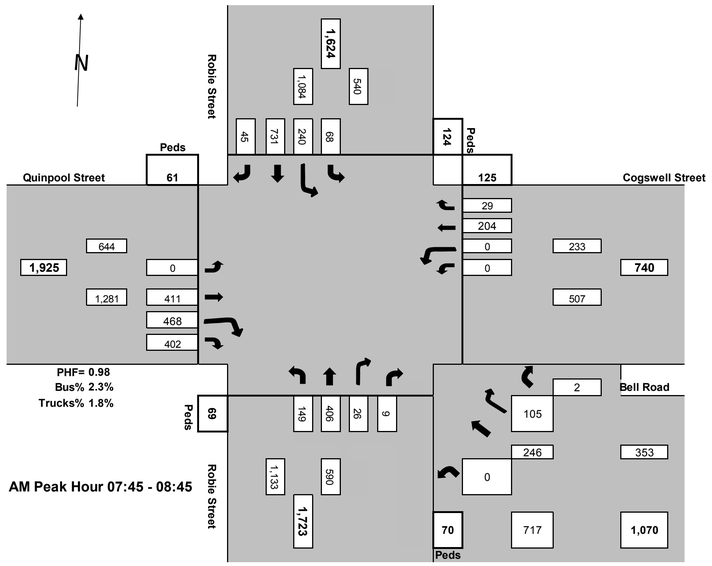
INTERSECTION : CHERRY STREET AT ROBIE STREET

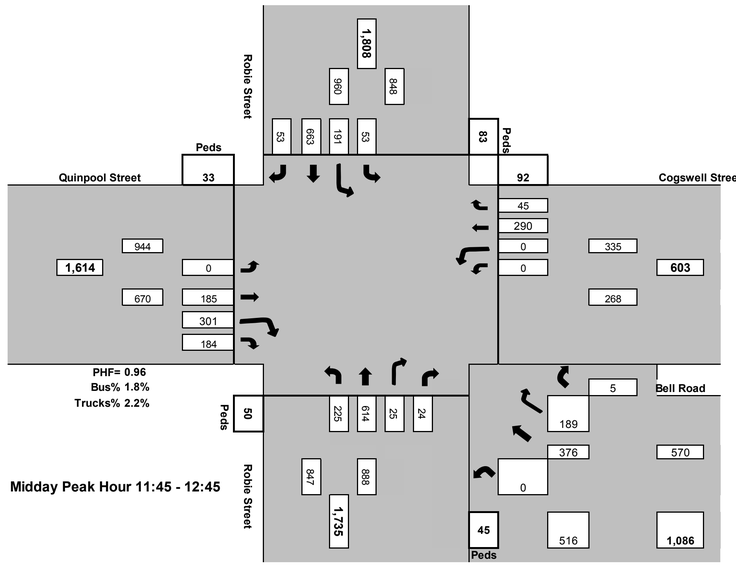


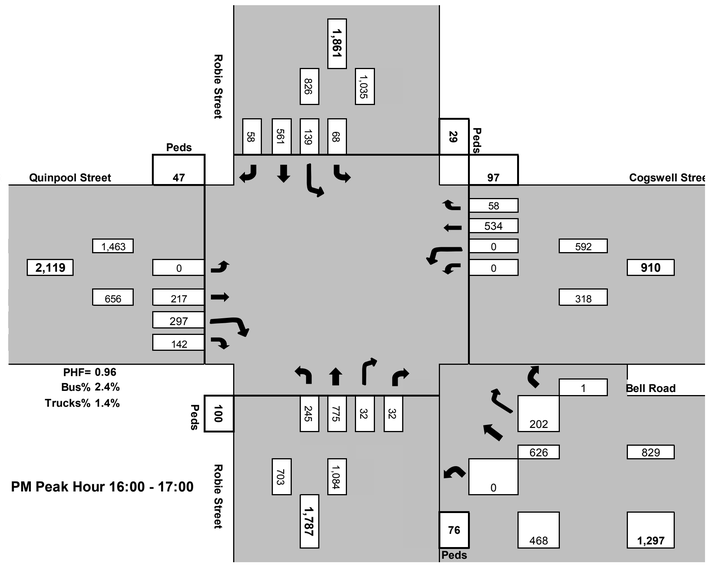



# Halifax Traffic Count
## Intersection Volumes - AM, Midday, and PM Weekday Peak Hours

ol Road ,Cogswell Street & Bell Road - known a



HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-247

# MANUAL TRAFFIC COUNTS

INTERSECTION: JUBILEE ROAD AT ROBIE STREET AND VETERANS MEMORIAL LANE

WEATHER: CLEAR
RECORDER: MIO

| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| WED. | 22 | OCT. | 2014 |

| STREET: | | VETERANS MEMORIAL LANE | | | JUBILEE ROAD | | | ROBIE STREET | | | ROBIE STREET | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
| 15 MIN INTERVALS | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 7:00:00 AM | 7:15:00 AM | 2 | 23 | 26 | 6 | 46 | 13 | 12 | 124 | 3 | 4 | 73 | 0 | 332 |
| 7:15:00 AM | 7:30:00 AM | 1 | 21 | 23 | 7 | 45 | 10 | 20 | 166 | 5 | 5 | 81 | 4 | 388 |
| 7:30:00 AM | 7:45:00 AM | 4 | 9 | 10 | 9 | 39 | 25 | 25 | 183 | 3 | 8 | 78 | 4 | 397 |
| 7:45:00 AM | 8:00:00 AM | 3 | 19 | 16 | 23 | 58 | 19 | 31 | 222 | 5 | 8 | 91 | 6 | 501 |
| TOTAL | | 10 | 72 | 75 | 45 | 188 | 67 | 88 | 695 | 16 | 25 | 323 | 14 | 1618 |
| PEAK | | | 157 | | | 300 | | | 799 | | | 362 | | |
| 15 MIN PEAK | | | 204 | | | 400 | | | 1032 | | | 420 | | |
| PEAK HOUR FACTOR | | | 0.77 | | | 0.75 | | | 0.77 | | | 0.86 | | PEAK HR |
| TWO WAY TOTALS | | | 447 | | | 413 | | | 1242 | | | 1134 | | FACTOR |
| | | | | | | | | | | | | | | 0.98 |
| | | | | | | | | | | | | | | 1586 |

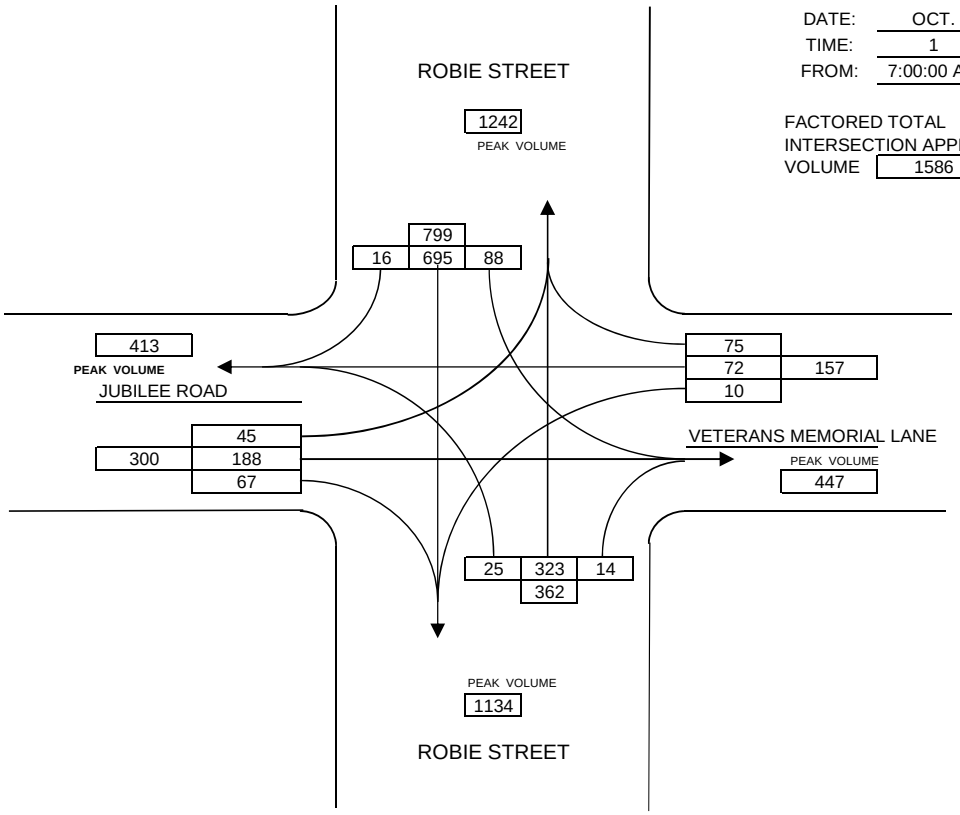
| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| WED. | 22 | OCT. | 2014 |

| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 MIN INTERVALS | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 8:00:00 AM | 8:15:00 AM | 5 | 22 | 25 | 10 | 56 | 29 | 46 | 246 | 3 | 10 | 107 | 5 | 564 |
| 8:15:00 AM | 8:30:00 AM | 3 | 24 | 24 | 18 | 67 | 23 | 59 | 253 | 8 | 15 | 150 | 9 | 653 |
| 8:30:00 AM | 8:45:00 AM | 8 | 28 | 29 | 18 | 74 | 17 | 52 | 222 | 6 | 12 | 146 | 15 | 627 |
| 8:45:00 AM | 9:00:00 AM | 4 | 31 | 16 | 18 | 80 | 17 | 37 | 185 | 4 | 9 | 108 | 20 | 529 |
| TOTAL | | 20 | 105 | 94 | 64 | 277 | 86 | 194 | 906 | 21 | 46 | 511 | 49 | 2373 |
| PEAK | | | 219 | | | 427 | | | 1121 | | | 606 | | |
| 15 MIN PEAK | | | 260 | | | 460 | | | 1280 | | | 696 | | |
| PEAK HOUR FACTOR | | | 0.84 | | | 0.93 | | | 0.88 | | | 0.87 | | PEAK HR |
| TWO WAY TOTALS | | | 739 | | | 599 | | | 1790 | | | 1618 | | FACTOR |
| | | | | | | | | | | | | | | 0.98 |
| | | | | | | | | | | | | | | 2326 |

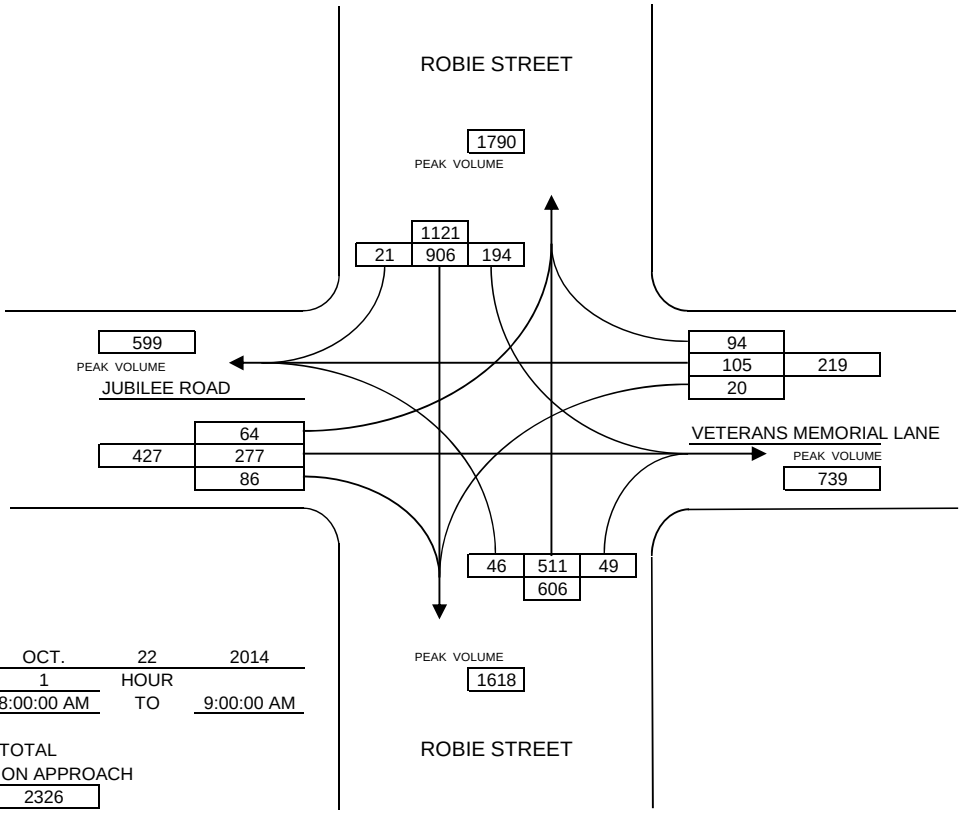
# VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : JUBILEE ROAD AT ROBIE STREET AND VETERANS MEMORIAL LANE

DATE: OCT. 22 2014
TIME: 1 HOUR
FROM: 7:00:00 AM TO 8:00:00 AM




FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 1586




DATE: OCT. 22 2014
TIME: 1 HOUR
FROM: 8:00:00 AM TO 9:00:00 AM

FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 2326

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-247

# MANUAL TRAFFIC COUNTS

INTERSECTION: JUBILEE ROAD AT ROBIE STREET AND VETERANS MEMORIAL LANE

WEATHER: CLEAR
RECORDER: MIO

| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| WED. | 22 | OCT. | 2014 |

| STREET: | | VETERANS MEMORIAL LANE | | | JUBILEE ROAD | | | ROBIE STREET | | | ROBIE STREET | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
| 15 MIN INTERVALS | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 11:00:00 AM | 11:15:00 AM | 4 | 25 | 19 | 7 | 26 | 19 | 29 | 158 | 8 | 16 | 167 | 7 | 485 |
| 11:15:00 AM | 11:30:00 AM | 1 | 30 | 14 | 14 | 26 | 18 | 29 | 167 | 7 | 28 | 181 | 13 | 528 |
| 11:30:00 AM | 11:45:00 AM | 5 | 48 | 26 | 16 | 35 | 22 | 32 | 127 | 5 | 19 | 172 | 11 | 518 |
| 11:45:00 AM | 12:00:00 PM | 5 | 31 | 22 | 14 | 48 | 19 | 40 | 157 | 6 | 20 | 164 | 7 | 533 |
| TOTAL | | 15 | 134 | 81 | 51 | 135 | 78 | 130 | 609 | 26 | 83 | 684 | 38 | 2064 |
| PEAK | | | 230 | | | 264 | | | 765 | | | 805 | | |
| 15 MIN PEAK | | | 316 | | | 324 | | | 812 | | | 888 | | |
| PEAK HOUR FACTOR | | | 0.73 | | | 0.81 | | | 0.94 | | | 0.91 | | PEAK HR |
| TWO WAY TOTALS | | | 533 | | | 507 | | | 1581 | | | 1507 | | FACTOR |
| | | | | | | | | | | | | | | 0.98 |
| | | | | | | | | | | | | | | 2023 |

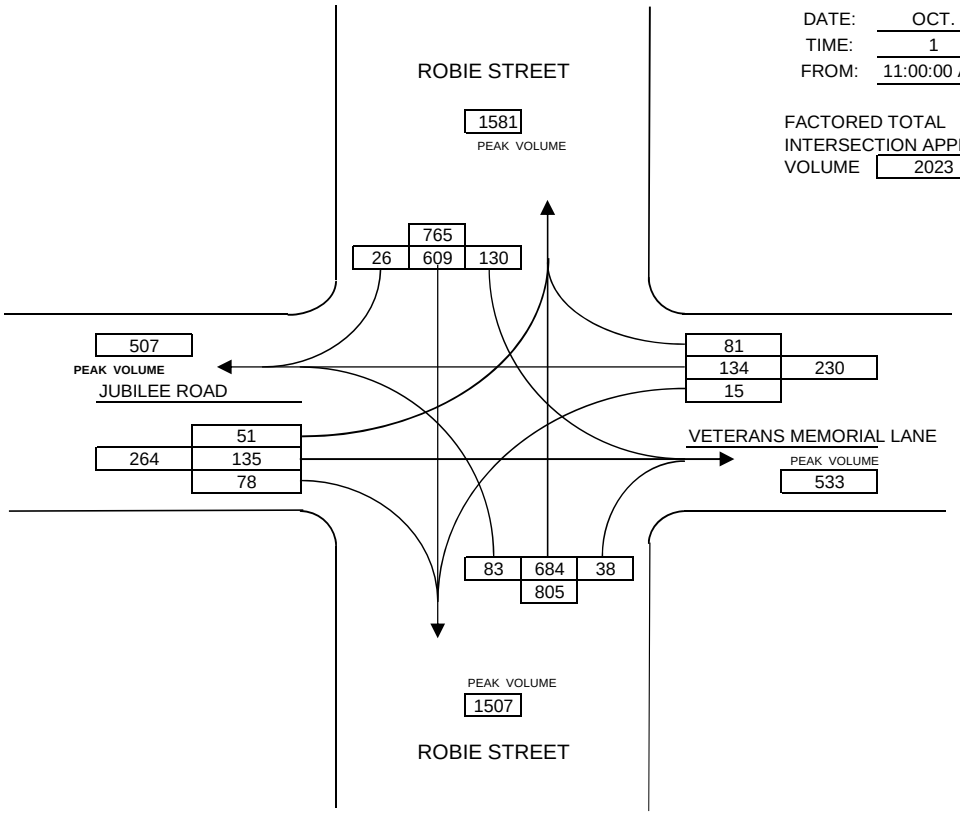
| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| WED. | 22 | OCT. | 2014 |

| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 MIN INTERVALS | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 12:00:00 PM | 12:15:00 PM | 3 | 41 | 27 | 15 | 30 | 27 | 49 | 148 | 10 | 25 | 159 | 5 | 539 |
| 12:15:00 PM | 12:30:00 PM | 4 | 24 | 23 | 14 | 40 | 14 | 39 | 145 | 3 | 19 | 147 | 4 | 476 |
| 12:30:00 PM | 12:45:00 PM | 3 | 30 | 26 | 16 | 34 | 13 | 32 | 167 | 9 | 15 | 189 | 5 | 539 |
| 12:45:00 PM | 1:00:00 PM | 4 | 29 | 25 | 14 | 42 | 19 | 27 | 165 | 7 | 13 | 171 | 9 | 525 |
| TOTAL | | 14 | 124 | 101 | 59 | 146 | 73 | 147 | 625 | 29 | 72 | 666 | 23 | 2079 |
| PEAK | | | 239 | | | 278 | | | 801 | | | 761 | | |
| 15 MIN PEAK | | | 284 | | | 300 | | | 832 | | | 836 | | |
| PEAK HOUR FACTOR | | | 0.84 | | | 0.93 | | | 0.96 | | | 0.91 | | PEAK HR |
| TWO WAY TOTALS | | | 555 | | | 503 | | | 1627 | | | 1473 | | FACTOR |
| | | | | | | | | | | | | | | 0.98 |
| | | | | | | | | | | | | | | 2037 |

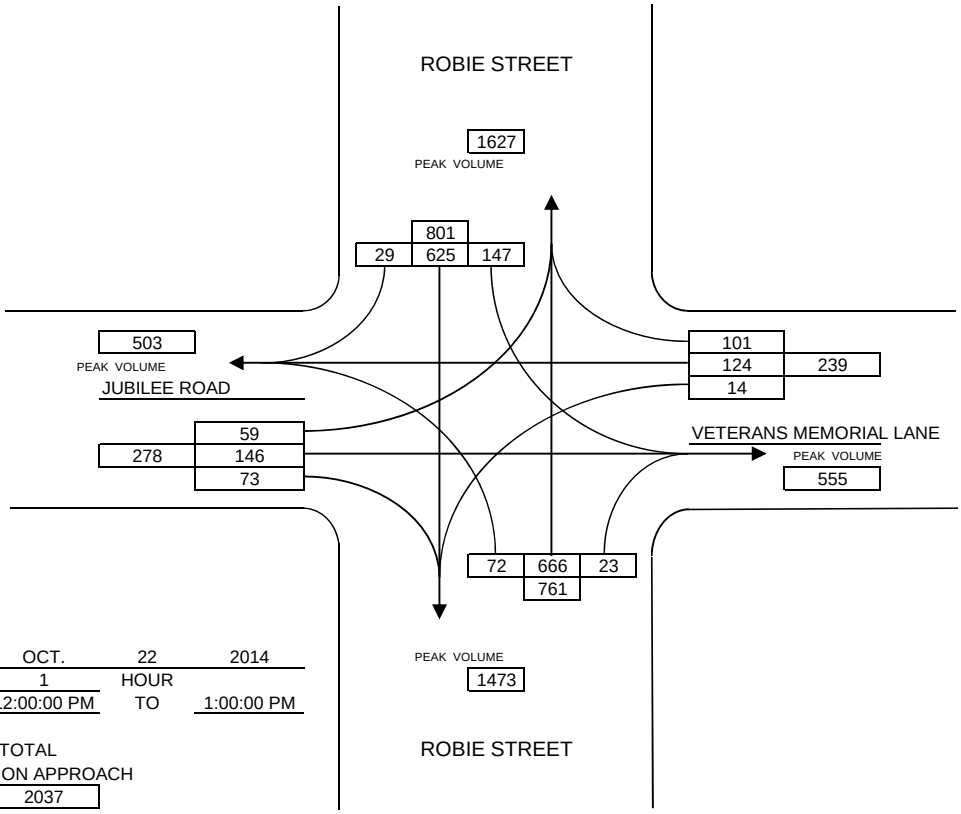
# VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : JUBILEE ROAD AT ROBIE STREET AND VETERANS MEMORIAL LANE

DATE: OCT. 22 2014
TIME: 1 HOUR
FROM: 11:00:00 AM TO 12:00:00 PM




FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 2023




DATE: OCT. 22 2014
TIME: 1 HOUR
FROM: 12:00:00 PM TO 1:00:00 PM

FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 2037

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-247

# MANUAL TRAFFIC COUNTS

INTERSECTION: JUBILEE ROAD AT ROBIE STREET AND VETERANS MEMORIAL LANE

WEATHER: CLEAR
RECORDER: MIO

| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| WED. | 22 | OCT. | 2014 |

| STREET: | | VETERANS MEMORIAL LAN | | | JUBILEE ROAD | | | ROBIE STREET | | | ROBIE STREET | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
| 15 MIN INTERVALS | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 4:00:00 PM | 4:15:00 PM | 6 | 88 | 37 | 11 | 33 | 11 | 27 | 165 | 7 | 36 | 166 | 14 | 601 |
| 4:15:00 PM | 4:30:00 PM | 4 | 92 | 28 | 14 | 31 | 8 | 27 | 144 | 9 | 36 | 195 | 14 | 602 |
| 4:30:00 PM | 4:45:00 PM | 3 | 84 | 25 | 19 | 31 | 7 | 29 | 159 | 8 | 47 | 196 | 8 | 616 |
| 4:45:00 PM | 5:00:00 PM | 3 | 77 | 29 | 14 | 40 | 13 | 23 | 155 | 7 | 42 | 181 | 7 | 591 |
| TOTAL | | 16 | 341 | 119 | 58 | 135 | 39 | 106 | 623 | 31 | 161 | 738 | 43 | 2410 |
| PEAK | | | 476 | | | 232 | | | 760 | | | 942 | | |
| 15 MIN PEAK | | | 524 | | | 268 | | | 796 | | | 1004 | | |
| PEAK HOUR FACTOR | | | 0.91 | | | 0.87 | | | 0.95 | | | 0.94 | | PEAK HR |
| TWO WAY TOTALS | | | 760 | | | 765 | | | 1675 | | | 1620 | | FACTOR |
| | | | | | | | | | | | | | | 0.98 |
| | | | | | | | | | | | | | | 2362 |

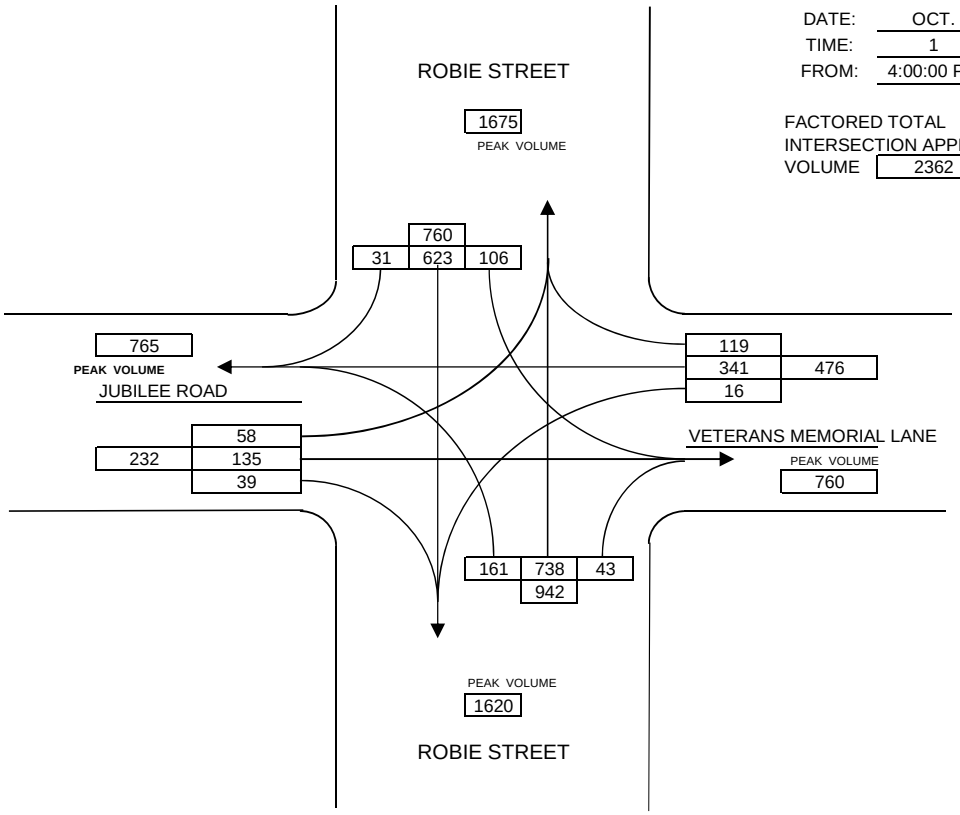
| DAY | DATE | MONTH | YEAR |
|---|---|---|---|
| WED. | 22 | OCT. | 2014 |

| TIME: | | FROM THE EAST | | | FROM THE WEST | | | FROM THE NORTH | | | FROM THE SOUTH | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 MIN INTERVALS | | L | S | R | L | S | R | L | S | R | L | S | R | |
| 5:00:00 PM | 5:15:00 PM | 2 | 67 | 23 | 14 | 32 | 10 | 26 | 152 | 3 | 48 | 212 | 7 | 596 |
| 5:15:00 PM | 5:30:00 PM | 1 | 71 | 21 | 13 | 34 | 9 | 19 | 129 | 5 | 36 | 218 | 6 | 562 |
| 5:30:00 PM | 5:45:00 PM | 3 | 47 | 19 | 12 | 33 | 10 | 23 | 138 | 6 | 26 | 181 | 3 | 501 |
| 5:45:00 PM | 6:00:00 PM | 3 | 39 | 14 | 18 | 33 | 16 | 26 | 151 | 4 | 36 | 175 | 3 | 518 |
| TOTAL | | 9 | 224 | 77 | 57 | 132 | 45 | 94 | 570 | 18 | 146 | 786 | 19 | 2177 |
| PEAK | | | 310 | | | 234 | | | 682 | | | 951 | | |
| 15 MIN PEAK | | | 372 | | | 268 | | | 724 | | | 1068 | | |
| PEAK HOUR FACTOR | | | 0.83 | | | 0.87 | | | 0.94 | | | 0.89 | | PEAK HR |
| TWO WAY TOTALS | | | 555 | | | 622 | | | 1602 | | | 1575 | | FACTOR |
| | | | | | | | | | | | | | | 0.98 |
| | | | | | | | | | | | | | | 2133 |

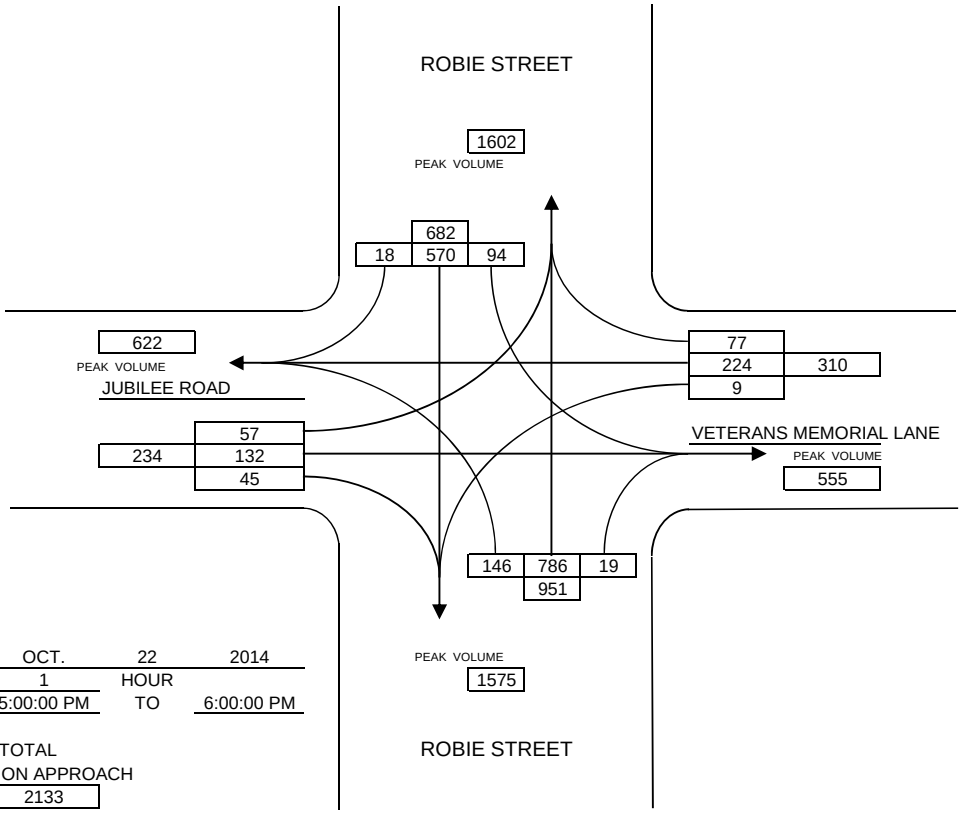
# VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : JUBILEE ROAD AT ROBIE STREET AND VETERANS MEMORIAL LANE

DATE: OCT. 22 2014
TIME: 1 HOUR
FROM: 4:00:00 PM TO 5:00:00 PM




FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 2362




DATE: OCT. 22 2014
TIME: 1 HOUR
FROM: 5:00:00 PM TO 6:00:00 PM

FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 2133

Ekistics Plan + Design
1 Starr Lane

Dartmouth, Nova Scotia, Canada B2Y4V7
(902) 461-2525 roger@ekistics.net
Ekistics

Count Name: Robie and Shirley AM Peak
Site Code:
Start Date: 05/28/2015

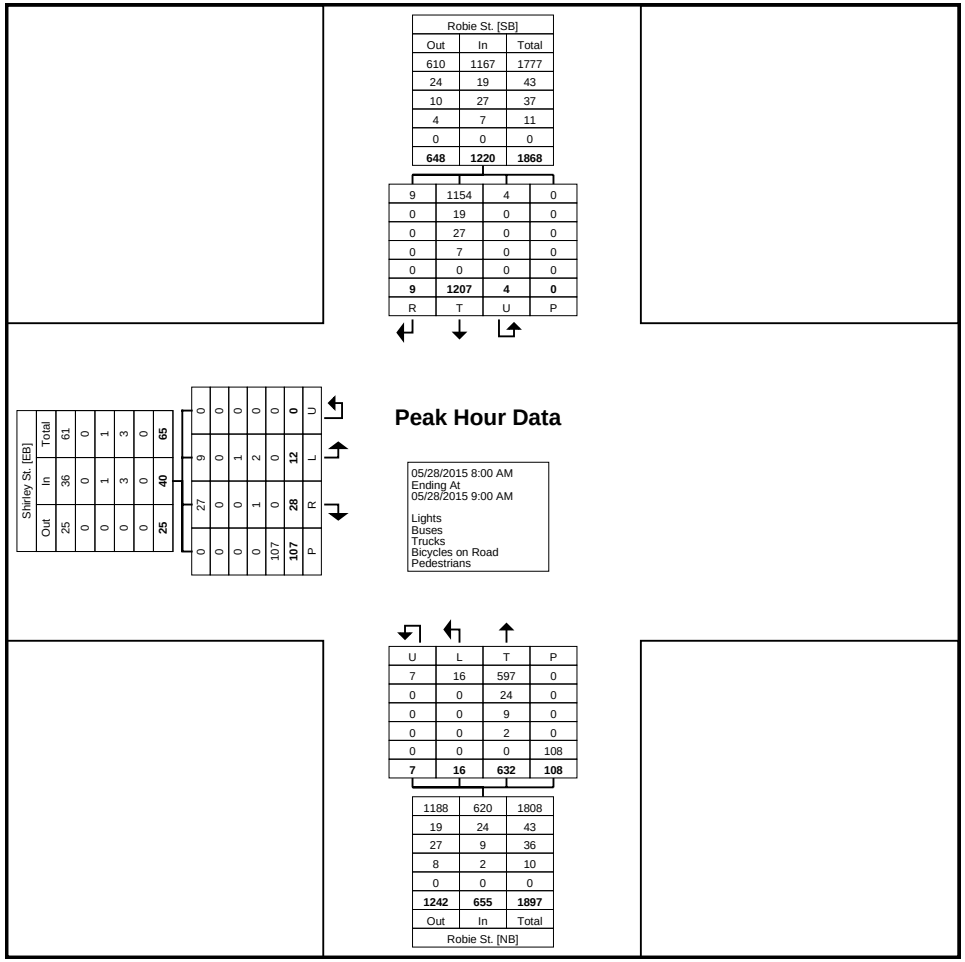

# Turning Movement Peak Hour Data (8:00 AM)

| Start Time | Robie St. Southbound | | | | | Robie St. Northbound | | | | | Shirley St. Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Right | Thru | U-Turn | Peds | App. Total | Thru | Left | U-Turn | Peds | App. Total | Right | Left | U-Turn | Peds | App. Total | Int. Total |
| 8:00 AM | 3 | 335 | 1 | 0 | 339 | 139 | 0 | 1 | 25 | 140 | 8 | 2 | 0 | 28 | 10 | 489 |
| 8:15 AM | 1 | 288 | 0 | 0 | 289 | 161 | 6 | 3 | 29 | 170 | 7 | 0 | 0 | 27 | 7 | 466 |
| 8:30 AM | 4 | 286 | 1 | 0 | 291 | 157 | 4 | 1 | 15 | 162 | 6 | 6 | 0 | 24 | 12 | 465 |
| 8:45 AM | 1 | 298 | 2 | 0 | 301 | 175 | 6 | 2 | 39 | 183 | 7 | 4 | 0 | 28 | 11 | 495 |
| Total | 9 | 1207 | 4 | 0 | 1220 | 632 | 16 | 7 | 108 | 655 | 28 | 12 | 0 | 107 | 40 | 1915 |
| Approach % | 0.7 | 98.9 | 0.3 | - | - | 96.5 | 2.4 | 1.1 | - | - | 70.0 | 30.0 | 0.0 | - | - | - |
| Total % | 0.5 | 63.0 | 0.2 | - | 63.7 | 33.0 | 0.8 | 0.4 | - | 34.2 | 1.5 | 0.6 | 0.0 | - | 2.1 | - |
| PHF | 0.563 | 0.901 | 0.500 | - | 0.900 | 0.903 | 0.667 | 0.583 | - | 0.895 | 0.875 | 0.500 | 0.000 | - | 0.833 | 0.967 |
| Lights | 9 | 1154 | 4 | - | 1167 | 597 | 16 | 7 | - | 620 | 27 | 9 | 0 | - | 36 | 1823 |
| % Lights | 100.0 | 95.6 | 100.0 | - | 95.7 | 94.5 | 100.0 | 100.0 | - | 94.7 | 96.4 | 75.0 | - | - | 90.0 | 95.2 |
| Buses | 0 | 19 | 0 | - | 19 | 24 | 0 | 0 | - | 24 | 0 | 0 | 0 | - | 0 | 43 |
| % Buses | 0.0 | 1.6 | 0.0 | - | 1.6 | 3.8 | 0.0 | 0.0 | - | 3.7 | 0.0 | 0.0 | - | - | 0.0 | 2.2 |
| Trucks | 0 | 27 | 0 | - | 27 | 9 | 0 | 0 | - | 9 | 0 | 1 | 0 | - | 1 | 37 |
| % Trucks | 0.0 | 2.2 | 0.0 | - | 2.2 | 1.4 | 0.0 | 0.0 | - | 1.4 | 0.0 | 8.3 | - | - | 2.5 | 1.9 |
| Bicycles on Road | 0 | 7 | 0 | - | 7 | 2 | 0 | 0 | - | 2 | 1 | 2 | 0 | - | 3 | 12 |
| % Bicycles on Road | 0.0 | 0.6 | 0.0 | - | 0.6 | 0.3 | 0.0 | 0.0 | - | 0.3 | 3.6 | 16.7 | - | - | 7.5 | 0.6 |
| Pedestrians | - | - | - | 0 | - | - | - | - | 108 | - | - | - | - | 107 | - | - |
| % Pedestrians | - | - | - | - | - | - | - | - | 100.0 | - | - | - | - | 100.0 | - | - |

Ekistics Plan + Design
1 Starr Lane

Dartmouth, Nova Scotia, Canada B2Y4V7
(902) 461-2525 roger@ekistics.net
Ekistics

Count Name: Robie and Shirley AM Peak
Site Code:
Start Date: 05/28/2015


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

Ekistics Plan + Design
1 Starr Lane

Dartmouth, Nova Scotia, Canada B2Y4V7
(902) 461-2525 roger@ekistics.net
Ekistics

Count Name: DEXEL - Robie and Shirley PM Peak
Site Code:
Start Date: 05/28/2015


Please Note: Start Time Incorrectly labelled as 12:15. Count represents the peak hour starting at 4:15 pm.

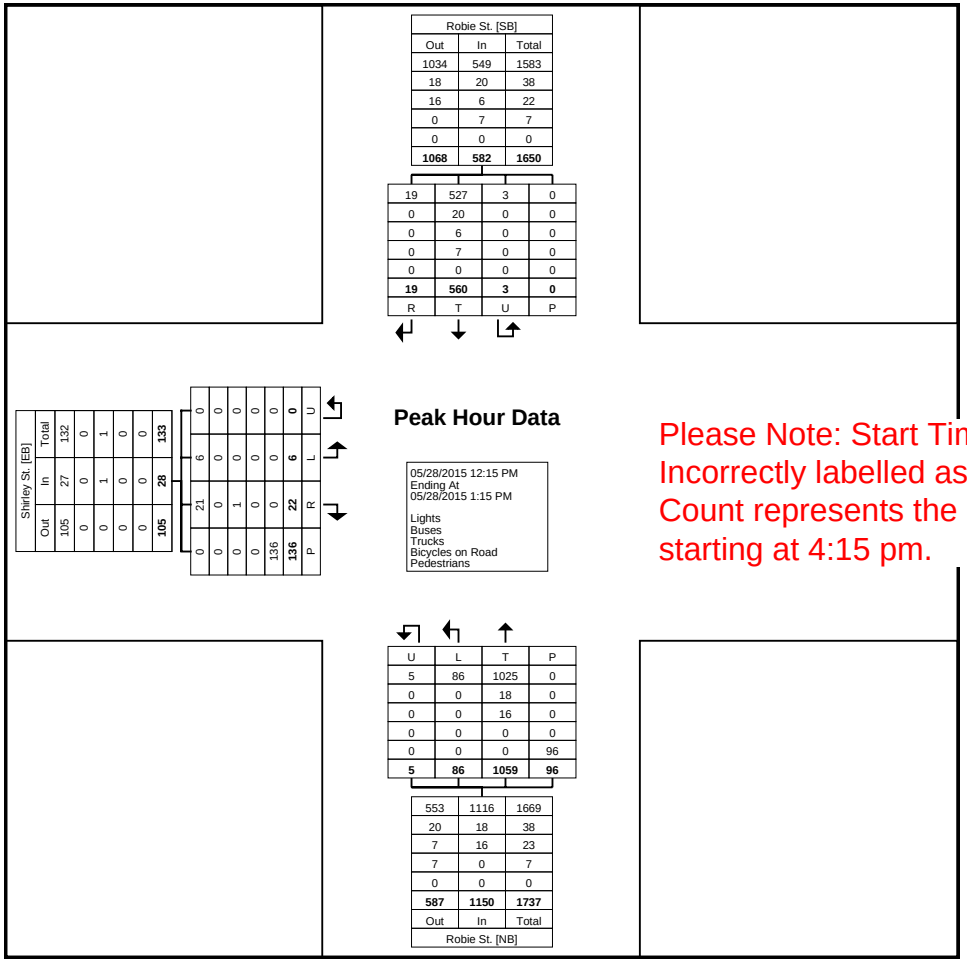
## Turning Movement Peak Hour Data (12:15 PM)

| Start Time | Robie St. Southbound | | | | | Robie St. Northbound | | | | | Shirley St. Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Right | Thru | U-Turn | Peds | App. Total | Thru | Left | U-Turn | Peds | App. Total | Right | Left | U-Turn | Peds | App. Total | Int. Total |
| 12:15 PM | 2 | 120 | 1 | 0 | 123 | 284 | 24 | 0 | 27 | 308 | 2 | 1 | 0 | 41 | 3 | 434 |
| 12:30 PM | 4 | 138 | 0 | 0 | 142 | 242 | 19 | 2 | 15 | 263 | 8 | 2 | 0 | 25 | 10 | 415 |
| 12:45 PM | 6 | 144 | 1 | 0 | 151 | 276 | 18 | 2 | 37 | 296 | 3 | 2 | 0 | 46 | 5 | 452 |
| 1:00 PM | 7 | 158 | 1 | 0 | 166 | 257 | 25 | 1 | 17 | 283 | 9 | 1 | 0 | 24 | 10 | 459 |
| Total | 19 | 560 | 3 | 0 | 582 | 1059 | 86 | 5 | 96 | 1150 | 22 | 6 | 0 | 136 | 28 | 1760 |
| Approach % | 3.3 | 96.2 | 0.5 | - | - | 92.1 | 7.5 | 0.4 | - | - | 78.6 | 21.4 | 0.0 | - | - | - |
| Total % | 1.1 | 31.8 | 0.2 | - | 33.1 | 60.2 | 4.9 | 0.3 | - | 65.3 | 1.3 | 0.3 | 0.0 | - | 1.6 | - |
| PHF | 0.679 | 0.886 | 0.750 | - | 0.877 | 0.932 | 0.860 | 0.625 | - | 0.933 | 0.611 | 0.750 | 0.000 | - | 0.700 | 0.959 |
| Lights | 19 | 527 | 3 | - | 549 | 1025 | 86 | 5 | - | 1116 | 21 | 6 | 0 | - | 27 | 1692 |
| % Lights | 100.0 | 94.1 | 100.0 | - | 94.3 | 96.8 | 100.0 | 100.0 | - | 97.0 | 95.5 | 100.0 | - | - | 96.4 | 96.1 |
| Buses | 0 | 20 | 0 | - | 20 | 18 | 0 | 0 | - | 18 | 0 | 0 | 0 | - | 0 | 38 |
| % Buses | 0.0 | 3.6 | 0.0 | - | 3.4 | 1.7 | 0.0 | 0.0 | - | 1.6 | 0.0 | 0.0 | - | - | 0.0 | 2.2 |
| Trucks | 0 | 6 | 0 | - | 6 | 16 | 0 | 0 | - | 16 | 1 | 0 | 0 | - | 1 | 23 |
| % Trucks | 0.0 | 1.1 | 0.0 | - | 1.0 | 1.5 | 0.0 | 0.0 | - | 1.4 | 4.5 | 0.0 | - | - | 3.6 | 1.3 |
| Bicycles on Road | 0 | 7 | 0 | - | 7 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 7 |
| % Bicycles on Road | 0.0 | 1.3 | 0.0 | - | 1.2 | 0.0 | 0.0 | 0.0 | - | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.4 |
| Pedestrians | - | - | - | 0 | - | - | - | - | 96 | - | - | - | - | 136 | - | - |
| % Pedestrians | - | - | - | - | - | - | - | - | 100.0 | - | - | - | - | 100.0 | - | - |

Ekistics Plan + Design
1 Starr Lane

Dartmouth, Nova Scotia, Canada B2Y4V7
(902) 461-2525 roger@ekistics.net
Ekistics

Count Name: DEXEL - Robie and Shirley PM Peak
Site Code:
Start Date: 05/28/2015


Please Note: Start Time Incorrectly labelled as 12:15. Count represents the peak hour starting at 4:15 pm.

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

# APPENDIX B

## Trip Generation

## Trip Generation Summary

Alternative: Build Out
Phase:
Project: DEXEL - Pepperell Streeet

Open Date: 2015-04-01
Analysis Date: 2015-06-23

| ITE | Land Use | | Weekday Average Daily Trips | | | Weekday AM Peak Hour of Adjacent Street Traffic | | | Weekday PM Peak Hour of Adjacent Street Traffic | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | * | Enter | Exit | Total | Enter | Exit | Total | Enter | Exit | Total |
| 232 | Condominiums | | 268 | 267 | 535 | 8 | 36 | 44 | 30 | 19 | 49 |
| | 160 Dwelling Units | | | | | | | | | | |
| Unadjusted Volume | | | 268 | 267 | 535 | 8 | 36 | 44 | 30 | 19 | 49 |
| Internal Capture Trips | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pass-By Trips | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Added to Adjacent Streets | | | 268 | 267 | 535 | 8 | 36 | 44 | 30 | 19 | 49 |

Total Weekday Average Daily Trips Internal Capture = 0 Percent

Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

* - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 9th Edition, 2012

# APPENDIX C

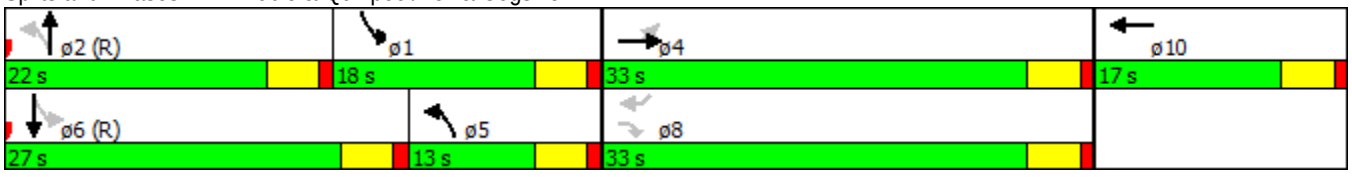
## Synchro Output

**(Existing Conditions Only)**

| Lane Group | EBL | EBT | EBR | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 400 | 450 | 390 | 245 | 105 | 149 | 406 | 35 | 308 | 731 | 45 | 204 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| Grade (%) | | 0% | | 0% | | | 0% | | | 0% | | |
| Storage Length (m) | 0.0 | | 60.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Storage Lanes | 1 | | 1 | | 0 | 1 | | 0 | 1 | | 0 | 2 |
| Taper Length (m) | 7.5 | | | | | 7.5 | | | 7.5 | | | |
| Right Turn on Red | | | Yes | | | | | | | | Yes | |
| Link Speed (k/h) | | 50 | | 50 | | | 50 | | | 50 | | |
| Link Distance (m) | | 81.6 | | 347.8 | | | 91.4 | | | 228.8 | | |
| Travel Time (s) | | 5.9 | | 25.0 | | | 6.6 | | | 16.5 | | |
| Turn Type | Perm | NA | custom | NA | | pm+pt | NA | | pm+pt | NA | | Perm |
| Protected Phases | | 4 | | 10 | | 5 | 2 | | 1 | 6 | | |
| Permitted Phases | 4 | | 8 | | | 2 | | | 6 | | | 8 |
| Detector Phase | 4 | 4 | 8 | 10 | | 5 | 2 | | 1 | 6 | | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 |
| Minimum Split (s) | 22.5 | 22.5 | 22.5 | 22.5 | | 9.5 | 22.0 | | 9.5 | 22.5 | | 22.5 |
| Total Split (s) | 33.0 | 33.0 | 33.0 | 17.0 | | 13.0 | 22.0 | | 18.0 | 27.0 | | 33.0 |
| Total Split (%) | 36.7% | 36.7% | 36.7% | 18.9% | | 14.4% | 24.4% | | 20.0% | 30.0% | | 36.7% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | | 3.5 | 3.5 | | 3.5 | 3.5 | | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | | 1.0 | 1.0 | | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 |
| Lead/Lag | | | | | | Lag | Lead | | Lag | Lead | | |
| Lead-Lag Optimize? | | | | | | Yes | Yes | | Yes | Yes | | |
| Recall Mode | Max | Max | Max | Max | | Max | Max | | Max | Max | | Max |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Cycle Length: 90 | |
| Actuated Cycle Length: 90 | |
| Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green | |
| Natural Cycle: 90 | |
| Control Type: Pretimed | |

Splits and Phases: 1: Robie & Quinpool/Bell & Cogswell



| Lane Group | EBL | EBT | EBR | WBT | NBL | NBT | SBL | SBT | SWR |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 435 | 489 | 424 | 380 | 162 | 479 | 335 | 844 | 254 |
| v/c Ratio | 0.74 | 0.83 | 0.54 | 0.81 | 0.65 | 0.71 | 0.82 | 0.96 | 0.25 |
| Control Delay | 36.4 | 42.5 | 5.2 | 52.6 | 42.2 | 40.3 | 47.3 | 55.7 | 7.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 36.4 | 42.5 | 5.2 | 52.6 | 42.2 | 40.3 | 47.3 | 55.7 | 7.9 |
| Queue Length 50th (m) | 70.0 | 81.8 | 0.0 | 35.7 | 19.2 | 43.2 | 44.6 | 79.2 | 5.1 |
| Queue Length 95th (m) | 105.7 | #134.6 | 20.5 | #58.4 | #36.7 | 60.5 | #84.9 | #118.8 | 14.7 |
| Internal Link Dist (m) | | 57.6 | | 323.8 | | 67.4 | | 204.8 | |
| Turn Bay Length (m) | | | 60.0 | | | | | | |
| Base Capacity (vph) | 589 | 589 | 791 | 469 | 250 | 679 | 410 | 882 | 1006 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.74 | 0.83 | 0.54 | 0.81 | 0.65 | 0.71 | 0.82 | 0.96 | 0.25 |

Intersection Summary

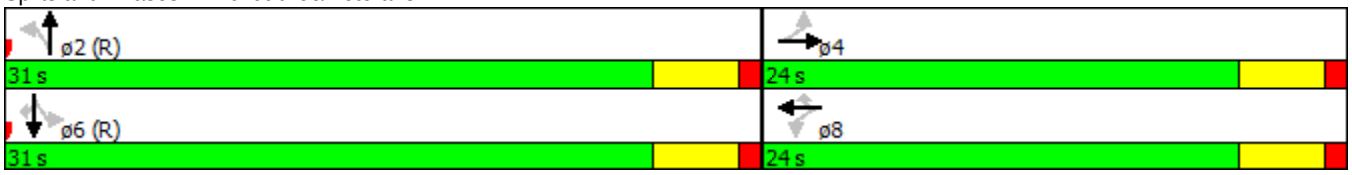
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 64 | 277 | 86 | 20 | 105 | 99 | 46 | 511 | 49 | 194 | 906 | 21 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| Grade (%) | | 0% | | | 0% | | | 0% | | | 0% | |
| Storage Length (m) | 0.0 | | 0.0 | 0.0 | | 30.0 | 40.0 | | 0.0 | 0.0 | | 20.0 |
| Storage Lanes | 0 | | 0 | 0 | | 1 | 1 | | 0 | 1 | | 1 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 20.0 | | | 7.5 | | |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Link Speed (k/h) | | 50 | | | 50 | | | 50 | | | 50 | |
| Link Distance (m) | | 150.1 | | | 173.9 | | | 70.1 | | | 113.5 | |
| Travel Time (s) | | 10.8 | | | 12.5 | | | 5.0 | | | 8.2 | |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | 6 |
| Detector Phase | 4 | 4 | | 8 | 8 | 8 | 2 | 2 | | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 22.5 | 22.5 | | 22.5 | 22.5 | 22.5 | 22.5 | 22.5 | | 22.5 | 22.5 | 22.5 |
| Total Split (s) | 24.0 | 24.0 | | 24.0 | 24.0 | 24.0 | 31.0 | 31.0 | | 31.0 | 31.0 | 31.0 |
| Total Split (%) | 43.6% | 43.6% | | 43.6% | 43.6% | 43.6% | 56.4% | 56.4% | | 56.4% | 56.4% | 56.4% |
| Yellow Time (s) | 3.5 | 3.5 | | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Recall Mode | Max | Max | | Max | Max | Max | Max | Max | | Max | Max | Max |

**Intersection Summary**

Area Type: Other
Cycle Length: 55
Actuated Cycle Length: 55
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Pretimed

Splits and Phases: 16: Jubilee/Veterans



| Lane Group | EBT | WBT | WBR | NBL | NBT | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 464 | 136 | 108 | 50 | 608 | 211 | 985 | 23 |
| v/c Ratio | 0.75 | 0.22 | 0.17 | 0.26 | 0.36 | 0.60 | 0.58 | 0.03 |
| Control Delay | 24.9 | 13.7 | 4.0 | 12.9 | 9.3 | 19.3 | 11.9 | 3.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 24.9 | 13.7 | 4.0 | 12.9 | 9.3 | 19.3 | 11.9 | 3.0 |
| Queue Length 50th (m) | 39.3 | 9.7 | 0.0 | 2.9 | 18.4 | 14.8 | 35.8 | 0.0 |
| Queue Length 95th (m) | #82.1 | 20.3 | 8.0 | 9.6 | 28.1 | #38.0 | 51.7 | 2.5 |
| Internal Link Dist (m) | 126.1 | 149.9 | | | 46.1 | | 89.5 | |
| Turn Bay Length (m) | | | 30.0 | 40.0 | | | | 20.0 |
| Base Capacity (vph) | 615 | 606 | 630 | 192 | 1695 | 354 | 1705 | 778 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.75 | 0.22 | 0.17 | 0.26 | 0.36 | 0.60 | 0.58 | 0.03 |

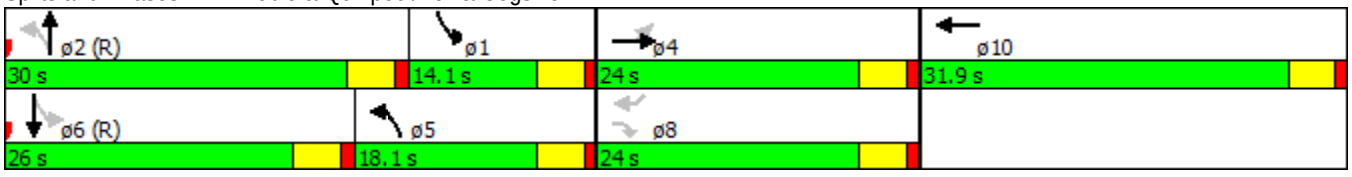
Intersection Summary

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

| Lane Group | EBL | EBT | EBR | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | SWR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 217 | 297 | 142 | 626 | 202 | 245 | 775 | 32 | 207 | 561 | 58 | 534 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| Grade (%) | | 0% | | 0% | | | 0% | | | 0% | | |
| Storage Length (m) | 0.0 | | 60.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Storage Lanes | 1 | | 1 | | 0 | 1 | | 0 | 1 | | 0 | 2 |
| Taper Length (m) | 7.5 | | | | | 7.5 | | | 7.5 | | | |
| Right Turn on Red | | | Yes | | | | | | | | Yes | |
| Link Speed (k/h) | | 50 | | 50 | | | 50 | | | 50 | | |
| Link Distance (m) | | 81.6 | | 347.8 | | | 91.4 | | | 228.8 | | |
| Travel Time (s) | | 5.9 | | 25.0 | | | 6.6 | | | 16.5 | | |
| Turn Type | Perm | NA | custom | NA | | pm+pt | NA | | pm+pt | NA | | Perm |
| Protected Phases | | 4 | | 10 | | 5 | 2 | | 1 | 6 | | |
| Permitted Phases | 4 | | 8 | | | 2 | | | 6 | | | 8 |
| Detector Phase | 4 | 4 | 8 | 10 | | 5 | 2 | | 1 | 6 | | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 |
| Minimum Split (s) | 22.5 | 22.5 | 22.5 | 22.5 | | 9.5 | 22.0 | | 9.5 | 22.5 | | 22.5 |
| Total Split (s) | 24.0 | 24.0 | 24.0 | 31.9 | | 18.1 | 30.0 | | 14.1 | 26.0 | | 24.0 |
| Total Split (%) | 24.0% | 24.0% | 24.0% | 31.9% | | 18.1% | 30.0% | | 14.1% | 26.0% | | 24.0% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | | 3.5 | 3.5 | | 3.5 | 3.5 | | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | | 1.0 | 1.0 | | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 |
| Lead/Lag | | | | | | Lag | Lead | | Lag | Lead | | |
| Lead-Lag Optimize? | | | | | | Yes | Yes | | Yes | Yes | | |
| Recall Mode | Max | Max | Max | Max | | Max | Max | | Max | Max | | Max |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Cycle Length: 100 | |
| Actuated Cycle Length: 100 | |
| Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green | |
| Natural Cycle: 100 | |
| Control Type: Pretimed | |

Splits and Phases: 1: Robie & Quinpool/Bell & Cogswell



| Lane Group | EBL | EBT | EBR | WBT | NBL | NBT | SBL | SBT | SWR |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 236 | 323 | 154 | 900 | 266 | 877 | 225 | 673 | 643 |
| v/c Ratio | 0.69 | 0.89 | 0.36 | 0.96 | 0.83 | 0.98 | 0.92 | 0.89 | 1.01 |
| Control Delay | 48.9 | 66.7 | 8.3 | 58.8 | 59.0 | 63.0 | 79.1 | 52.8 | 72.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.9 | 66.7 | 8.3 | 58.8 | 59.0 | 63.0 | 79.1 | 52.8 | 72.4 |
| Queue Length 50th (m) | 45.1 | 64.7 | 0.0 | 95.3 | 37.9 | 93.5 | 31.1 | 69.5 | ~64.6 |
| Queue Length 95th (m) | #73.1 | #114.6 | 16.6 | #136.8 | #78.6 | #135.5 | #72.8 | #102.1 | #107.0 |
| Internal Link Dist (m) | | 57.6 | | 323.8 | | 67.4 | | 204.8 | |
| Turn Bay Length (m) | | | 60.0 | | | | | | |
| Base Capacity (vph) | 344 | 363 | 432 | 933 | 320 | 897 | 244 | 758 | 636 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.69 | 0.89 | 0.36 | 0.96 | 0.83 | 0.98 | 0.92 | 0.89 | 1.01 |

Intersection Summary

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

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

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 60 | 135 | 45 | 16 | 341 | 120 | 146 | 788 | 43 | 106 | 623 | 31 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| Grade (%) | | 0% | | | 0% | | | 0% | | | 0% | |
| Storage Length (m) | 0.0 | | 0.0 | 0.0 | | 30.0 | 40.0 | | 0.0 | 0.0 | | 20.0 |
| Storage Lanes | 0 | | 0 | 0 | | 1 | 1 | | 0 | 1 | | 1 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 20.0 | | | 7.5 | | |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Link Speed (k/h) | | 50 | | | 50 | | | 50 | | | 50 | |
| Link Distance (m) | | 150.1 | | | 173.9 | | | 70.1 | | | 113.5 | |
| Travel Time (s) | | 10.8 | | | 12.5 | | | 5.0 | | | 8.2 | |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | 6 |
| Detector Phase | 4 | 4 | | 8 | 8 | 8 | 2 | 2 | | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 22.5 | 22.5 | | 22.5 | 22.5 | 22.5 | 22.5 | 22.5 | | 22.5 | 22.5 | 22.5 |
| Total Split (s) | 23.0 | 23.0 | | 23.0 | 23.0 | 23.0 | 32.0 | 32.0 | | 32.0 | 32.0 | 32.0 |
| Total Split (%) | 41.8% | 41.8% | | 41.8% | 41.8% | 41.8% | 58.2% | 58.2% | | 58.2% | 58.2% | 58.2% |
| Yellow Time (s) | 3.5 | 3.5 | | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Recall Mode | Max | Max | | Max | Max | Max | Max | Max | | Max | Max | Max |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Cycle Length: 55 | |
| Actuated Cycle Length: 55 | |
| Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green | |
| Natural Cycle: 55 | |
| Control Type: Pretimed | |

Splits and Phases: 16: Jubilee/Veterans

| Lane Group | EBT | WBT | WBR | NBL | NBT | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 261 | 388 | 130 | 159 | 904 | 115 | 677 | 34 |
| v/c Ratio | 0.56 | 0.63 | 0.21 | 0.47 | 0.51 | 0.49 | 0.38 | 0.04 |
| Control Delay | 19.2 | 20.9 | 5.2 | 14.9 | 10.4 | 17.9 | 9.3 | 3.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 19.2 | 20.9 | 5.2 | 14.9 | 10.4 | 17.9 | 9.3 | 3.2 |
| Queue Length 50th (m) | 19.7 | 33.4 | 1.2 | 10.0 | 30.0 | 7.3 | 21.1 | 0.0 |
| Queue Length 95th (m) | 39.9 | 58.3 | 10.5 | 25.0 | 43.6 | 21.8 | 31.3 | 3.4 |
| Internal Link Dist (m) | 126.1 | 149.9 | | | 46.1 | | 89.5 | |
| Turn Bay Length (m) | | | 30.0 | 40.0 | | | | 20.0 |
| Base Capacity (vph) | 465 | 614 | 607 | 336 | 1762 | 236 | 1769 | 808 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.56 | 0.63 | 0.21 | 0.47 | 0.51 | 0.49 | 0.38 | 0.04 |

Intersection Summary