

Traffic Impact Study King's Wharf Development Dartmouth Marine Slips Halifax Regional Municipality, NS

Prepared for

EDM Limited
Halifax, NS
and
Fares Inc.
Halifax, NS

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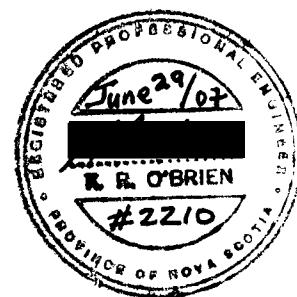
Table of Contents

Chapter	Contents	Page
1.0	Introduction	1
2.0	Site Descriptions	3
3.0	Trip Generation, Distribution and Assignment	6
4.0	Intersection Performance Analysis	11
4.1	Signal Warrant Analysis	11
4.2	Rail Grade Crossing Protection	12
4.3	Level of Service Analysis	13
5.0	Summary and Conclusions	23
	Appendices	

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1.0 Introduction

Background

Fares Inc. is planning the King's Wharf development at the Dartmouth Marine Slips as a multi-use development that will include residential, office, retail, and hotel land uses (Figure 1). Access to the development will be from the existing King Street intersection on Alderney Drive, as well as a possible partial or full access at the Prince Street / Alderney Drive intersection. Phase 1 of the development is expected to start during 2008 and full build-out of the development is expected by 2014.

Atlantic Road & Traffic Management has been retained to complete a Traffic Impact Study satisfactory to Halifax Regional Municipality (HRM).

A Traffic Impact Study Usually Considers Four Questions

A Traffic Impact Study usually consists of four steps to answer the following questions:

1. **What are the existing traffic situations** on streets adjacent to the study site, or other streets that may be impacted by site generated trips? How have traffic volumes increased historically?
2. **What traffic changes are expected** at Study Area intersections? How many vehicle trips will be generated by the proposed development during AM and PM peak hours? How will the traffic be distributed at the exits from the development and to Study Area streets and intersections?
3. **What traffic impacts will occur** on Study Area streets and intersections? How will level of performance at intersections be affected?
4. **What street or intersection improvements are required** to mitigate project impacts on Study Area traffic movements?

Study Objectives

1. Develop 2007 and projected 2010, 2012, and 2014 background AM and PM peak hourly volumes for the existing Study Area intersections.
2. Estimate the number of vehicle trips that will be generated by each of three development phases proposed for the project. Consider the effects that on-site synergies and higher than average transit, walk and bicycle home-to-work trips prevalent in the downtown Dartmouth area will have in reducing the number of external vehicle trips.
3. Distribute external site generated trips to site access and Study Area intersections.
4. Evaluate impacts of site generated traffic on the performance and level of service of Study Area intersections for 2010, 2012, and 2014 AM and PM peak hour volumes, and recommend street and intersection improvements that may be needed to mitigate impacts of site generated traffic.

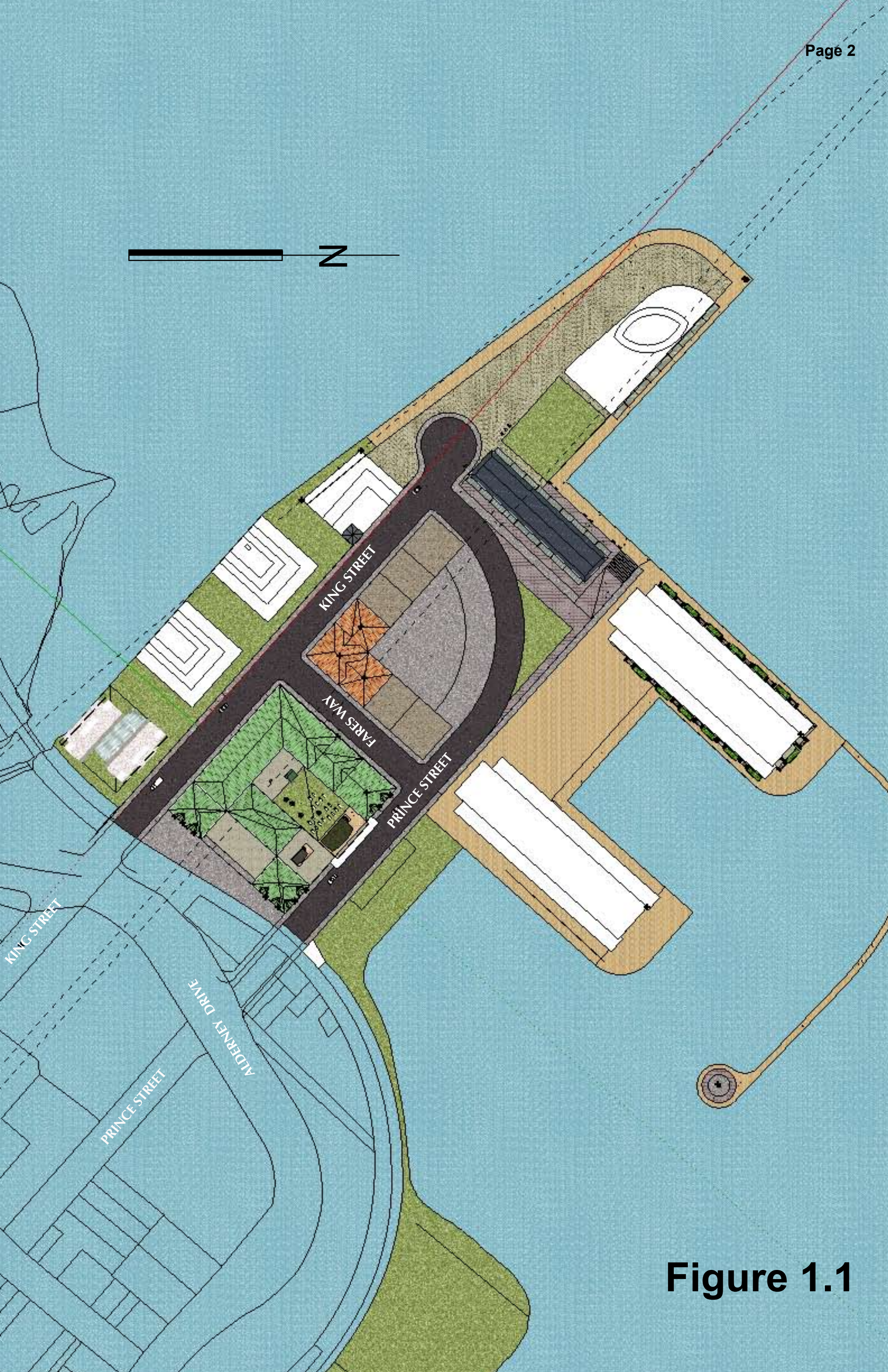


Figure 1.1

2.0 Site Descriptions

Description of Proposed Development

King's Wharf will be a mixed use development with residential, office, retail, and hotel land uses (Figure 1.1). Site access will initially be provided at King Street by a grade crossing of the railroad and proposed traffic signal controlled intersection with Alderney Drive. As development proceeds through Phase 3, a right-in / right-out emergency site access may be constructed from Alderney Drive opposite Pince Street, complete with a railroad overpass. The development is proposed to be constructed in three phases as indicated in Table 2.1.

Table 2.1 - Proposed King's Wharf Development Phasing				
Phase	Proposed Land Use for Each Development Phase			
	Residential (Number of Units)	Office (Square Feet)	Retail (Square Feet)	Hotel (Number of Rooms)
Phase 1 (2008 - 2010)	400	60,000	12,000	
Phase 2 (2010 - 2012)	400	20,000	20,000	200
Phase 3 (2012 - 2014)	400	20,000	8,000	
TOTALS	1,200	100,000	40,000	200

Intersections in the Study Area

Discussions with HRM officials indicated that the following intersections (Figure 2.1) should be included in the Study Area:

1. Alderney Drive @ Portland Street / Prince Albert Road
2. Alderney Drive @ King Street
3. Alderney Drive @ Prince Street
4. Alderney Drive @ Portland Street
5. Alderney Drive @ Queen Street
6. Alderney Drive @ Ochterloney Street
7. Ochterloney Street @ Victoria Road.

It was also indicated that site generated trips should be determined for the Wyse Road / Nantucket Avenue / Macdonald Bridge intersection. However, since this is considered a 'regional' intersection, v/c ratios and other performance indicators will not be required for that intersection.

Description of Study Area Streets

Alderney Drive is an arterial street with two through lanes for each direction of travel and a concrete curbed median between the Portland Street / Prince Albert Road intersection and the Ochterloney Street intersection. While the King Street and Prince Street intersections are controlled by STOP signs on the side street approaches, the following intersections are controlled by traffic signals:

- Portland Street / Prince Albert Road
- Portland Street (near the Ferry Terminal)
- Queen Street
- Ochterloney Street.

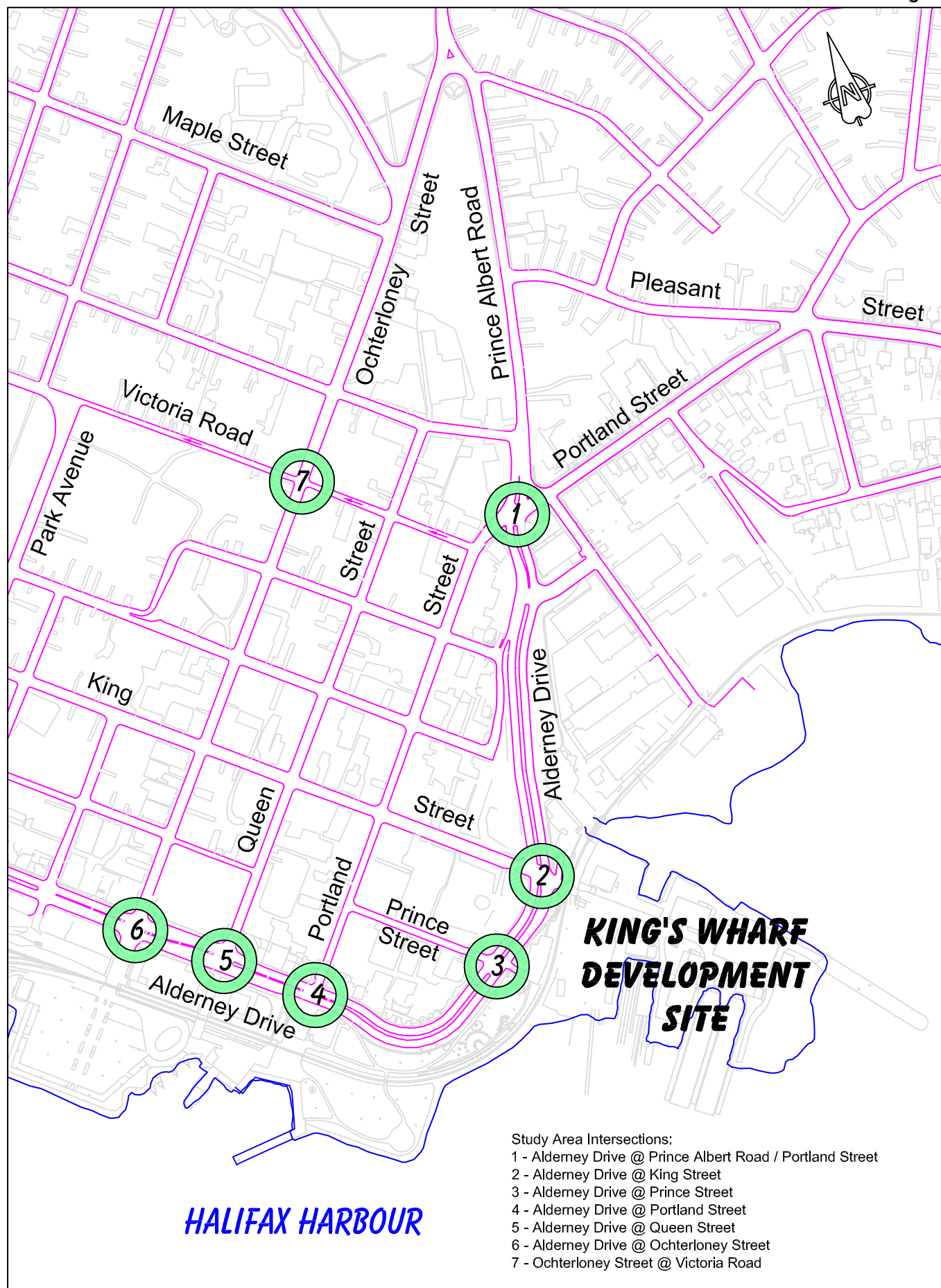


Figure 2.1 - Study Area Intersections

June 2007

**Description of
Study Area Streets
(Continued)**

Prince Street is a two-lane wide local street that connects Alderney Drive to Portland Street. King Street is a two-lane Street that provides east-west connections from Alderney Drive to Portland, Queen and Ochterloney Streets. The Downtown section of Portland Street, and Queen and Ochterloney Streets, provide north-south connections from Alderney Drive through the central business district of Dartmouth.

Victoria Road is a collector street that is frequently used as a route from Downtown Dartmouth to access the Macdonald Bridge, Woodland Avenue (Highway 118), and the Burnside area. In the Downtown area, it is one-way westbound from Portland Street to Park Avenue with a STOP controlled intersection at Ochterloney Street.

**Historical Traffic
Count Data**

HRM Traffic and Right-of-Way Services group has obtained several machine traffic counts on Alderney Drive between Ochterloney Street and Wyse Road in recent years. Average annual weekday traffic volumes for that street section are included in Table 2.2. While traffic volume growth has not been apparent during the past few years, a 0.5% annual growth rate has been used to project future year background volumes.

Table 2.2 - Traffic Volumes - Alderney Drive (between Ochterloney Street and Wyse Road)			
Date of Count	Two-Way Average Annual Weekday Volumes	Two-Way Peak Hour Volumes for Count Periods	
		AM Peak	PM Peak
Sept. 23 - 24, 2003	21862	1750	1910
July 21 - 26, 2004	20812 ¹	1420 ¹	1810 ¹
June 20 - 29, 2005	22032	1700	1960
NOTE: 1. A summer count can be expected to have lower weekday and peak hour volumes.			

**Manual Turning
Movement Counts**

Manual turning movement counts obtained at the following Study Area intersections during June, 2007, are tabulated in Tables A-1 to A-7, Appendix A, with peak hours indicated by shaded areas:

Table A-1 - Alderney Drive @ Portland Street / Prince Albert Road

Table A-2 - Alderney Drive @ King Street

Table A-3 - Alderney Drive @ Prince Street

Table A-4 - Alderney Drive @ Portland Street

Table A-5 - Alderney Drive @ Queen Street

Table A-6 - Alderney Drive @ Ochterloney Street

Table A-7 - Ochterloney Street @ Victoria Road.

Pedestrian crossing volumes at the seven intersections are tabulated in Table A-8.

**Determination of
2007 Background
Volumes**

AM and PM 2007 peak hour background volumes are shown diagrammatically on Figure B-1A (AM) and B-1B (PM).

3.0 Trip Generation, Distribution and Assignment

***Trip Generation
Estimates are Based
on Gross Floor Area
or Number of Units***

Trip Generation, 7th Edition (Institute of Transportation Engineers (ITE), Washington, 2003) contains trip generation rates for various land uses which are usually recorded as 'trips per 1000 square feet of Gross Floor Area (GFA)' for commercial and retail land uses, and 'trips per unit' for residential and hotel land uses.

Trip generation estimates for development Phases 1, 2, and 3 as described in Table 2.1, calculated using *Trip Generation* rates and equations, are included in upper sections of Tables 3.1, 3.2, and 3.3, respectively.

***Adjustments for
On-Site Synergies
and Modal Split***

While trip generation rates and equations published in *Trip Generation* provide estimates of the number of trips generated by individual land uses in a development, adjustments must be made to consider on-site synergies between various land uses in a large mixed use development. Also, since *Trip Generation* published data may be from studies in suburban areas with limited transit service, adjustments are required to account for higher than average transit, walking or bicycle usage.

Since the proposed King's Wharf development includes a mix of residential, office, retail, and hotel land uses, it is reasonable to expect that a significant number of trips generated by the individual land uses will be internal to the site and as such will reduce the number of external site generated vehicle trips.

The 2001 Census collected information concerning the type of transportation used for the trip from home to work. Information reported for the Downtown Dartmouth area indicated the following modal splits:

1. 50.0% automobile
2. 29.0% transit (including ferry)
3. 14.5% walk
4. 6.5% bicycle.

Trip Generation provides the following information on the areas where trip generation data were collected for land uses included in the King's Wharf development.

- **Condominium** - The published data for high-rise condominium developments were from surveys completed in Richmond (Virginia), Washington, Minneapolis and Vancouver, during the 1980s and 1990s (Page 399).
- **Office** - Nearly all office buildings surveyed were in suburban locations where transit service was either non-existent or negligible (Page 1149).
- **Retail** - Speciality retail centers are generally small strip shopping centers (Page 1337). While survey locations were not indicated, these facilities are usually found in suburban areas.
- **Hotel** - The hotels included in the surveys were primarily located outside central business districts in suburban areas (Page 541).

**Adjustments for
On-Site Synergies
and Modal Split
(Continued)**

While areas of Washington and Vancouver are known to have good transit service, most of the published trip generation data for King's Wharf land uses were obtained from suburban areas where the majority of trips are made by automobile.

A 25% vehicle trip reduction factor has been used to account for on-site synergies and the central business district King's Wharf location in an area with higher than average transit (including good access to the Ferry Terminal), walking and bicycling trips. Adjusted trip estimates are shown in the lower sections of Tables 3.1, 3.2, and 3.3.

Table 3.1 - Trip Generation Estimates for King's Wharf - Phase 1									
Land Use ¹	Number Units ³	Trip Generation Rates ¹				Estimate of Trips Generated ²			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Trip Generation Estimates Calculated with <i>Trip Generation, 7th Edition</i> , Rates, Equations and Directional Splits									
Condominium (ITE 232)	400 units	Trip estimates have been calculated using equations and directional splits from <i>Trip Generation</i> , Pages 401 and 402				28	117	94	58
Office (ITE 710)	60.0 KGFA	1.36	0.19	0.25	1.24	82	11	15	74
Retail ⁴ (ITE 814)	12.0 KGLA	0.76	0.60	1.19	1.52	9	7	14	18
Hotel (ITE 310)	0 Rooms	0.34	0.22	0.31	0.28	0	0	0	0
Total Estimated Trips for Phase 1 Site Development						119	135	123	150
Trip Generation Estimates Adjusted for On-Site Synergies and Modal Split									
Condominium (ITE 232)	400 units	A 25% vehicle trip reduction factor has been used to account for on-site synergies and the central business district King's Wharf location in an area with higher than average transit, walking and bicycling trips.				21	88	71	44
Office (ITE 710)	60.0 KGFA					62	8	11	56
Retail ⁴ (ITE 814)	12.0 KGLA					7	5	11	14
Hotel (ITE 310)	0 Rooms					0	0	0	0
Adjusted Trip Generation Estimates for Phase 1 Site Development						90	101	93	114
NOTES: 1. Trip generation rates are 'vehicles per hour per unit' for AM and PM peak hours per unit. Rates are for indicated Land Uses and Land Use Codes, <i>Trip Generation, 7th Edition</i> , Institute of Transportation Engineers, 2003. 2. Vehicles per hour for peak hours. 3. Units are as indicated; KGFA / KGLA is '1000 square feet gross floor or leasable area' for Retail and Office land uses. 4. Speciality Retail (Land Use 814) rates have been used. Since there are no published rates for the AM peak hour for this Land Use, and since AM peak hour trips to Speciality Retail are generally very low, AM trip rates have been assumed to be 50% of the PM rate with reversal of the directional split.									

Table 3.2 - Trip Generation Estimates for King's Wharf - Phase 1 Plus Phase 2									
Land Use ¹	Number Units ³	Trip Generation Rates ¹				Estimate of Trips Generated ²			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Trip Generation Estimates Calculated with <i>Trip Generation, 7th Edition</i> , Rates, Equations and Directional Splits									
Condominium (ITE 232)	800 units	Trip estimates have been calculated using equations and directional splits from <i>Trip Generation</i> , Pages 401 and 402				50	211	178	109
Office (ITE 710)	80.0 KGFA	1.36	0.19	0.25	1.24	109	15	20	99
Retail ⁴ (ITE 814)	32.0 KGLA	0.76	0.60	1.19	1.52	24	19	38	49
Hotel (ITE 310)	200 Rooms	0.34	0.22	0.31	0.28	68	44	62	56
Total Estimated Trips for Phases 1 and 2 Development						251	289	298	313
Trip Generation Estimates Adjusted for On-Site Synergies and Modal Split									
Condominium (ITE 232)	800 units	A 25% vehicle trip reduction factor has been used to account for on-site synergies and the central business district King's Wharf location in an area with higher than average transit, walking and bicycling trips.				38	158	134	82
Office (ITE 710)	80.0 KGFA					82	11	15	74
Retail ⁴ (ITE 814)	32.0 KGLA					18	14	29	37
Hotel (ITE 310)	200 Rooms					51	33	47	42
Adjusted Trip Generation Estimates for Phases 1 and 2 Development						189	216	225	235
NOTES: 1. Trip generation rates are 'vehicles per hour per unit' for AM and PM peak hours per unit. Rates are for indicated Land Uses and Land Use Codes, <i>Trip Generation, 7th Edition</i> , Institute of Transportation Engineers, 2003. 2. Vehicles per hour for peak hours. 3. Units are as indicated; KGLA is '1000 square feet gross floor or leasable area' for Retail and Office land uses 4. Speciality Retail (Land Use 814) rates have been used. Since there are no published rates for the AM peak hour for this Land Use, and since AM peak hour trips to Speciality Retail are generally very low, AM trip rates have been assumed to be 50% of the PM rate with reversal of the directional split.									

Table 3.3 - Trip Generation Estimates for King's Wharf - Full Development									
Land Use ¹	Number Units ³	Trip Generation Rates ¹				Estimate of Trips Generated ²			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Trip Generation Estimates Calculated with <i>Trip Generation, 7th Edition</i> , Rates, Equations and Directional Splits									
Condominium (ITE 232)	1200 units	Trip estimates have been calculated using equations and directional splits from <i>Trip Generation</i> , Pages 401 and 402				72	305	263	161
Office (ITE 710)	100.0 KGFA	1.36	0.19	0.25	1.24	136	19	25	124
Retail ⁴ (ITE 814)	40.0 KGLA	0.76	0.60	1.19	1.52	30	24	48	61
Hotel (ITE 310)	200 Rooms	0.34	0.22	0.31	0.28	68	44	62	56
Total Estimated Trips for Full Site Development						306	392	398	402
Trip Generation Estimates Adjusted for On-Site Synergies and Modal Split									
Condominium (ITE 232)	1200 units	A 25% vehicle trip reduction factor has been used to account for on-site synergies and the central business district King's Wharf location in an area with higher than average transit, walking and bicycling trips.				54	229	197	121
Office (ITE 710)	100.0 KGFA					102	14	19	93
Retail ⁴ (ITE 814)	40.0 KGLA					23	18	36	46
Hotel (ITE 310)	200 Rooms					51	33	47	42
Adjusted Trip Generation Estimates for Full Site Development						230	294	299	302
NOTES: 1. Trip generation rates are 'vehicles per hour per unit' for AM and PM peak hours per unit. Rates are for indicated Land Uses and Land Use Codes, <i>Trip Generation, 7th Edition</i> , Institute of Transportation Engineers, 2003. 2. Vehicles per hour for peak hours'. 3. Units are as indicated; KGLA is '1000 square feet gross floor or leasable area' for Retail and Office land uses 4. Speciality Retail (Land Use 814) rates have been used. Since there are no published rates for the AM peak hour for this Land Use, and since AM peak hour trips to Speciality Retail are generally very low, AM trip rates have been assumed to be 50% of the PM rate with reversal of the directional split.									

Distribution of Site Generated External Trips

The HRM QRS-II Regional Transportation Model has been used to provide general distribution information for trips generated (productions and attractions) by the King's Wharf development. Adjustments have been made to account for trip distribution changes caused by Dartmouth Crossing and the new access opportunities provided to Burnside Business Park by the recently completed Highway 118 interchange and the Commodore Drive and Wright Avenue connections under construction.

Site generated trips have been distributed and assigned in the following manner:

- East and northeast - 35% (20% to Portland Street and Pleasant Street; 15% to Prince Albert Road)
- North and northwest - 35% (25% Windmill Road; 10% Victoria Road)
- West - Macdonald Bridge - 30% (7.5% by Victoria Road / Nantucket Avenue and 22.5% by Alderney Drive / Wyse Road).

***Projected 2010
Volumes with
Phase 1***

Projected 2010 background volumes (Figure B-2) have been calculated using the 2007 background volumes (Figure B-1) and a 0.5% annual growth rate. Phase 1 trip generated volumes (Table 3.1) have been distributed and assigned as described above and are shown diagrammatically for seven study area intersections in Figure B-3. Phase 1 trip generated volumes at the Wyse Road / Nantucket Avenue / Macdonald Bridge intersection are shown diagrammatically in Figure B-11, Boxes A and B. Projected 2010 volumes that include site generated trips for Phase 1 are shown diagrammatically in Figure B-4.

***Projected 2012
Volumes with
Phase 2***

Projected 2012 background volumes (Figure B-5) have been calculated using the 2007 background volumes (Figure B-1) and a 0.5% annual growth rate. Phase 2 trip generated volumes (Table 3.2) have been distributed and assigned as described above and are shown diagrammatically for seven study area intersections in Figure B-6. Phase 2 trip generated volumes at the Wyse Road / Nantucket Avenue / Macdonald Bridge intersection are shown diagrammatically in Figure B-11, Boxes C and D. Projected 2012 volumes that include site generated trips for Phase 2 are shown diagrammatically in Figure B-7.

***Projected 2014
Volumes with
Phase 3***

Projected 2014 background volumes (Figure B-8) have been calculated using the 2007 background volumes (Figure B-1) and a 0.5% annual growth rate. Phase 3 trip generated volumes (Table 3.3) have been distributed and assigned as described above and are shown diagrammatically for seven study area intersections in Figure B-9. Phase 3 trip generated volumes at the Wyse Road / Nantucket Avenue / Macdonald Bridge intersection are shown diagrammatically in Figure B-11, Boxes E and F. Projected 2014 volumes that include site generated trips for Phase 1 are shown diagrammatically in Figure B-10.

4.0 Intersection Performance Analysis

4.1 Signal Warrant Analysis

Traffic Signal Warrant Principles

A signal warrant analysis is completed to determine if the installation of traffic signals at an intersection will provide a positive impact on total intersection operation. That is, the benefits in time saved and improved safety that will accrue to vehicles entering from a side street will exceed the impact that signals will have in time lost and potential additional collisions for vehicles approaching the intersection on the main street.

The *Canadian Traffic Signal Warrant Matrix Analysis* (Transportation Association of Canada (TAC), 2005) considers 100 warrant points as an indication that traffic signals will provide a positive impact. Signal warrant analysis uses vehicular and pedestrian volumes, and intersection, roadway and study area characteristics to calculate a warrant point value.

Traffic Signal Warrant Analysis Results

Signal warrant analyses have been completed for the following scenarios and signal warrant analysis sheets are included in Tables B-1 to B-3, Appendix B, after the volume diagram sheets:

- Ochterloney / Victoria intersection for existing 2007 volumes (91 warrant points)
- Ochterloney / Victoria intersection for projected 2010 volumes that include Phase 1 site generated trips (102 warrant points)
- Alderney / King intersection for projected 2010 volumes that include Phase 1 site generated trips (92 warrant points). Ten pedestrian crossings have been added for each Alderney Drive cross walk for each hour, in addition to those recorded in Table A-8.2.

Conclusions Reached from Signal Warrant Analysis

- Traffic signals are not warranted at the Ochterloney / Victoria intersection for existing 2007 volumes.
- Traffic signals will be warranted at the Ochterloney / Victoria intersection with completion of Phase 1 development in 2010.
- The 92 warrant points achieved at the Alderney / King intersection for Phase 1 development would not normally be sufficient to warrant installation of traffic signals. However, since signals will be warranted during the construction of Phase 2, installation of traffic signals, complete with rail crossing signal preemption, is recommended early in the construction process for Phase 1.

4.2 Railroad Grade Crossing Protection

RTD 10 Defines Requirements for Installation of a Grade Crossing Warning System

The requirement to install a grade crossing warning system is included in *RTD 10, Road / Railway Grade Crossing Technical Standards and Inspection, Testing and Maintenance Requirements* published by the Rail Safety Directorate, Transport Canada.

Section 11.1 - Grade Crossing Warning Systems of the current *RTD 10* (DRAFT October 24, 2002) indicates that

"Unrestricted grade crossings for vehicular use shall have a grade crossing warning system if: (a) (i) the forecast *cross-product* is 1000 or more"

Section 12.1 - Gates indicates that

"Where grade crossing warning systems are installed, they shall include gates if . . .

- (a) the forecast cross-product is 50,000 or more; or
- (e) the maximum railway operating speed exceeds 15 mph, and the distance between the front of a vehicle in the first stopped position at a Stop Sign or traffic signal on that part of the road leading away from the grade crossing and a rail in the grade crossing is:
 - (i) less than 30 m for a Stop Sign, or less than 60 m for traffic signals"

Definitions Provided by Railway Safety Act Regulations

Section 1. of the *Grade Crossing Regulations* provides the following definitions:

"*average annual daily traffic*" means

- (a) in respect of a railway, the number of train and engine movements over a point or segment of the line of railway in any year, divided by the number of days in the year; and
- (b) in respect of a road, the number of vehicles passing over a point or segment of the road in any year, divided by the number of days in the year.

"*cross-product* ", in respect of a grade crossing, means the product of the average annual daily traffic of trains and engines on the line of railway and the average annual daily number of vehicles on the road that pass over the grade crossing.

Grade Crossing Protection for King Street

It is understood that the railway operates at a speed of less than 15 mph with an average of about four train movements per day. The following crossing protection is required, or should be considered:

- Since a cross product of greater than 1000 will be reached early in the construction process, a grade crossing warning system will be required.
- The projected vehicle volume of about 8000 vpd in 2014, resulting in a cross-product of about 32,000, will not warrant installation of gates. However, since there is expected to be heavy pedestrian volumes, and the grade crossing is close to the proposed signalized Alderney Drive / King Street intersection, further study is required concerning the desirability of installing crossing gates.

4.3 Level of Service Analyses

Intersection Level of Service Analysis

The level or quality of performance of an intersection in terms of traffic movement is determined by a level of service (LOS) analysis. LOS for intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and increased travel time.

LOS criteria (Table 4.1) are stated in terms of average control delay per vehicle which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS 'A' describes an intersection approach with a very low control delay of up to ten seconds per vehicle. On the other hand, LOS 'F' describes an intersection with control delay greater than 80 seconds (50 seconds for STOP control), which is considered unacceptable by most drivers.

Table 4.1 - Level of Service (LOS) Criteria			
LOS	Signalized Intersections Control Delay (seconds per vehicle)	LOS Description	Two Way Stop Controlled (TWSC) Intersections Control Delay (seconds per vehicle)
A	less than 10.0	Very low delay; most vehicles do not stop (Excellent)	less than 10.0
B	between 10.0 and 20.0	Higher delay; more vehicles stop (Very Good)	between 10.0 and 15.0
C	between 20.0 and 35.0	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping (Good)	between 15.0 and 25.0
D	between 35.0 and 55.0	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop (Satisfactory)	between 25.0 and 35.0
E	between 55.0 and 80.0	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of acceptable delay	between 35.0 and 50.0
F	greater than 80.0	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection (Unacceptable)	greater than 50.0

LOS Analysis - Years and Development Scenarios

Level of service (LOS) analyses have been completed using *Synchro 6.0*. Analyses results for seven intersections are included in Appendix C and are summarized in Tables 4.2 to 4.8. LOS analyses have been completed for AM and PM peak hour volumes for the following development scenarios:

1. 2007 existing volumes (Figure B-1)
2. 2010 projected volumes with Phase 1 (Figure B-4)
3. 2012 projected volumes with Phase 2 (Figure B-7)
4. 2014 projected volumes with Phase 3 (Figure B-10).

**LOS Analyses -
Intersection
Configurations and
Traffic Control**

The following intersection configurations and traffic control were used for the LOS analyses completed for this Study:

1. The five Alderney Drive intersections between King Street and Ochterloney Street have been considered as being in the CBD. The Alderney / Prince Albert / Portland and Ochterloney / Victoria intersections have been considered as 'other' locations.
2. 2007 existing volumes (Pages C-1 to C-14) - Existing 2007 intersection configurations and traffic control have been used. Existing traffic signal timings have been used at the four signalized intersections.
3. 2010 projected volumes with Phase 1 development (Pages C-15 to C-28) - Northbound and southbound left turn lanes have been added to Alderney Drive at the King Street intersection. Traffic signals have been added at the Alderney / King and Ochterloney / Victoria intersections. The advanced left turn for Ochterloney has been reduced by 3.0 seconds at the Alderney intersection to provide additional time for opposing through traffic movement.
4. 2012 projected volumes with Phase 2 development (Pages C-29 to C-42) - Intersection of Alderney / Ochterloney has been upgraded to semi-actuated with vehicle detection on Ochterloney, Alderney Landing Driveway, and the Alderney left turn lane to Ochterloney.
5. 2014 projected volumes with Phase 3 development (Pages C-43 to C-56) - The same conditions used for the 2012 analyses have been used for 2014 analyses.

**Summary Level of
Service Analysis**

1. **Alderney Drive / Prince Albert Road / Portland Street Intersection** (Table 4.2) - While most intersection movements have v/c ratios considerably less than 0.85, during PM peak hours the Alderney Drive northbound exclusive right turn lane has a v/c ratio of 0.84 for existing 2007 volumes, increasing to 0.94 for 2014 volumes which include trips generated by full site development. This is an existing capacity problem which should be monitored.
2. **Alderney Drive / King Street Intersection** (Table 4.3) - With construction of Alderney Drive left turn lanes and installation of traffic signals, this intersection will provide good levels of service during 2014 with full site build-out.
3. **Alderney Drive / Prince Street Intersection** (Table 4.4) - Current plans are considering construction of a right-in / right-out emergency site access on Alderney Drive using the section of Prince Street east of Alderney Drive. Site generated traffic is not expected to have any significant impact to Prince Street west of Alderney Drive.
4. **Alderney Drive / Portland Street Intersection** (Table 4.5) - Site generated traffic is not expected to have any significant impact to the level of performance of this intersection.

Summary is continued on Page 22.

Table 4.2 - LOS for Alderney Drive / Prince Albert Road / Portland Street									
LOS Criteria	Control Delay (sec/veh), LOS, v/c Ratio, and 95% Queue (m) by Intersection Movement								Intersection LOS
	EB-L	EB-TR	WB-L	WB-TR	NB-LT	NB-R	SB-T	SB-R	
AM Peak Hour - 2007 Background Volumes Without Additional Development - Traffic Signal Control (Page C-1)									
Delay	29.7	31.2	25.9	19.6	33.7	10.4	37.1	9.5	20.5
LOS	C	C	C	B	C	B	D	A	C
v/c	0.07	0.25	0.67	0.44	0.10	0.52	0.32	0.24	-
Queue	8.0	31.8	119.1	71.2	13.9	64.7	34.9	12.8	-
AM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-15)									
Delay	29.8	31.2	27.0	19.7	34.4	11.0	38.2	9.5	21.3
LOS	C	C	C	B	C	B	D	A	C
v/c	0.07	0.25	0.70	0.45	0.14	0.55	0.37	0.24	-
Queue	8.0	31.8	127.1	72.4	18.4	69.7	40.3	12.8	-
AM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-29)									
Delay	29.8	31.5	28.4	19.8	35.1	11.7	39.2	9.3	22.2
LOS	C	C	C	B	D	B	D	A	C
v/c	0.07	0.26	0.73	0.46	0.19	0.58	0.42	0.25	-
Queue	8.0	33.4	136.1	73.7	23.4	76.0	44.5	13.2	-
AM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-43)									
Delay	29.8	31.5	29.2	19.9	35.7	12.3	39.7	9.3	22.8
LOS	C	C	C	B	D	B	D	A	C
v/c	0.07	0.26	0.75	0.46	0.23	0.60	0.44	0.25	-
Queue	8.0	33.4	140.9	75.0	27.1	80.9	46.4	13.2	-
PM Peak Hour - 2007 Background Volumes Without Additional Development - Traffic Signal Control (Page C-8)									
Delay	33.5	38.4	22.0	18.8	37.9	22.6	33.7	11.2	24.9
LOS	C	D	C	B	D	C	C	B	C
v/c	0.26	0.57	0.53	0.38	0.36	0.84	0.10	0.15	-
Queue	22.6	69.0	87.1	60.2	37.9	160.2	13.9	9.8	-
PM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-22)									
Delay	33.5	38.7	22.8	18.9	39.0	25.8	34.3	11.2	26.6
LOS	C	D	C	B	D	C	C	B	C
v/c	0.26	0.58	0.56	0.38	0.41	0.87	0.14	0.15	-
Queue	22.6	70.6	94.1	61.1	42.7	197.3	18.1	9.8	-
PM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-36)									
Delay	33.5	39.1	23.9	18.9	40.4	30.1	35.3	11.2	28.8
LOS	C	D	C	B	D	C	D	B	C
v/c	0.26	0.59	0.60	0.39	0.47	0.91	0.20	0.15	-
Queue	22.6	72.1	103.2	62.1	48.3	242.4	24.4	9.8	-
PM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-50)									
Delay	33.6	39.1	24.4	19.0	41.7	33.9	35.8	11.2	30.6
LOS	C	D	C	B	D	C	D	B	C
v/c	0.26	0.59	0.62	0.40	0.51	0.94	0.24	0.15	-
Queue	22.6	72.1	108.0	63.8	52.5	253.6	27.7	9.8	-

NOTE: Alderney Drive is considered a north-south street at this intersection.

Table 4.3 - LOS for Alderney Drive / King Street								
LOS Criteria	Control Delay (sec/veh), LOS, v/c Ratio, and 95% Queue (m) by Intersection Movement							Intersection LOS
	EB-LTR	WB-L	WB-TR	NB-L	NB-TR	SB-L	SB-TR	
AM Peak Hour - 2007 Background Volumes Without Additional Development - STOP Control (Page C-2)								
Delay	14.6	0.0	10.1	0.9	0.0	0.0	0.0	0.4
LOS	B	A	B	A	A	A	A	A
v/c	0.04	0.00	0.00	0.33	0.17	0.00	0.20	-
Queue	1.0	0.0	0.0	0.6	0.0	0.0	0.0	-
AM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-16)								
Delay	21.3	33.6	11.1	6.8	5.9	4.1	3.3	6.6
LOS	C	C	B	A	A	A	A	A
v/c	0.15	0.39	0.17	0.04	0.28	0.08	0.25	-
Queue	10.0	21.1	7.6	4.8	36.6	3.8	22.7	-
AM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-30)								
Delay	21.3	37.2	7.8	11.2	11.1	6.2	5.7	11.3
LOS	C	D	A	B	B	A	A	B
v/c	0.15	0.59	0.24	0.06	0.38	0.17	0.29	-
Queue	14.0	40.0	10.3	6.3	53.6	9.4	33.7	-
AM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-44)								
Delay	20.8	39.5	6.8	13.2	13.3	7.8	7.1	13.6
LOS	C	D	A	B	B	A	A	B
v/c	0.15	0.68	0.28	0.06	0.42	0.23	0.31	-
Queue	15.3	53.5	11.7	6.9	61.6	12.4	38.4	-
PM Peak Hour - 2007 Background Volumes Without Additional Development - STOP Control (Page C-9)								
Delay	17.6	0.0	11.1	0.1	0.0	0.0	0.0	0.6
LOS	C	A	B	A	A	A	A	A
v/c	0.15	0.00	0.00	0.45	0.29	0.32	0.13	-
Queue	4.1	0.0	0.0	0.1	0.0	0.0	0.0	-
PM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-23)								
Delay	22.1	34.1	10.6	7.2	7.8	5.2	3.4	8.4
LOS	C	C	B	A	A	A	A	A
v/c	0.29	0.42	0.18	0.01	0.46	0.13	0.18	-
Queue	16.0	23.2	8.0	1.9	72.3	4.1	17.2	-
PM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-37)								
Delay	22.3	37.7	7.4	11.6	15.7	9.4	5.8	14.9
LOS	C	D	A	B	B	A	A	B
v/c	0.28	0.61	0.25	0.01	0.63	0.34	0.21	-
Queue	21.8	43.5	10.6	2.5	109.5	11.5	25.2	-
PM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-51)								
Delay	22.6	42.0	6.6	13.4	19.6	15.0	7.0	18.3
LOS	C	D	A	B	B	B	A	B
v/c	0.28	0.72	0.27	0.01	0.70	0.47	0.22	-
Queue	25.1	57.0	11.9	2.5	123.7	18.8	27.2	-

NOTE: Alderney Drive is considered a north-south street at this intersection.

Table 4.4 - LOS for Alderney Drive / Prince Street							
LOS Criteria	Control Delay (sec/veh), LOS, v/c Ratio, and 95% Queue (m) by Intersection Movement						Intersection LOS
	EB-LTR	WB-LTR	NB-LT	NB-TR	SB-LT	SB-TR	
AM Peak Hour - 2007 Background Volumes Without Additional Development - STOP Control (Page C-3)							
Delay	15.6	0.0	0.2	0.0	0.4	0.0	0.3
LOS	C	A	A	A	A	A	A
v/c	0.03	0.00	0.31	0.18	0.30	0.18	-
Queue	0.8	0.0	0.1	0.0	0.3	0.0	-
AM Peak Hour - Projected 2010 Volumes With Phase 1 Development - STOP Control (Page C-17)							
Delay	15.6	0.0	0.2	0.0	0.4	0.0	0.3
LOS	C	A	A	A	A	A	A
v/c	0.03	0.00	0.35	0.19	0.35	0.20	-
Queue	0.8	0.0	0.1	0.0	0.3	0.0	-
AM Peak Hour - Projected 2012 Volumes With Phase 2 Development - STOP Control (Page C-31)							
Delay	15.9	0.0	0.2	0.0	0.4	0.0	0.3
LOS	C	A	A	A	A	A	A
v/c	0.03	0.00	0.41	0.21	0.41	0.22	-
Queue	0.8	0.0	0.1	0.0	0.3	0.0	-
AM Peak Hour - Projected 2014 Volumes With Phase 3 Development - STOP Control (Page C-45)							
Delay	16.3	0.0	0.2	0.0	0.4	0.0	0.3
LOS	C	A	A	A	A	A	A
v/c	0.03	0.00	0.44	0.22	0.44	0.23	-
Queue	0.8	0.0	0.2	0.0	0.3	0.0	-
PM Peak Hour - 2007 Background Volumes Without Additional Development - STOP Control (Page C-10)							
Delay	15.8	17.7	0.2	0.0	0.0	0.0	0.5
LOS	C	C	A	A	A	A	A
v/c	0.06	0.05	0.45	0.28	0.32	0.15	-
Queue	1.6	1.4	0.1	0.0	0.0	0.0	-
PM Peak Hour - Projected 2010 Volumes With Phase 1 Development - STOP Control (Page C-24)							
Delay	16.9	18.8	0.2	0.0	0.0	0.0	0.5
LOS	C	C	A	A	A	A	A
v/c	0.07	0.06	0.50	0.30	0.39	0.17	-
Queue	1.7	1.5	0.1	0.0	0.0	0.0	-
PM Peak Hour - Projected 2012 Volumes With Phase 2 Development - STOP Control (Page C-38)							
Delay	17.7	20.0	0.2	0.0	0.0	0.0	0.5
LOS	C	C	A	A	A	A	A
v/c	0.07	0.06	0.57	0.32	0.47	0.18	-
Queue	1.8	1.6	0.1	0.0	0.0	0.0	-
PM Peak Hour - Projected 2014 Volumes With Phase 3 Development - STOP Control (Page C-52)							
Delay	18.5	21.0	0.2	0.0	0.0	0.0	0.5
LOS	C	C	A	A	A	A	A
v/c	0.08	0.07	0.61	0.34	0.53	0.20	-
Queue	1.9	1.7	0.1	0.0	0.0	0.0	-

NOTE: Alderney Drive is considered a north-south street at this intersection.

Table 4.5 - LOS for Alderney Drive / Portland Street				
LOS Criteria	Control Delay (sec/veh), LOS, v/c Ratio, and 95% Queue (m) by Intersection Movement			Intersection LOS
	EB-LT	WB-TR	SB-LR	
AM Peak Hour - 2007 Background Volumes Without Additional Development - Traffic Signal Control (Page C-4)				
Delay	10.7	9.7	6.7	9.8
LOS	B	A	A	A
v/c	0.38	0.35	0.26	-
Queue	36.1	36.8	12.8	-
AM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-18)				
Delay	11.2	10.0	6.7	10.3
LOS	B	B	A	B
v/c	0.41	0.39	0.26	-
Queue	40.2	41.1	12.8	-
AM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-32)				
Delay	11.7	10.4	6.7	10.7
LOS	B	B	A	B
v/c	0.46	0.46	0.26	-
Queue	44.6	45.8	12.8	-
AM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-46)				
Delay	12.0	10.7	6.7	11.0
LOS	B	B	A	B
v/c	0.46	0.45	0.26	-
Queue	46.7	48.8	12.8	-
PM Peak Hour - 2007 Background Volumes Without Additional Development - Traffic Signal Control (Page C-11)				
Delay	16.7	9.2	6.1	13.3
LOS	B	A	A	B
v/c	0.64	0.30	0.28	-
Queue	69.1	31.0	12.3	-
PM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-25)				
Delay	18.9	9.5	6.1	14.6
LOS	B	A	A	B
v/c	0.68	0.34	0.29	-
Queue	76.1	35.2	12.6	-
PM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-39)				
Delay	25.3	9.9	6.1	18.4
3.9LOS	C	A	A	B
v/c	0.74	0.38	0.29	-
Queue	87.3	39.5	12.6	-
PM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-53)				
Delay	35.6	10.2	6.1	24.2
LOS	D	B	A	C
v/c	0.80	0.40	0.29	-
Queue	97.6	42.8	12.6	-

NOTE: Alderney Drive is considered an east-west street at this intersection.

Table 4.6 - LOS for Alderney Drive / Queen Street					
LOS Criteria	Control Delay (sec/veh), LOS, v/c Ratio, and 95% Queue (m) by Intersection Movement				Intersection LOS
	EB-L	EB-T	WB-TR	SB-LR	
AM Peak Hour - 2007 Background Volumes Without Additional Development - Traffic Signal Control (Page C-5)					
Delay	2.8	2.5	2.6	13.4	3.0
LOS	A	A	A	B	A
v/c	0.08	0.22	0.27	0.36	-
Queue	3.8	17.5	22.5	10.6	-
AM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-19)					
Delay	2.9	2.6	2.7	13.5	3.1
LOS	A	A	A	B	A
v/c	0.09	0.24	0.30	0.36	-
Queue	3.9	19.5	25.1	10.6	-
AM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-33)					
Delay	3.1	2.7	2.8	13.5	3.2
LOS	A	A	A	B	A
v/c	0.10	0.26	0.32	0.36	-
Queue	4.0	21.5	27.7	10.6	-
AM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-47)					
Delay	3.2	2.7	2.9	13.4	3.3
LOS	A	A	A	B	A
v/c	0.11	0.27	0.34	0.37	-
Queue	4.1	22.7	29.7	10.7	-
PM Peak Hour - 2007 Background Volumes Without Additional Development - Traffic Signal Control (Page C-12)					
Delay	3.2	3.7	2.9	12.7	3.8
LOS	A	A	A	B	A
v/c	0.11	0.36	0.26	0.40	-
Queue	5.2	31.5	20.4	11.1	-
PM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-26)					
Delay	3.5	3.9	3.1	12.7	3.9
LOS	A	A	A	B	A
v/c	0.13	0.38	0.28	0.40	-
Queue	5.9	33.7	23.0	11.1	-
PM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-40)					
Delay	3.7	4.2	3.2	12.8	4.1
LOS	A	A	A	B	A
v/c	0.15	0.41	0.31	0.40	-
Queue	6.1	38.0	25.6	11.1	-
PM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-54)					
Delay	3.9	4.3	3.3	12.8	4.2
LOS	A	A	A	B	A
v/c	0.16	0.43	0.33	0.40	-
Queue	6.3	40.2	27.5	11.1	-

NOTE: Alderney Drive is considered an east-west street at this intersection.

Table 4.7 - LOS for Alderney Drive / Octerloney Street										
LOS Criteria	Control Delay (sec/veh), LOS, v/c Ratio, and 95% Queue (m) by Intersection Movement									Intersection LOS
	EB-L	EB-TR	WB-L	WB-TR	NB-L	NB-T	NB-R	SB-TL	SB-R	
AM Peak Hour - 2007 Background Volumes Without Additional Development - Traffic Signal Control (Page C-6)										
Delay	11.7	9.6	21.5	50.3	19.9	19.0	9.3	20.9	5.8	23.6
LOS	B	A	C	D	B	B	A	C	A	C
v/c	0.42	0.40	0.18	0.72	0.10	0.05	0.04	0.21	0.57	-
Queue	21.9	40.4	11.7	76.0	11.1	8.5	4.2	25.5	20.3	-
AM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-20)										
Delay	13.0	10.0	19.2	54.7	19.9	19.0	9.3	20.9	8.9	26.1
LOS	B	B	B	D	B	B	A	C	A	C
v/c	0.47	0.43	0.17	0.70	0.10	0.05	0.04	0.21	0.61	-
Queue	21.9	44.7	11.1	78.5	11.1	8.5	4.2	25.5	34.4	-
AM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Improved Traffic Signal Control (Page C-34)										
Delay	12.8	6.7	15.3	16.4	22.3	20.6	10.1	24.5	14.5	14.1
LOS	B	A	B	B	C	C	A	C	B	B
v/c	0.53	0.40	0.14	0.58	0.16	0.08	0.06	0.32	0.75	-
Queue	25.9	49.4	11.2	86.7	11.1	8.5	4.2	25.5	37.3	-
AM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Improved Traffic Signal Control (Page C-48)										
Delay	14.9	6.9	15.6	21.3	22.1	20.5	10.1	24.3	15.4	15.2
LOS	B	A	B	C	C	C	A	C	B	B
v/c	0.56	0.42	0.14	0.61	0.16	0.08	0.06	0.32	0.76	-
Queue	28.8	51.5	11.3	92.7	11.1	8.5	4.2	25.5	39.8	-
PM Peak Hour - 2007 Background Volumes Without Additional Development - Traffic Signal Control (Page C-13)										
Delay	13.8	11.6	25.1	32.3	22.9	21.9	6.3	20.2	5.1	18.6
LOS	B	B	C	C	C	C	A	C	A	B
v/c	0.54	0.52	0.29	0.64	0.30	0.28	0.15	0.14	0.29	-
Queue	29.9	59.7	15.2	66.3	27.1	32.7	8.4	17.5	12.6	-
PM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-27)										
Delay	17.1	12.1	22.7	34.2	23.1	22.0	6.3	20.2	5.1	19.8
LOS	B	B	C	C	C	C	A	C	A	B
v/c	0.63	0.56	0.28	0.63	0.31	0.29	0.15	0.14	0.29	-
Queue	32.2	65.3	14.5	69.7	28.4	34.0	8.4	17.5	12.6	-
PM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Improved Traffic Signal Control (Page C-41)										
Delay	15.7	7.8	18.1	18.5	29.6	27.1	7.6	23.1	6.8	14.2
LOS	B	A	B	B	C	C	A	C	A	B
v/c	0.65	0.52	0.24	0.55	0.47	0.44	0.21	0.22	0.38	-
Queue	37.2	67.4	14.3	73.8	28.7	34.3	8.5	17.6	12.9	-
PM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Improved Traffic Signal Control (Page C-55)										
Delay	18.7	8.0	18.6	19.8	29.6	27.1	7.6	23.1	6.8	14.9
LOS	B	A	B	B	C	C	A	C	A	B
v/c	0.68	0.54	0.25	0.58	0.47	0.44	0.21	0.22	0.39	-
Queue	45.3	71.3	14.5	79.3	28.7	34.3	8.5	17.6	13.0	-

NOTE: Alderney Drive is considered an east-west street at this intersection.

Table 4.8 - LOS for Ochterloney Street and Victoria Road				
LOS Criteria	Control Delay (sec/veh), LOS, v/c Ratio, and 95% Queue (m) by Intersection Movement			Intersection LOS
	WB-LTR	NB-LT	SB-TR	
AM Peak Hour - 2007 Background Volumes Without Additional Development - STOP Control (Page C-7)				
Delay	116.2	3.0	0.0	28.8
LOS	F	A	A	D
v/c	1.07	0.25	0.37	-
Queue	90.5	1.8	0.0	-
AM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-21)				
Delay	26.9	9.5	12.1	15.1
LOS	C	A	B	B
v/c	0.52	0.33	0.58	-
Queue	61.4	31.8	85.0	-
AM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-35)				
Delay	27.3	10.3	12.2	15.5
LOS	C	A	B	B
v/c	0.54	0.38	0.59	-
Queue	63.4	35.2	85.8	-
AM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-49)				
Delay	28.0	10.9	12.3	16.0
LOS	C	B	B	B
v/c	0.57	0.42	0.59	-
Queue	67.3	37.9	87.6	-
PM Peak Hour - 2007 Background Volumes Without Additional Development - STOP Control (Page C-14)				
Delay	85.7	1.9	0.0	18.5
LOS	F	A	A	C
v/c	0.94	0.48	0.19	-
Queue	67.9	1.8	0.0	-
PM Peak Hour - Projected 2010 Volumes With Phase 1 Development - Traffic Signal Control (Page C-28)				
Delay	24.8	13.6	8.1	14.4
LOS	C	B	A	B
v/c	0.45	0.62	0.29	-
Queue	51.8	88.7	34.3	-
PM Peak Hour - Projected 2012 Volumes With Phase 2 Development - Traffic Signal Control (Page C-42)				
Delay	25.3	14.3	8.1	15.0
LOS	C	B	A	B
v/c	0.46	0.64	0.29	-
Queue	54.1	94.6	34.3	-
PM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-56)				
Delay	25.6	15.2	8.1	15.6
LOS	C	B	A	B
v/c	0.48	0.67	0.30	-
Queue	55.8	101.3	35.0	-

NOTE: Ochterloney Street is considered a north-south street at this intersection.

**Summary Level of
Service Analysis
(Continued from
Page 14)**

5. **Alderney Drive / Queen Street Intersection** (Table 4.6) - Site generated traffic is not expected to have any significant impact to the level of performance of this intersection.
6. **Alderney Drive / Ochterloney Street Intersection** (Table 4.7) - With suggested signal timing changes, and implementation of semi-actuated control by 2012, the intersection will provide good levels of performance for 2014 with full site build-out.
7. **Ochterloney Street / Victoria Road Intersection** (Table 4.8) - The Victoria Road westbound approach currently operates with a v/c ratio of 1.07 during the AM peak hour and 0.94 during the PM peak hour. With installation of traffic signals by 2010, the intersection will provide good levels of performance for 2014 with full site build-out.

**Volume Changes at
the Wyse Road /
Nantucket Avenue /
Macdonald Bridge
Intersection**

Since the Wyse Road / Nantucket Avenue / Macdonald Bridge intersection is a 'regional' intersection, level of performance analyses have not been completed for that intersection. However, site generated volumes assigned to the intersection are shown diagrammatically in Figure B-11 for each development phase. The volumes assigned to the Bridge can be summarized:

- Phase 1 - about 30 vph in each direction during AM and PM peak hours
- Phase 2 - about 60 vph in each direction during the AM peak hour and about 70 vph in each direction during the PM peak hour
- Phase 3 - about 90 vph in each direction during AM and PM peak hours.

5.0 Summary and Conclusions

Description of the Proposed Development

1. King's Wharf will be a mixed use development with residential, office, retail, and hotel land uses. Preliminary plans include 1200 condominium units, 100,000 square feet of office space, 40,000 square feet of retail space, and a 200 room hotel. Development is expected to start during 2008, with full site development planned for 2014. Site access will be provided at King Street by a grade crossing of the railroad and traffic signal controlled intersection with Alderney Drive. As development proceeds through Phase 3, a right-in / right-out emergency site access may be constructed from Alderney Drive opposite Prince Street, complete with a railroad overpass.

Trip Generation Estimates

2. Trip generation estimates for development Phases 1, 2, and 3 have been calculated using equations and rates published in *Trip Generation, 7th Edition* (Institute of Transportation Engineers (ITE), Washington, 2003). The 2001 Census information indicates that only 50.0% home to work trips in Downtown Dartmouth are made by automobile, with 29.0 % transit, 14.5% walking, and 6.5% bicycling trips. A 25% vehicle trip reduction factor has been used to account for on-site synergies and the central business district location of King's Wharf in an area with higher than average transit (including good access to the Ferry Terminal), walking and bicycling trips.

AM peak hour site generated external trips include:

Phase 1 (2010) - 90 vph entering and 101 vph exiting

Phases 1 & 2 (2012) - 189 vph entering and 216 vph exiting

Full site build-out (2014) - 230 vph entering and 294 vph exiting.

PM peak hour site generated external trips include:

Phase 1 (2010) - 93 vph entering and 114 vph exiting

Phases 1 & 2 (2012) - 225 vph entering and 235 vph exiting

Full site build-out (2014) - 299 vph entering and 302 vph exiting.

Trip Distribution and Assignment

3. The HRM QRS II transportation planning model has been used to provide guidance for distribution of site generated trips. Site generated trips have been distributed and assigned in the following manner:
 - East and northeast - 35% (20% to Portland Street and Pleasant Street; 15% to Prince Albert Road)
 - North and northwest - 35% (25% Windmill Road; 10% Victoria Road)
 - West - Macdonald Bridge - 30% (7.5% by Victoria Road / Nantucket Avenue and 22.5% by Alderney Drive / Wyse Road).

Traffic Signal Warrant Analyses

4. Traffic signal warrant analyses were completed at the Ochterloney / Victoria and Alderney / King intersections.

- While traffic signals are not warranted at the Ochterloney / Victoria intersection for existing 2007 volumes, the intersection does achieve 91 warrant points. Traffic signals will be warranted at the Ochterloney / Victoria intersection with completion of Phase 1 development in 2010.
- The 92 warrant points achieved at the Alderney / King intersection for Phase 1 development would not normally be sufficient to warrant installation of traffic signals. However, since signals will be warranted during the construction of Phase 2, installation of traffic signals, complete with rail crossing signal preemption, is recommended early in the construction process for Phase 1.

**Railway Grade
Crossing Protection**

5. The requirement to install a grade crossing warning system is included in *RTD 10, Road / Railway Grade Crossing Technical Standards and Inspection, Testing and Maintenance Requirements* published by the Rail Safety Directorate, Transport Canada. Review of train movements and projected vehicle crossing volumes indicate the following:
 - Since a cross product of greater than 1000 will be reached early in the construction process, a grade crossing warning system will be required.
 - The projected vehicle volume of about 8000 vpd in 2014, resulting in a cross-product of about 32,000, will not warrant installation of gates. However, since there is expected to be heavy pedestrian volumes, and the grade crossing is close to the proposed signalized Alderney Drive / King Street intersection, further study is required concerning the desirability of installing crossing gates.

**Intersection and Traffic
Signal Improvements**

6. The following intersection and traffic control improvements were used during the LOS analyses completed for this Study:
 - 2010 - Left turn lanes have been added on Alderney Drive at the King Street intersection.
 - 2010 - Traffic signals have been added at the Alderney / King and Ochterloney / Victoria intersections.
 - 2010 - The advanced left turn for Ochterloney has been reduced by 3.0 seconds at the Alderney intersection to provide additional time for opposing through traffic movement.
 - 2012 - Traffic signals at the intersection of Alderney / Ochterloney have been upgraded to semi-actuated with vehicle detection on Ochterloney, Alderney Landing Driveway, and the Alderney left turn lane to Ochterloney.

**Summary Level of
Service Analysis**

7. Level of service analyses of projected 2010, 2012 and 2014 volumes, completed using Synchro 6.0, indicate that all intersections will provide satisfactory performance for 2014 with the provision of improvements recommended in Item 6.0 above. However, during PM peak hours, the Alderney Drive northbound

exclusive right turn lane has a v/c ratio of 0.84 for existing 2007 volumes, increasing to 0.94 for 2014 volumes which include trips generated at full site development. This is an existing capacity problem which should be monitored.

***Volume Changes at the
Wyse Road / Nantucket
Avenue / Macdonald
Bridge intersection***

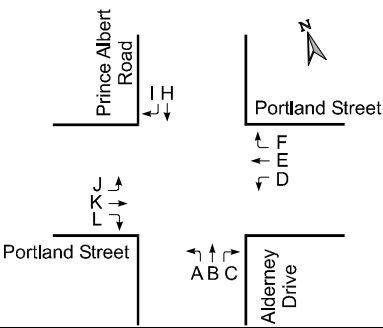
8. Since the Wyse Road / Nantucket Avenue / Macdonald Bridge intersection is a 'regional' intersection, level of performance analyses have not been completed for that intersection. However, site generated volumes assigned to the intersection have been estimated for each development phase. Volumes assigned to the Bridge can be summarized:
 - Phase 1 - about 30 vph in each direction during AM and PM peak hours
 - Phase 2 - about 60 vph in each direction during the AM peak hour and about 70 vph in each direction during the PM peak hour
 - Phase 3 - about 90 vph in each direction during AM and PM peak hours.

Conclusions

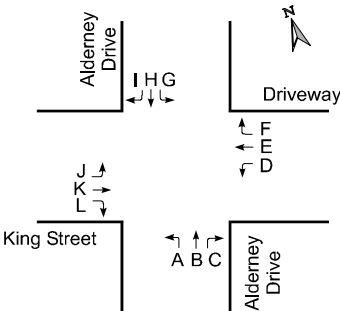
9.
 - A. With the provision of the recommended intersection improvements and traffic control changes, the King Street access to Alderney Drive will provide satisfactory site access for the King's Wharf development.
 - B. Site generated traffic is not expected to have any significant impacts to the level of performance of the existing street system in the Study Area.
 - C. The proposed right-in / right-out to the site at the Alderney Drive / Prince Street is only expected to be required for emergency site access.

Appendix A

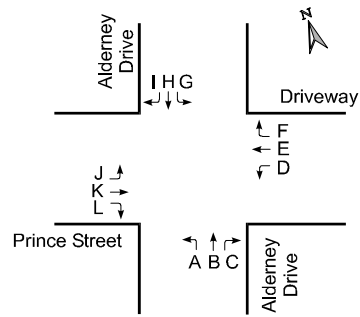
Manual Turning Movement Counts

Table A-1 Portland Street @ Alderney Drive / Prince Albert Road Dartmouth, Nova Scotia Wednesday, June 6, 2007												
Time	Alderney Drive Northbound Approach			Portland Street Westbound Approach			Prince Albert Rd. Southbound Approach		Portland Street Eastbound Approach			Total Vehicles
	A	B	C	D	E	F	H	I	J	K	L	
07:30-07:45	1	3	116	141	61	7	17	18	2	23	2	391
07:45-08:00	1	7	119	125	66	8	22	15	0	24	0	387
08:00-08:15	0	6	113	129	64	7	22	20	2	19	3	385
08:15-08:30	1	5	125	129	55	8	30	30	4	23	1	411
08:30-08:45	1	10	106	129	95	18	28	21	3	26	1	438
08:45-09:00	0	8	129	106	74	19	22	10	4	28	1	401
09:00-09:15	3	9	119	85	63	21	10	7	6	32	0	355
09:15-09:30	2	10	95	83	66	10	8	8	3	35	0	320
AM Peak Hour	2	29	473	493	288	52	102	81	13	96	6	1635
15:30-15:45	4	12	211	110	78	4	9	15	9	49	2	503
15:45-16:00	3	8	182	82	66	13	8	13	21	34	1	431
16:00-16:15	3	16	193	107	74	10	6	16	8	53	3	489
16:15-16:30	2	17	191	79	66	8	7	8	17	70	1	466
16:30-16:45	3	38	179	106	63	3	10	16	15	53	0	486
16:45-17:00	1	29	198	96	61	6	7	5	20	51	0	474
17:00-17:15	2	46	170	87	55	5	9	9	16	59	2	460
17:15-17:30	0	39	216	62	54	7	10	10	8	43	0	449
PM Peak Hour	9	100	761	388	264	27	30	45	60	227	4	1915

NOTE: Pedestrian volumes for this intersection are tabulated in Table A-8.1

Table A-2													
Alderney Drive @ King Street													
Dartmouth, Nova Scotia													
Wednesday, June 6, 2007													
Time	Alderney Drive Northbound Approach			Driveway Westbound Approach			Alderney Drive Southbound Approach			King Street Eastbound Approach			Total Vehicles
	A	B	C	D	E	F	G	H	I	J	K	L	
07:30-07:45	1	68	0	0	0	0	0	62	3	1	0	0	135
07:45-08:00	2	160	1	0	0	1	0	126	8	0	0	3	301
08:00-08:15	6	118	0	0	0	0	0	131	8	2	0	3	268
08:15-08:30	3	139	0	0	0	0	0	148	10	1	0	0	301
08:30-08:45	8	113	0	0	0	0	0	140	8	1	0	2	272
08:45-09:00	3	136	0	0	0	0	0	103	9	2	0	3	256
09:00-09:15	6	131	0	0	0	0	0	96	8	0	0	1	242
09:15-09:30	1	81	0	0	0	0	0	87	2	2	0	0	173
07:30 to 08:30	12	485	1	0	0	1	0	467	29	4	0	6	1005
08:30 to 09:30	18	461	0	0	0	0	0	426	27	5	0	6	943
AM Peak Hour	19	530	1	0	0	1	0	545	34	4	0	8	1142
11:00-11:15	2	104	0	0	0	0	0	79	2	0	0	1	188
11:15-11:30	1	103	0	0	0	0	0	72	0	1	0	2	179
11:30-11:45	0	119	0	0	0	1	0	83	2	1	0	0	206
11:45-12:00	1	115	0	0	0	0	0	71	2	0	0	0	189
12:00-12:15	0	139	0	0	0	0	1	81	2	1	0	1	225
12:15-12:30	3	118	0	0	0	0	0	83	2	2	0	2	210
12:30-12:45	0	117	0	0	0	0	0	63	0	1	0	1	182
12:45-13:00	1	119	0	0	0	0	1	87	0	1	0	1	210
11:00 to 12:00	4	441	0	0	0	1	0	305	6	2	0	3	762
12:00 to 13:00	4	493	0	0	0	0	2	314	4	5	0	5	827
Noon Peak Hour	4	491	0	0	0	1	1	318	8	4	0	3	830
15:30-15:45	1	222	0	0	0	0	0	118	1	2	0	2	346
15:45-16:00	1	205	0	0	0	0	0	97	1	1	0	0	305
16:00-16:15	2	213	0	0	0	0	0	115	2	0	0	0	332
16:15-16:30	2	214	0	0	0	0	0	109	1	5	0	1	332
16:30-16:45	1	233	0	0	0	0	0	108	0	8	0	5	355
16:45-17:00	1	200	0	0	0	0	0	94	1	9	0	7	312
17:00-17:15	3	249	0	0	0	0	0	106	0	4	0	7	369
17:15-17:30	1	216	0	1	0	0	0	70	0	3	0	3	294
15:30 to 16:30	6	854	0	0	0	0	0	439	5	8	0	3	1315
16:30 to 17:30	6	898	0	1	0	0	0	378	1	24	0	22	1330
PM Peak Hour	7	896	0	0	0	0	0	417	2	26	0	20	1368

NOTE: Pedestrian volumes for this intersection are tabulated in Table A-8.2

Table A-3													
Alderney Drive @ Prince Street Dartmouth, Nova Scotia													
Wednesday, June 20, 2007													
Time	Alderney Drive Northbound Approach			Driveway Westbound Approach			Alderney Drive Southbound Approach			Prince Street Eastbound Approach			Total Vehicles
	A	B	C	D	E	F	G	H	I	J	K	L	
07:30-07:45	0		1	0	0	0	0		2	0	0	0	3
07:45-08:00	2		1	0	0	0	2		2	1	0	1	9
08:00-08:15	2		2	0	0	0	3		8	1	0	0	16
08:15-08:30	0		0	0	0	0	2		4	1	0	1	8
08:30-08:45	3		1	0	0	0	1		6	2	0	1	14
08:45-09:00	1		0	0	0	0	0		12	2	1	1	17
09:00-09:15	1		0	0	0	0	0		0	2	0	2	5
09:15-09:30	1		0	0	0	0	0		3	4	0	0	8
07:30 to 08:30	4		4	0	0	0	7		16	3	0	2	36
08:30 to 09:30	6		1	0	0	0	1		21	10	1	4	44
AM Peak Hour	7		4	0	0	0	8		20	5	0	3	47
11:00-11:15	2		0	1	1	0	0		8	6	0	4	22
11:15-11:30	3		0	0	0	0	0		5	5	0	0	13
11:30-11:45	1		1	1	0	0	1		2	5	0	1	12
11:45-12:00	2		0	0	1	0	0		5	2	0	2	12
12:00-12:15	0		0	1	0	1	0		6	3	0	2	13
12:15-12:30	2		0	0	1	0	0		2	3	0	4	12
12:30-12:45	3		1	0	1	0	1		5	5	1	0	17
12:45-13:00	5		0	1	0	0	0		1	4	0	3	14
11:00 to 12:00	8		1	2	2	0	1		20	18	0	7	59
12:00 to 13:00	10		1	2	2	1	1		14	15	1	9	56
Noon Peak Hour	5		1	2	2	1	1		15	13	0	9	49
15:30-15:45	1		1	0	0	0	0		8	2	0	0	12
15:45-16:00	0		0	0	0	2	0		3	5	0	1	11
16:00-16:15	1		1	0	0	0	0		1	6	0	2	11
16:15-16:30	0		1	0	0	2	0		4	1	0	3	11
16:30-16:45	1		0	2	0	3	0		6	2	0	5	19
16:45-17:00	0		1	0	1	0	0		2	4	0	3	11
17:00-17:15	2		0	1	0	4	0		7	2	0	1	17
17:15-17:30	3		0	1	1	0	0		3	2	0	1	11
15:30 to 16:30	2		3	0	0	4	0		16	14	0	6	45
16:30 to 17:30	6		1	4	2	7	0		18	10	0	10	58
PM Peak Hour	3		2	3	1	9	0		19	9	0	12	58

NOTE: Pedestrian volumes for this intersection are tabulated in Table A-8.3

<div>Table A-4</div> <div>Alderney Drive @ Portland Street</div> <div>Dartmouth, Nova Scotia</div> <div>Friday, June 8, 2007</div>									
Time	Alderney Drive Westbound Approach		Portland Street Southbound Approach		Alderney Drive Eastbound Approach		Total Vehicles		
	E	F	G	I	J	K			
07:30-07:45		3	1	31	8		43		
07:45-08:00		0	5	13	3		21		
08:00-08:15		5	6	18	12		41		
08:15-08:30		3	0	41	11		55		
08:30-08:45		2	1	42	17		62		
08:45-09:00		0	1	20	12		33		
09:00-09:15		3	2	22	15		42		
09:15-09:30		4	2	20	13		39		
AM Peak Hour		11	12	103	34		160		
15:30-15:45		1	1	30	15		47		
15:45-16:00		4	5	39	11		59		
16:00-16:15		1	4	27	25		57		
16:15-16:30		1	3	36	25		65		
16:30-16:45		3	1	26	27		57		
16:45-17:00		1	0	30	21		52		
17:00-17:15		3	3	29	22		57		
17:15-17:30		1	1	32	30		64		
PM Peak Hour		8	5	117	100		230		

NOTE: Pedestrian volumes for this intersection are tabulated in Table A-8.4

<div>Table A-5</div> <div>Alderney Drive @ Queen Street</div> <div>Dartmouth, Nova Scotia</div> <div>Friday, June 8, 2007</div>									
Time	Alderney Drive Westbound Approach		Queen Street Southbound Approach		Alderney Drive Eastbound Approach		Total Vehicles		
	E	F	G	I	J	K			
07:30-07:45	2		0	18	6		26		
07:45-08:00	1		2	8	9		20		
08:00-08:15	1		2	10	7		20		
08:15-08:30	2		1	20	13		36		
08:30-08:45	0		1	20	13		34		
08:45-09:00	0		2	8	11		21		
09:00-09:15	3		0	13	8		24		
09:15-09:30	6		1	18	8		33		
AM Peak Hour	6		5	56	35		102		
15:30-15:45	0		0	19	8		27		
15:45-16:00	3		1	12	13		29		
16:00-16:15	5		5	15	24		49		
16:15-16:30	1		0	22	11		34		
16:30-16:45	1		0	28	20		49		
16:45-17:00	3		3	15	10		31		
17:00-17:15	1		1	13	15		30		
17:15-17:30	3		2	14	7		26		
PM Peak Hour	8		6	70	52		136		

NOTE: Pedestrian volumes for this intersection are tabulated in Table A-8.5

<div>Table A-6</div> <div>Alderney Drive</div> <div>@</div> <div>Ochterloney Street</div> <div>Dartmouth, Nova Scotia</div> <div>Thursday, June 7, 2007</div>													
Time	Driveway			Alderney Drive			Ochterloney Street			Alderney Drive			Total Vehicles
	Northbound Approach			Westbound Approach			Southbound Approach			Eastbound Approach			
	A	B	C	D	E	F	G	H	I	J	K	L	
07:30-07:45	8	11	3	4	175	2	3	27	114	31	126	18	522
07:45-08:00	11	7	4	10	176	4	4	23	84	53	145	23	544
08:00-08:15	8	6	2	10	173	5	4	27	94	34	125	35	523
08:15-08:30	7	2	5	9	164	2	1	17	94	41	169	23	534
08:30-08:45	1	6	1	8	151	7	2	16	49	38	146	22	447
08:45-09:00	3	7	5	8	121	4	6	10	44	51	157	12	428
09:00-09:15	4	5	3	7	101	5	4	6	32	30	114	17	328
09:15-09:30	5	5	6	2	106	7	6	6	41	43	133	12	372
AM Peak Hour	34	26	14	33	688	13	12	94	386	159	565	99	2123
15:30-15:45	18	20	9	7	135	5	4	4	32	49	204	10	497
15:45-16:00	17	24	7	4	141	7	6	7	40	62	183	10	508
16:00-16:15	22	17	9	5	174	7	10	4	33	55	160	5	501
16:15-16:30	19	22	7	9	167	4	6	5	39	44	184	13	519
16:30-16:45	36	46	19	12	158	3	3	13	42	58	197	8	595
16:45-17:00	32	34	18	10	149	5	5	12	41	59	192	16	573
17:00-17:15	25	43	13	7	162	3	5	6	31	45	219	8	567
17:15-17:30	13	18	9	16	148	2	8	12	29	60	225	10	550
PM Peak Hour	106	141	59	45	617	13	21	43	143	222	833	42	2285

NOTE: Pedestrian volumes for this intersection are tabulated in Table A-8.6

<div>Table A-7</div> <div>Ochterloney Street @ Victoria Road</div> <div>Dartmouth, Nova Scotia</div> <div>Wednesday, June 20, 2007</div>			<div><div><div>Ochterloney Street</div><div>I</div><div>H</div></div><div><div>Victoria Road</div><div>F</div><div>M</div><div>D</div></div><div><div>Victoria Road</div><div>A</div><div>B</div></div><div><div>Ochterloney Street</div></div></div>					
Time	Ochterloney Street Northbound Approach		Victoria Road Westbound Approach			Ochterloney Street Southbound Approach		Total Vehicles
	A	B	D	E	F	H	I	
07:30-07:45	15	43	2	81	3	101	16	261
07:45-08:00	18	28	0	59	3	120	36	264
08:00-08:15	14	43	3	51	6	120	33	270
08:15-08:30	12	43	2	44	5	134	21	261
08:30-08:45	11	47	2	50	5	107	19	241
08:45-09:00	8	55	2	61	2	111	14	253
09:00-09:15	10	41	0	47	3	69	8	178
09:15-09:30	6	40	3	41	3	53	10	156
07:30 to 08:30	59	157	7	235	17	475	106	1056
08:30 to 09:30	35	183	7	199	13	340	51	828
AM Peak Hour	59	157	7	235	17	475	106	1056
11:00-11:15	5	42	1	32	6	54	3	143
11:15-11:30	9	58	1	42	10	63	9	192
11:30-11:45	8	55	4	38	10	51	7	173
11:45-12:00	9	63	3	41	13	52	6	187
12:00-12:15	15	67	3	39	11	49	15	199
12:15-12:30	17	68	6	36	6	47	8	188
12:30-12:45	12	51	3	43	7	58	14	188
12:45-13:00	11	63	3	42	7	72	10	208
11:00 to 12:00	31	218	9	153	39	220	25	695
12:00 to 13:00	55	249	15	160	31	226	47	783
Noon Peak Hour	55	249	15	160	31	226	47	783
15:30-15:45	3	72	3	66	3	39	12	198
15:45-16:00	13	58	0	47	6	59	7	190
16:00-16:15	16	126	2	40	12	61	8	265
16:15-16:30	16	124	2	35	6	58	10	251
16:30-16:45	13	79	0	46	11	54	14	217
16:45-17:00	20	126	3	48	3	59	8	267
17:00-17:15	29	124	0	50	3	66	13	285
17:15-17:30	18	135	2	38	11	66	9	279
15:30 to 16:30	48	380	7	188	27	217	37	904
16:30 to 17:30	80	464	5	182	28	245	44	1048
PM Peak Hour	80	464	5	182	28	245	44	1048

NOTE: Pedestrian volumes for this intersection are tabulated in Table A-8.7

Table A-8.1 - Pedestrian Crossings at Alderney / Prince Albert / Portland - (Wednesday, June 6, 2007)

Time	Crossing Prince Albert	Crossing Alderney	Crossing Portland	
	North Side	South Side	West Side	East Side
07:30 - 08:30	42	45	0	22
08:30 - 09:30	21	32	0	7
15:30 - 16:30	35	59	2	18
16:30 - 17:30	46	56	6	23

NOTE: Alderney Drive is considered a north-south street at this intersection.

Table A-8.2 - Pedestrian Crossings at Alderney / King - (Wednesday, June 6, 2007)

Time	Crossing Alderney		Crossing King	
	North Side	South Side	West Side	East Side
07:30 - 08:30	0	0	2	10
08:30 - 09:30	0	4	1	8
11:00 - 12:00	13	1	2	27
12:00 - 13:00	1	1	1	51
15:30 - 16:30	1	4	2	18
16:30 - 17:30	0	2	3	20

NOTE: Alderney Drive is considered a north-south street at this intersection.

Table A-8.3 - Pedestrian Crossings at Alderney / Prince - (Wednesday, June 20, 2007)

Time	Crossing Alderney		Crossing Prince	
	North Side	South Side	West Side	East Side
07:30 - 08:30	2	13	8	23
08:30 - 09:30	1	9	2	9
11:00 - 12:00	1	7	4	6
12:00 - 13:00	2	11	4	19
15:30 - 16:30	1	21	7	15
16:30 - 17:30	5	14	1	17

NOTE: Alderney Drive is considered a north-south street at this intersection.

Table A-8.4 - Pedestrian Crossings at Alderney / Portland - (Friday, June 8, 2007)

Time	Crossing Alderney		Crossing Portland
	West Side	East Side	
07:30 - 08:30	119	26	8
08:30 - 09:30	81	32	22
15:30 - 16:30	110	47	12
16:30 - 17:30	123	50	22

NOTE: Alderney Drive is considered an east-west street at this intersection.

Table A-8.5 - Pedestrian Crossings at Alderney / Queen - (Friday, June 8, 2007)

Time	Crossing Alderney		Crossing Queen
	West Side	East Side	
07:30 - 08:30	99	23	19
08:30 - 09:30	74	16	2
15:30 - 16:30	79	67	37
16:30 - 17:30	91	47	51

NOTE: Alderney Drive is considered an east-west street at this intersection.

Table A-8.6 - Pedestrian Crossings at Alderney / Ochterloney - (Thursday, June 7, 2007)

Time	Crossing Alderney		Crossing Ochterloney	
	West Side	East Side	North Side	South Side
07:30 - 08:30	17	75	52	35
08:30 - 09:30	13	46	35	45
15:30 - 16:30	26	95	43	36
16:30 - 17:30	27	76	40	47

NOTE: Alderney Drive is considered an east-west street at this intersection.

Table A-8.7 - Pedestrian Crossings at Ochterloney / Victoria - (Wednesday, June 20, 2007)

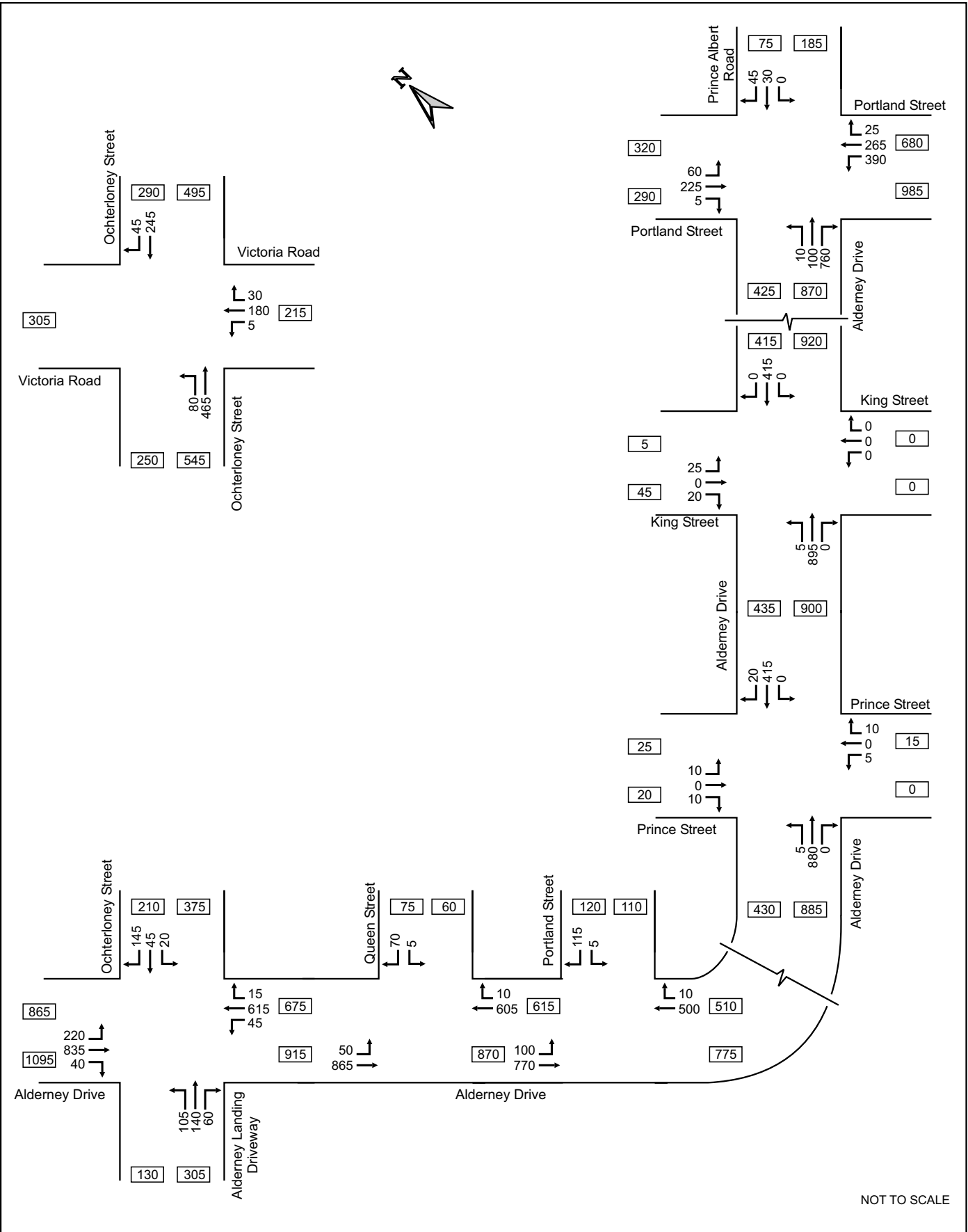
Time	Crossing Ochterloney		Crossing Victoria	
	North Side	South Side	West Side	East Side
07:30 - 08:30	16	-	49	31
08:30 - 09:30	9	-	37	17
11:00 - 12:00	7	-	39	60
12:00 - 13:00	23	-	84	69
15:30 - 16:30	30	-	36	31
16:30 - 17:30	33	-	44	46

NOTE: Ochterloney Street is considered a north-south street at this intersection.

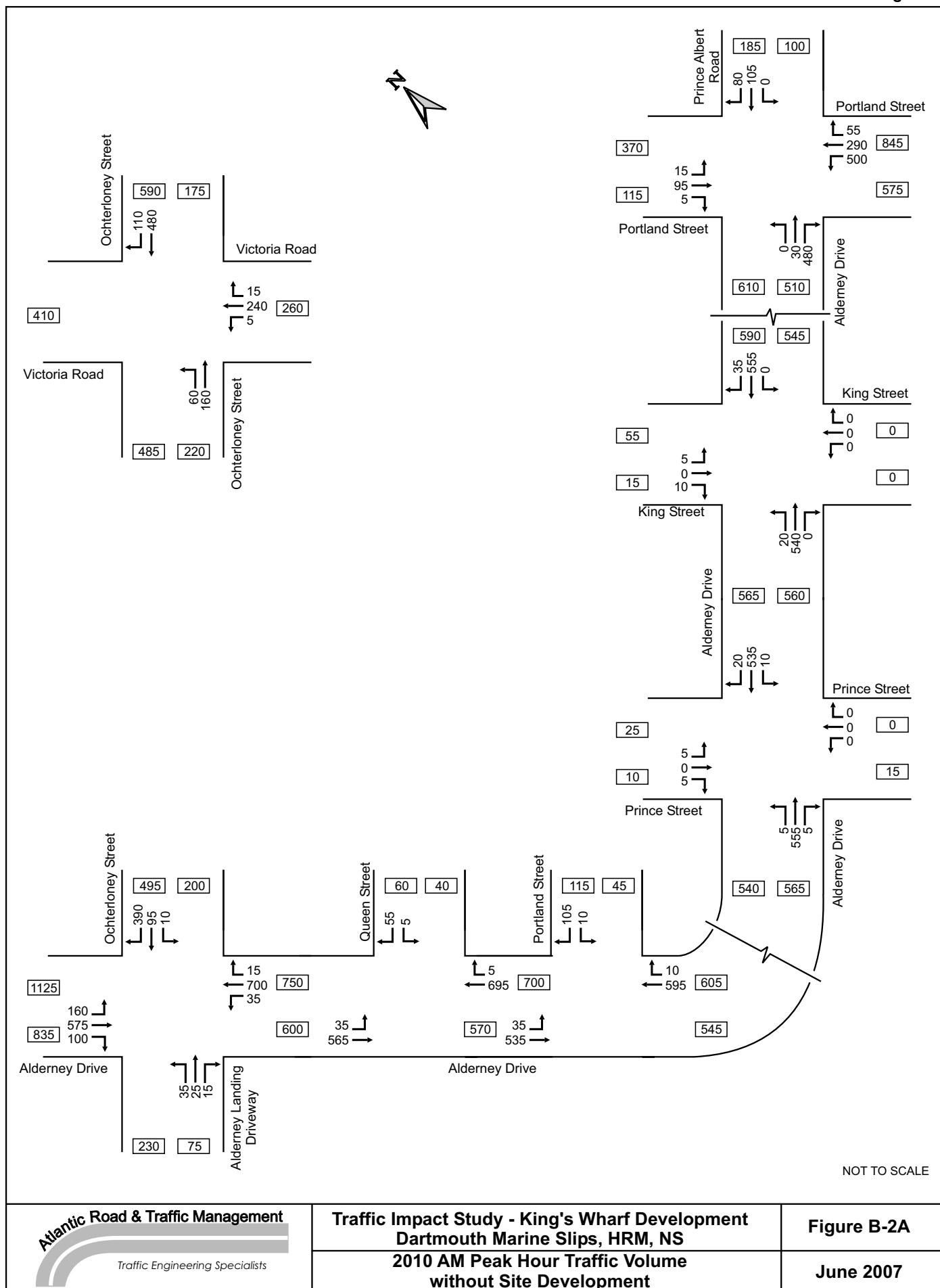
Appendix B

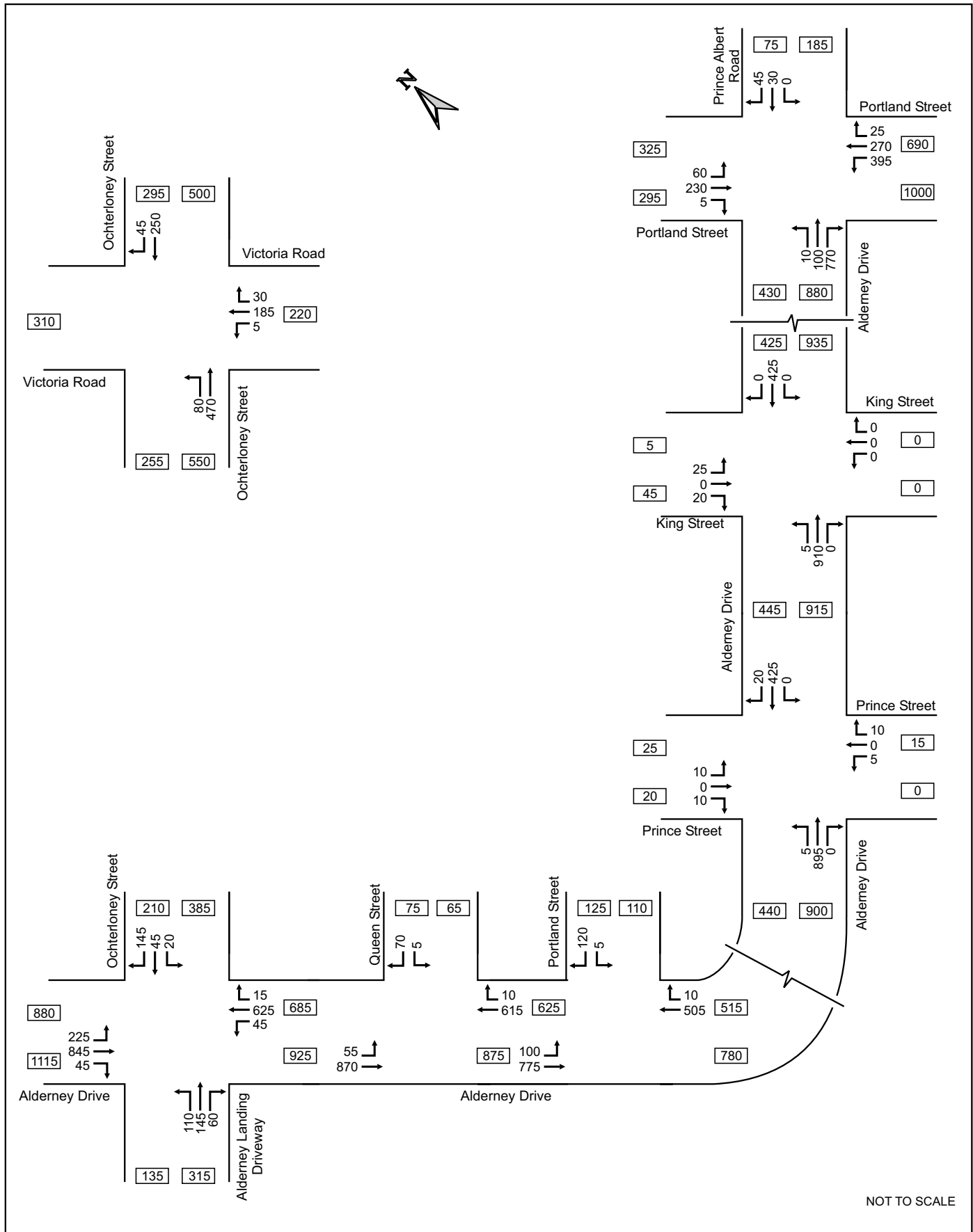
Traffic Volume Diagrams

Signal Warrant Analysis




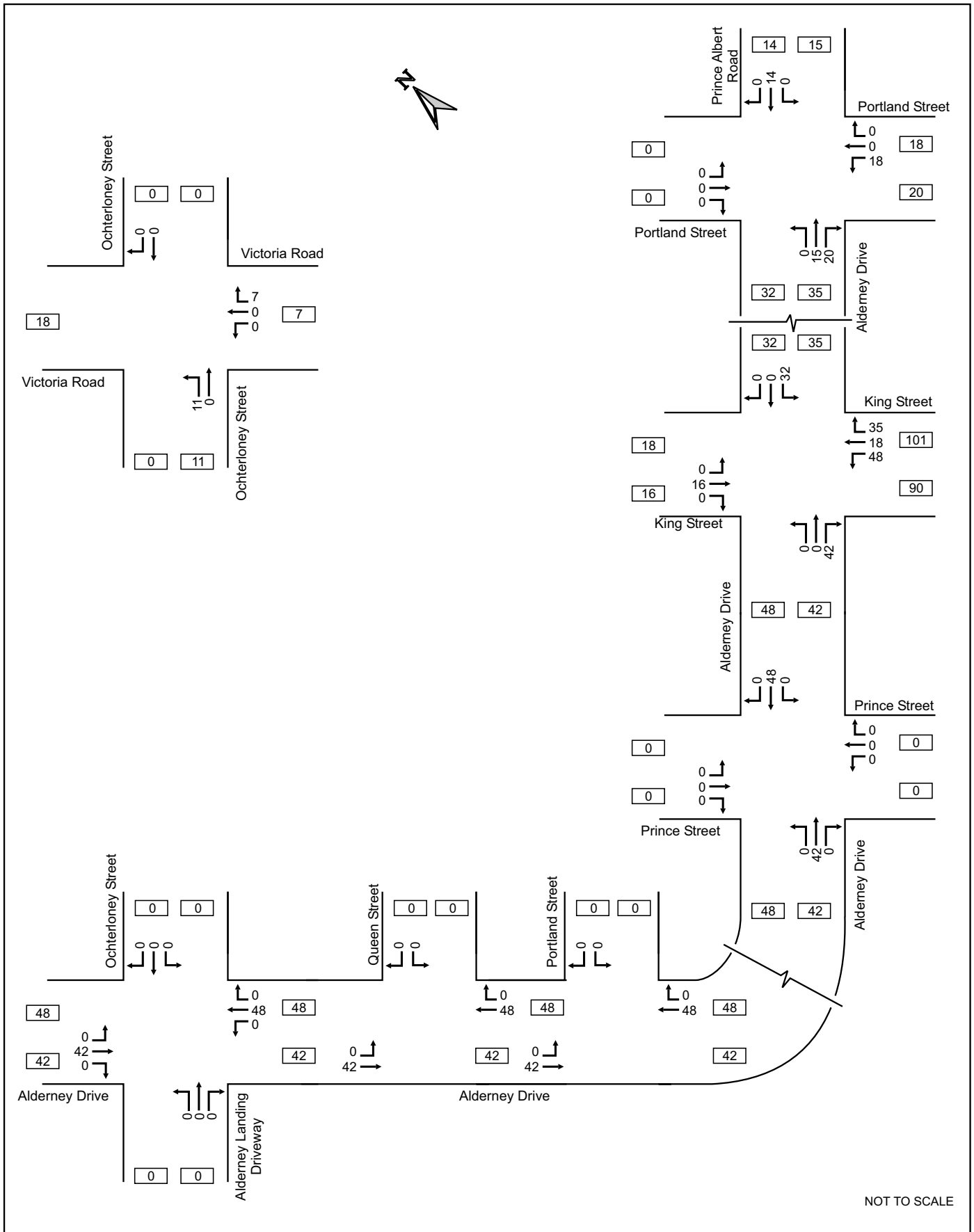
NOT TO SCALE



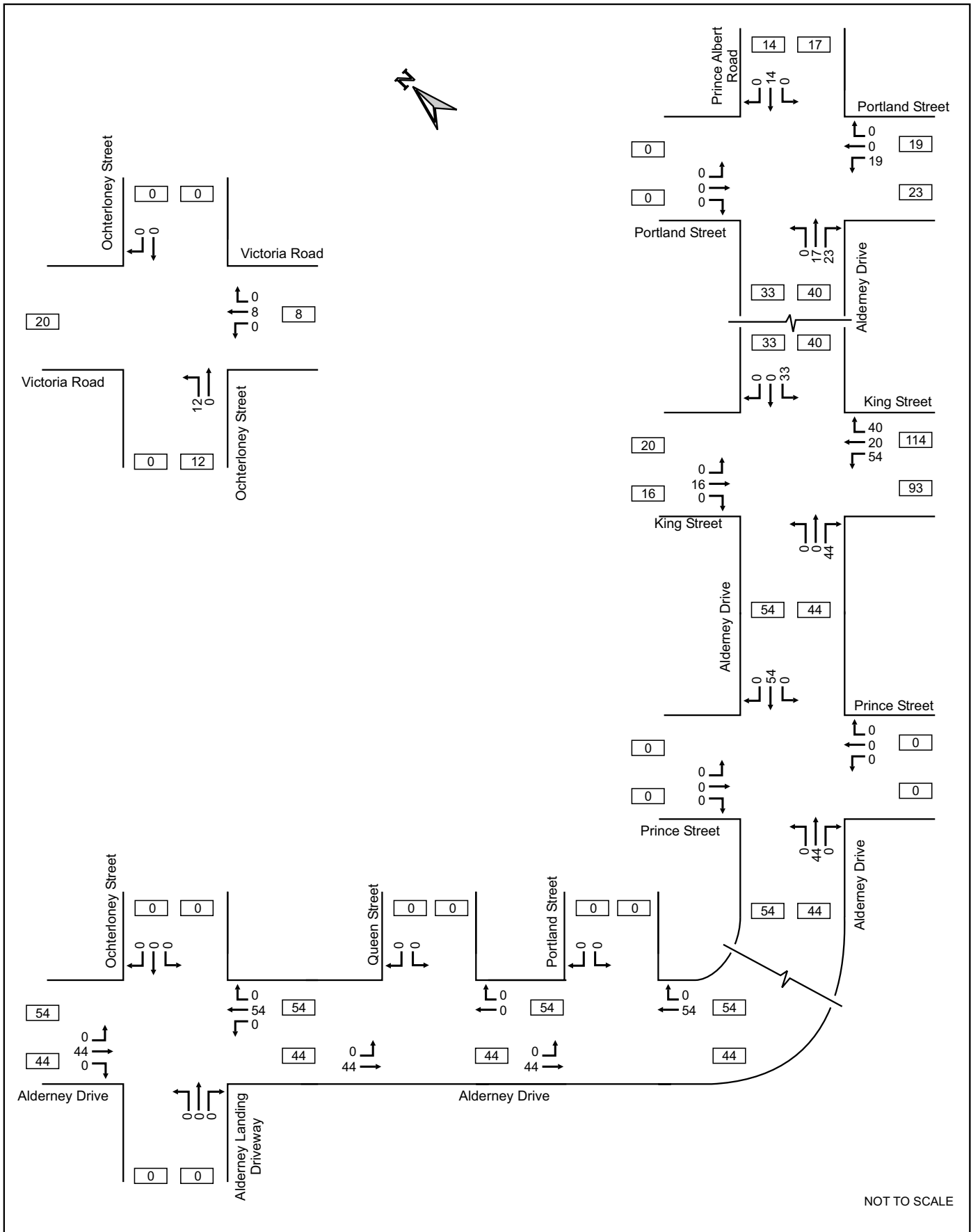



NOT TO SCALE

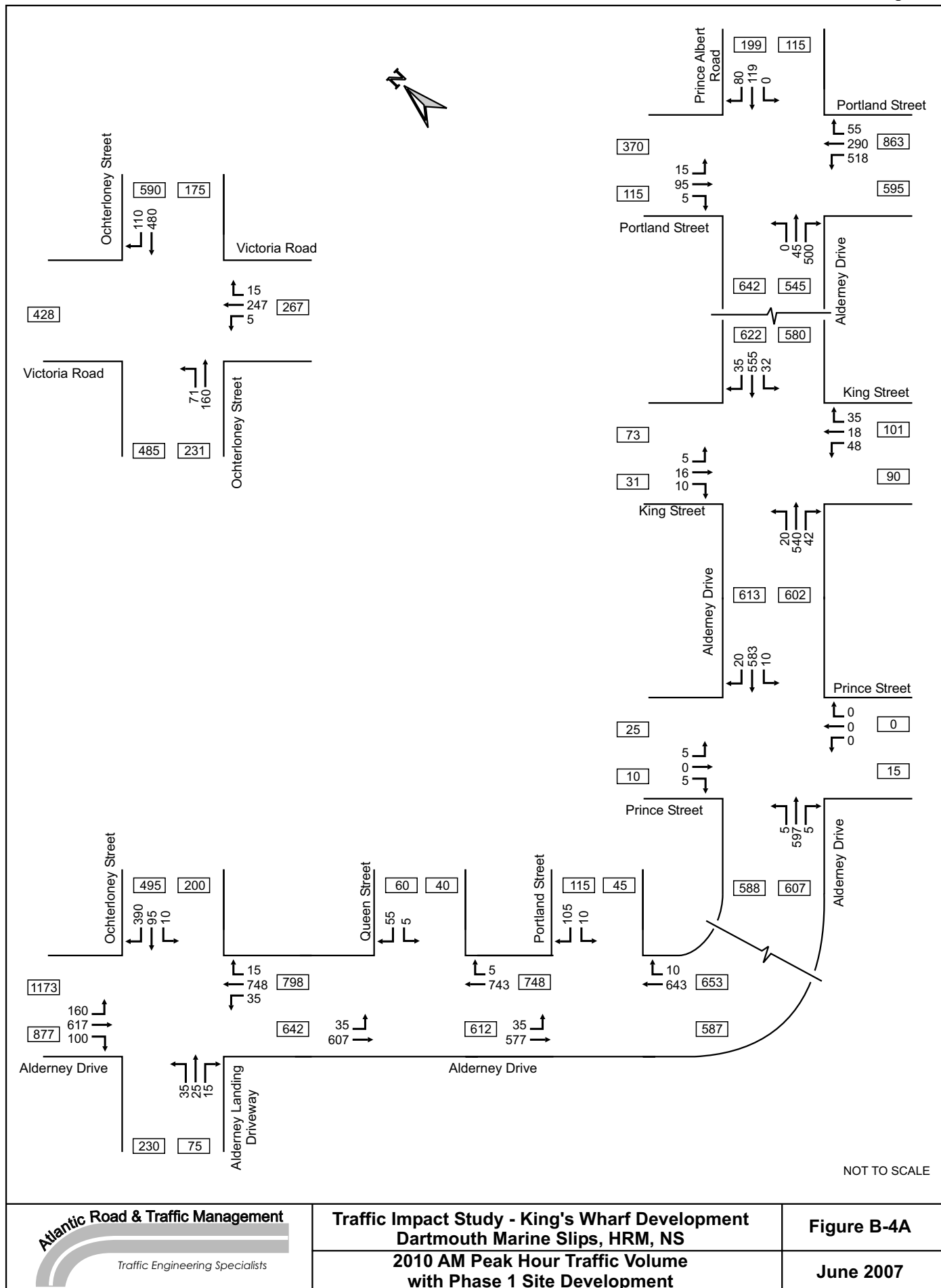
 <p>Atlantic Road & Traffic Management Traffic Engineering Specialists</p>	<p>Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips, HRM, NS</p>	<p>Figure B-2B</p>
	<p>2010 PM Peak Hour Traffic Volume without Site Development</p>	<p>June 2007</p>

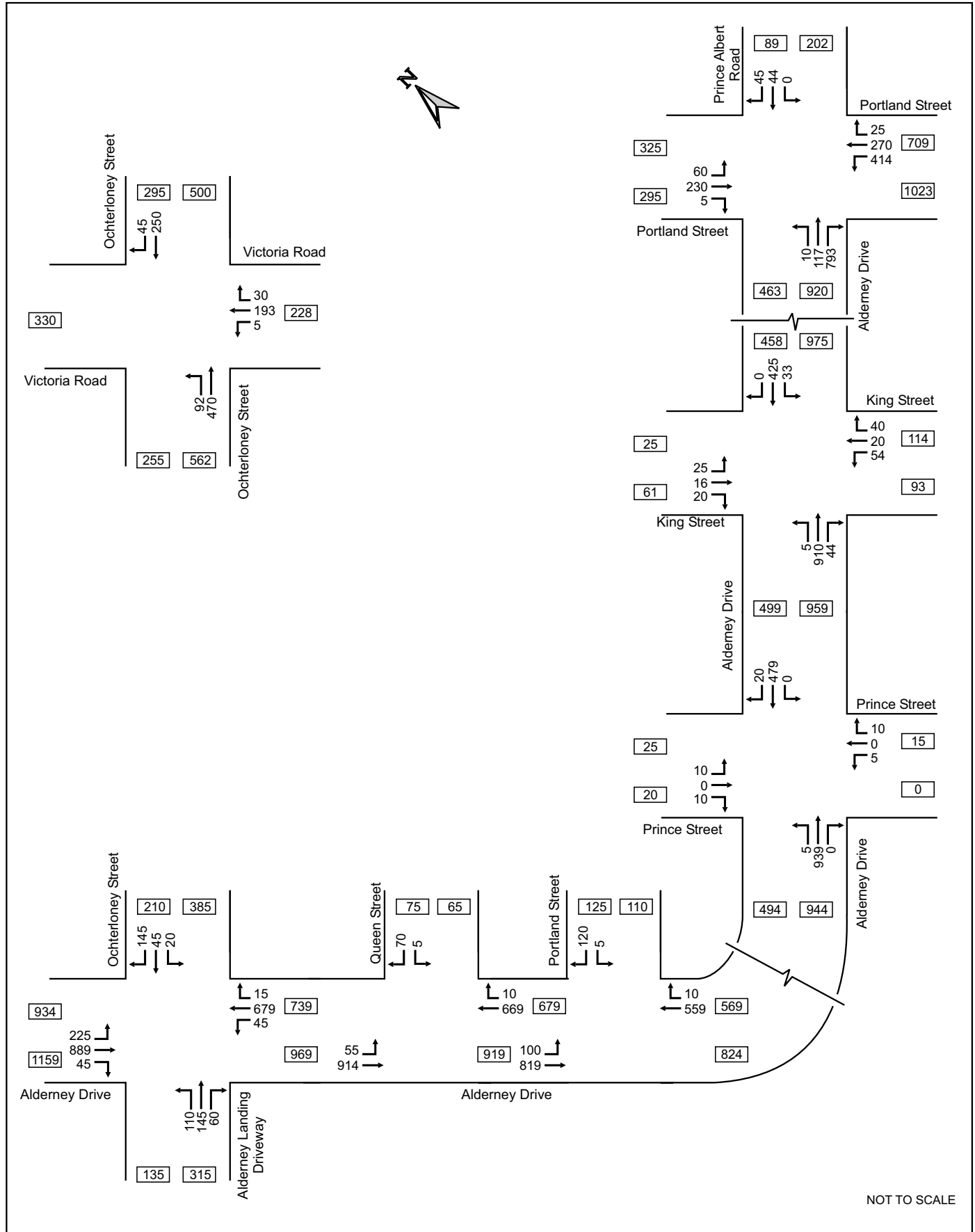



NOT TO SCALE

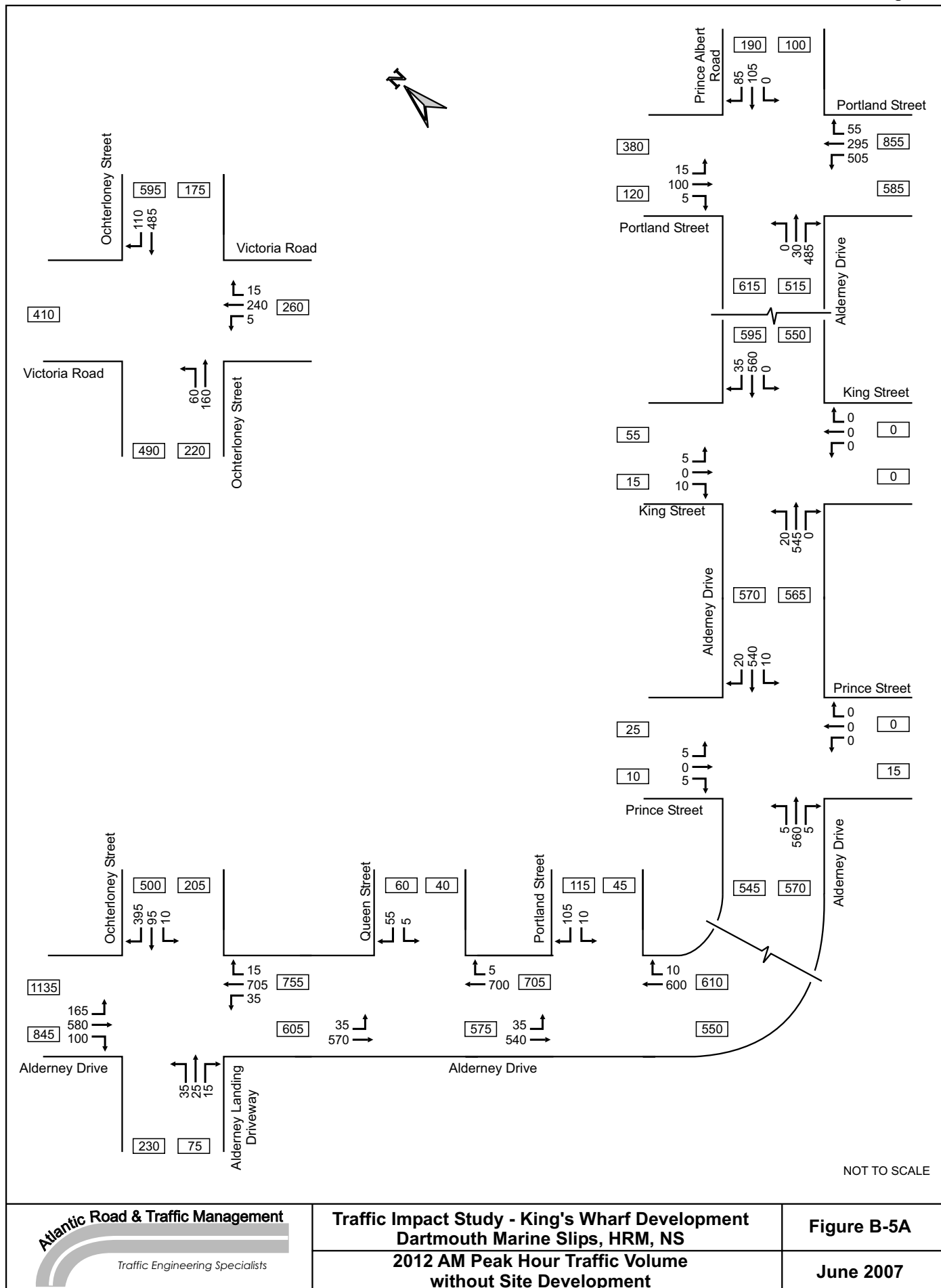


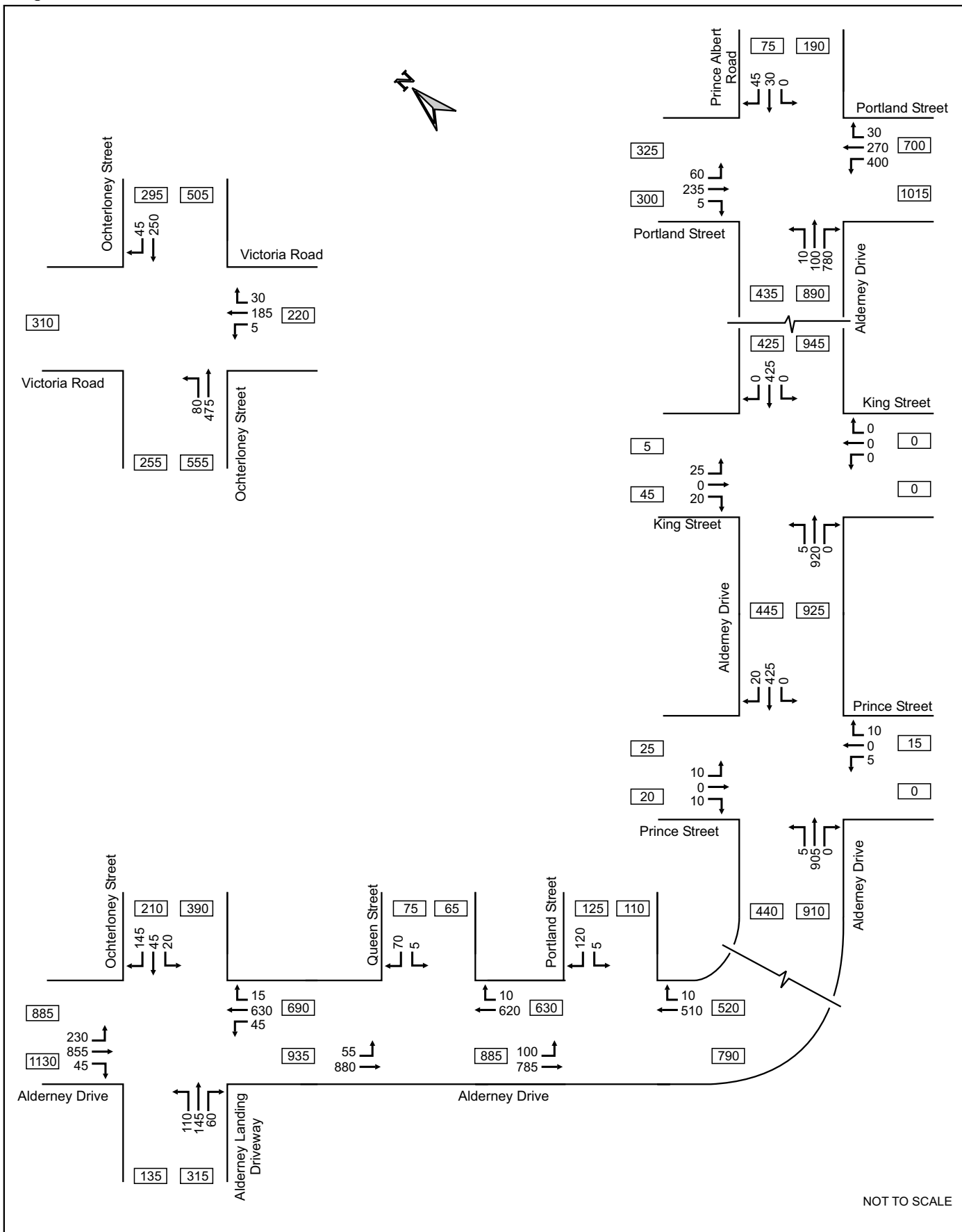
 <p>Atlantic Road & Traffic Management Traffic Engineering Specialists</p>	<p>Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips, HRM, NS</p>	<p>Figure B-3B</p>
	<p>Site Generated Trips Phase 1 PM Peak Hour</p>	<p>June 2007</p>

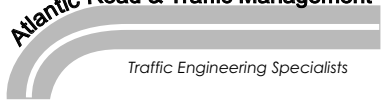


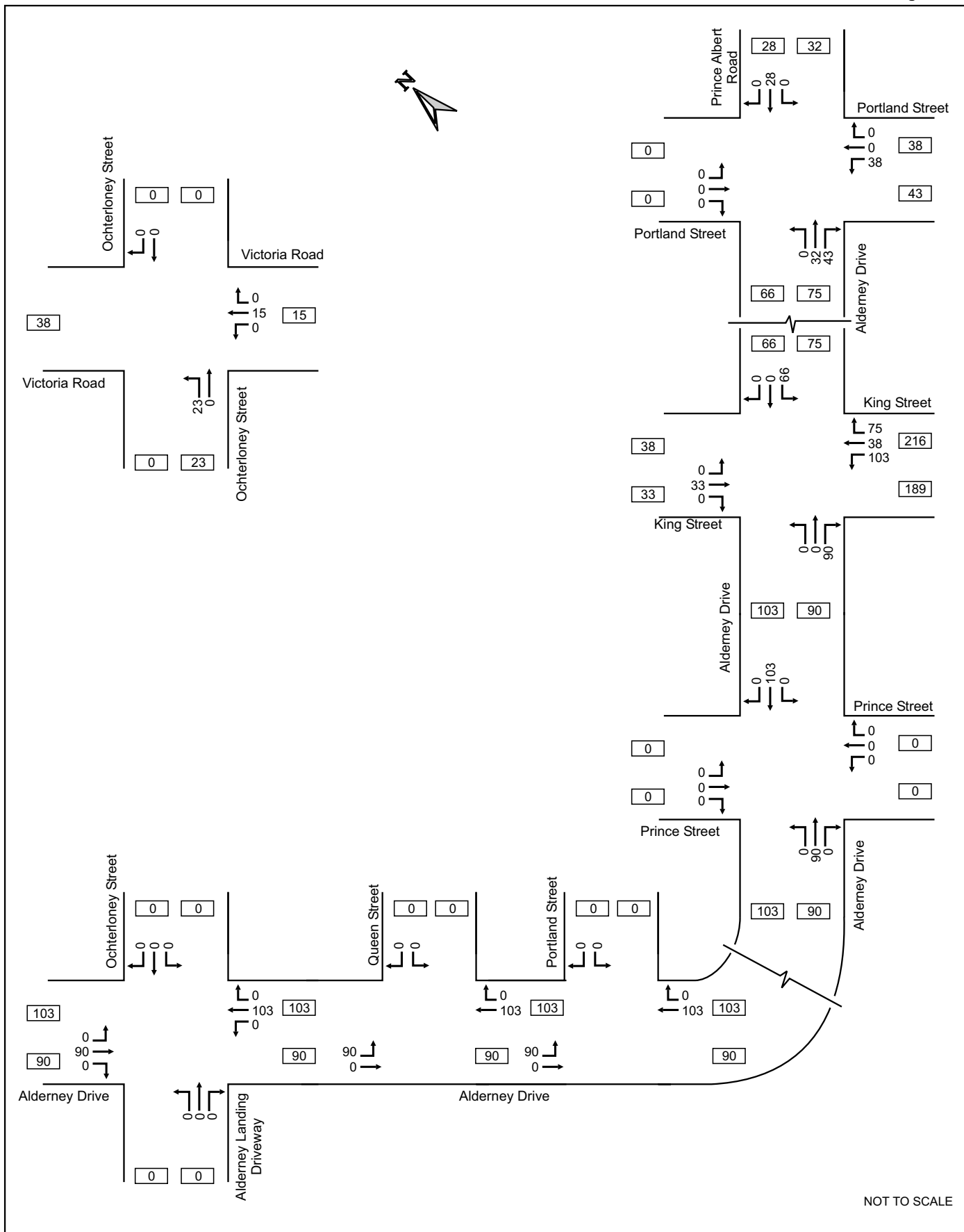


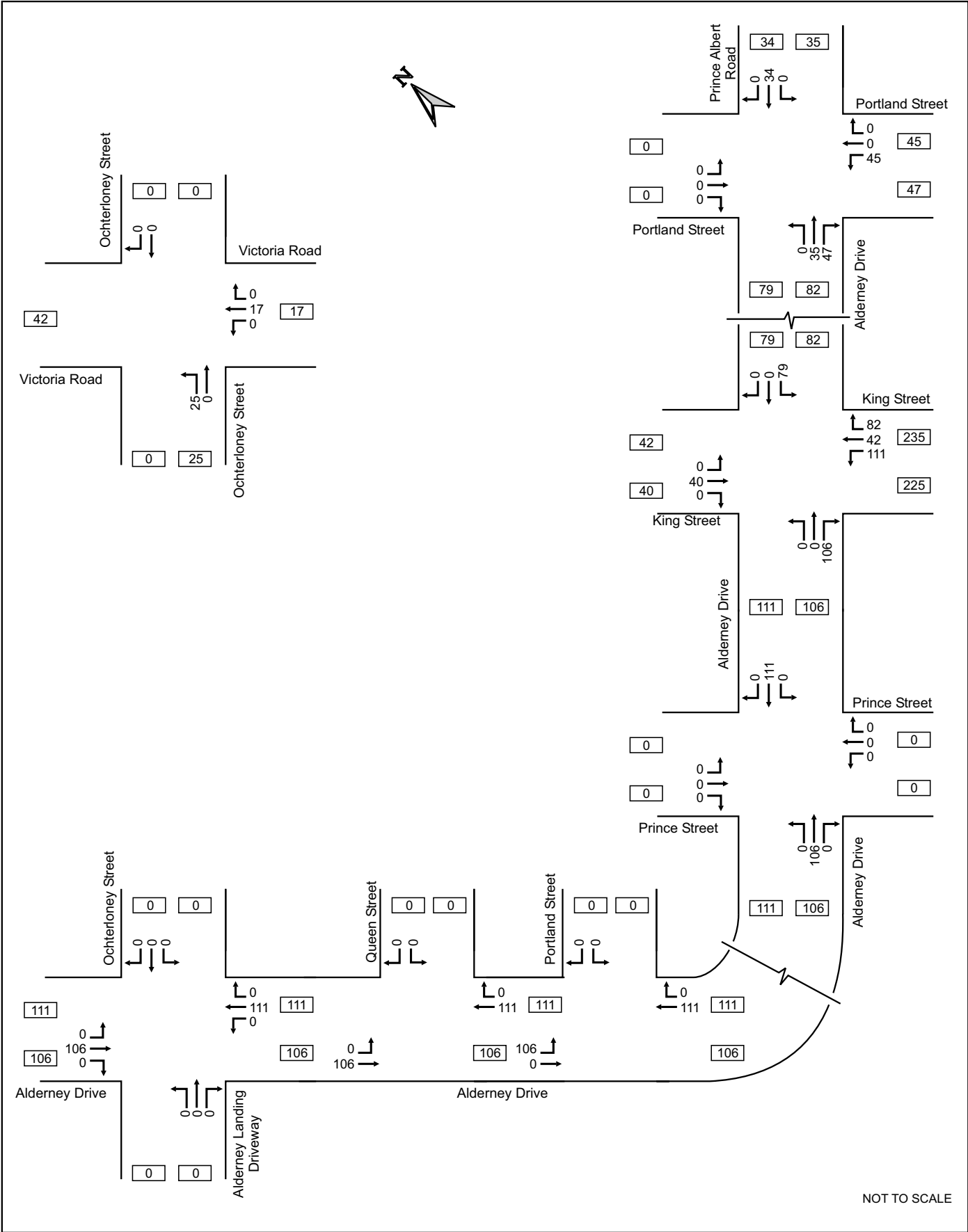
 <p>Atlantic Road & Traffic Management Traffic Engineering Specialists</p>	<p>Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips, HRM, NS</p>	<p>Figure B-4B</p>
	<p>2010 PM Peak Hour Traffic Volume with Phase 1 Site Development</p>	<p>June 2007</p>

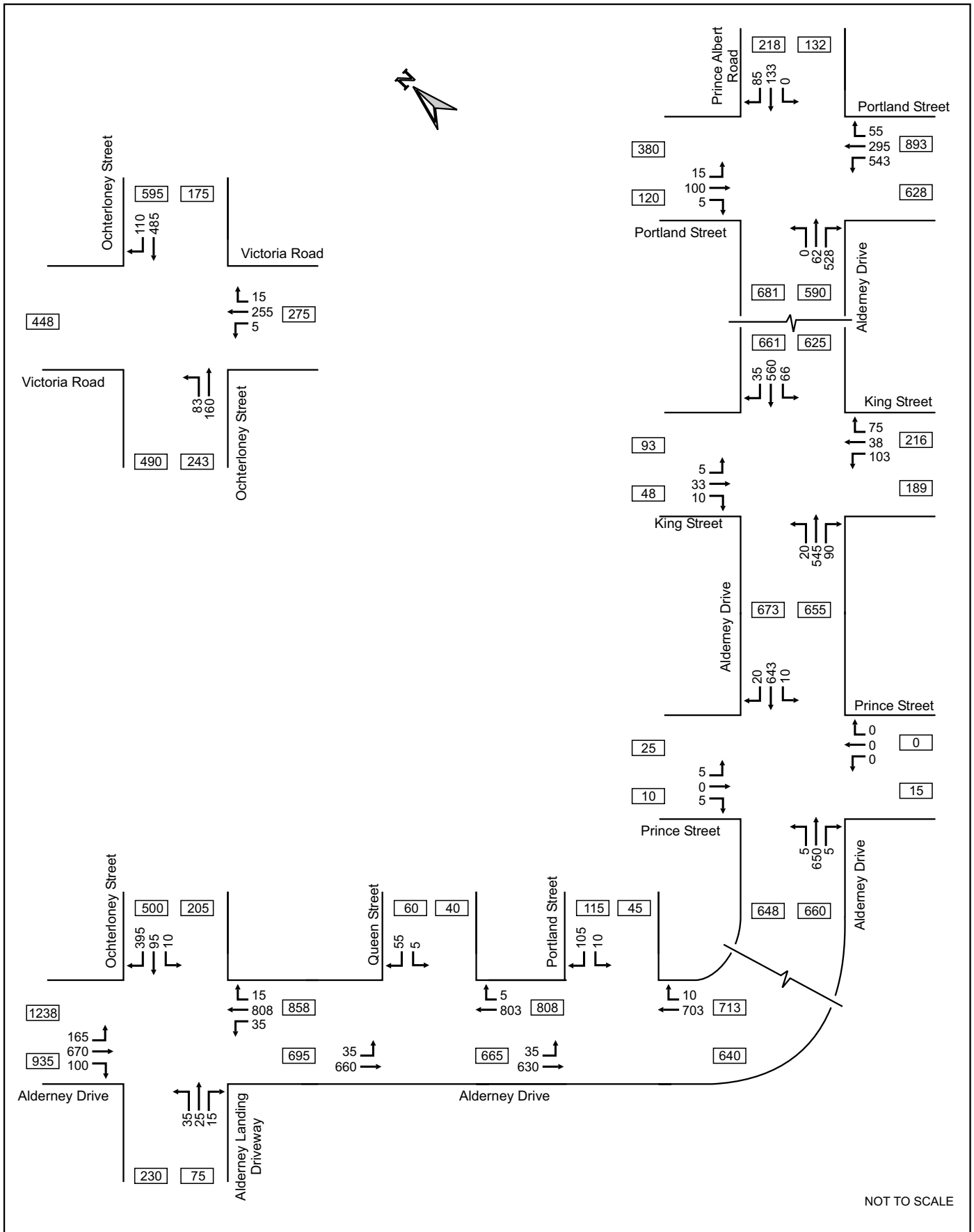




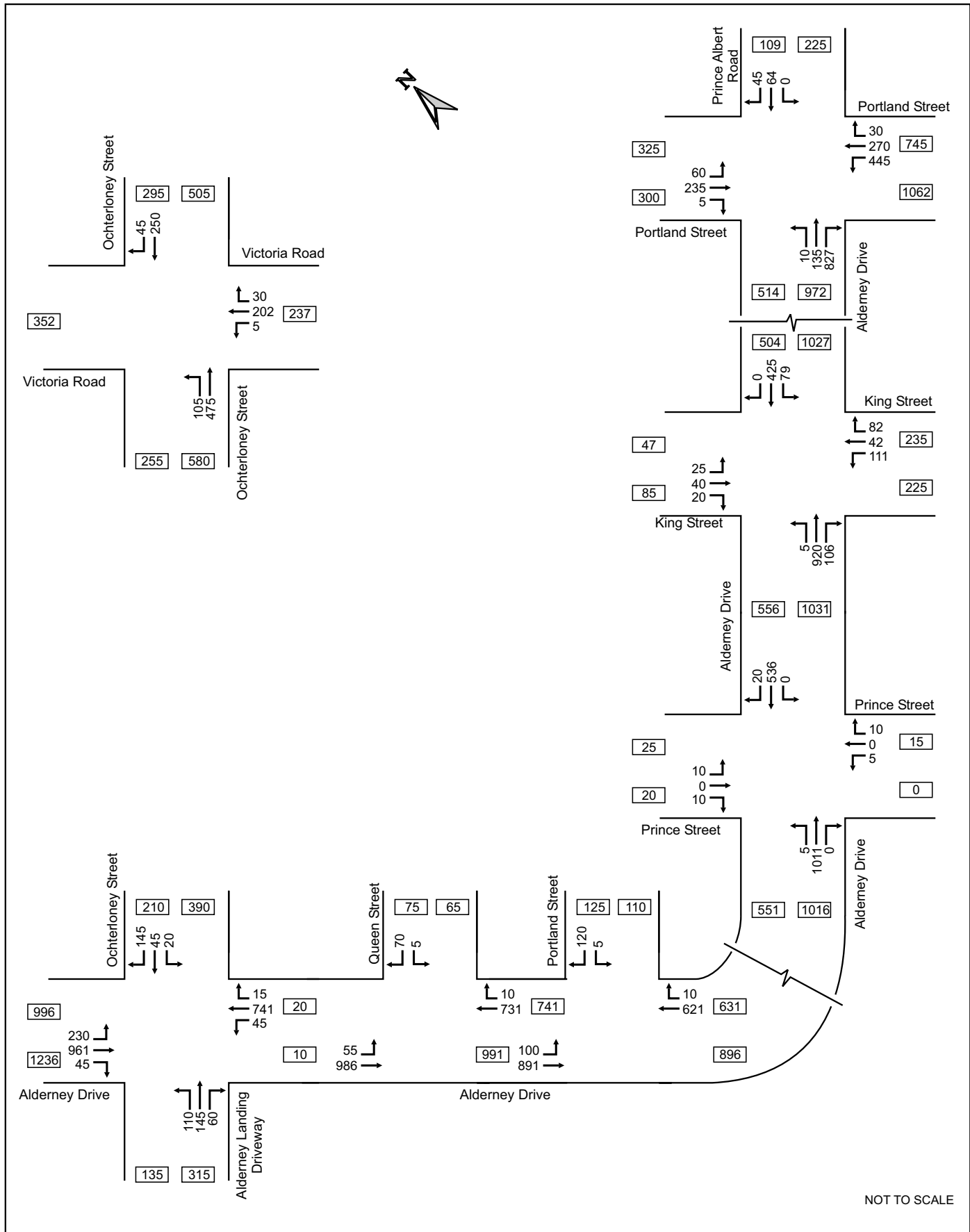
 <p>Atlantic Road & Traffic Management Traffic Engineering Specialists</p>	<p>Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips, HRM, NS</p>	<p>Figure B-5B</p>
	<p>2012 PM Peak Hour Traffic Volume without Site Development</p>	<p>June 2007</p>

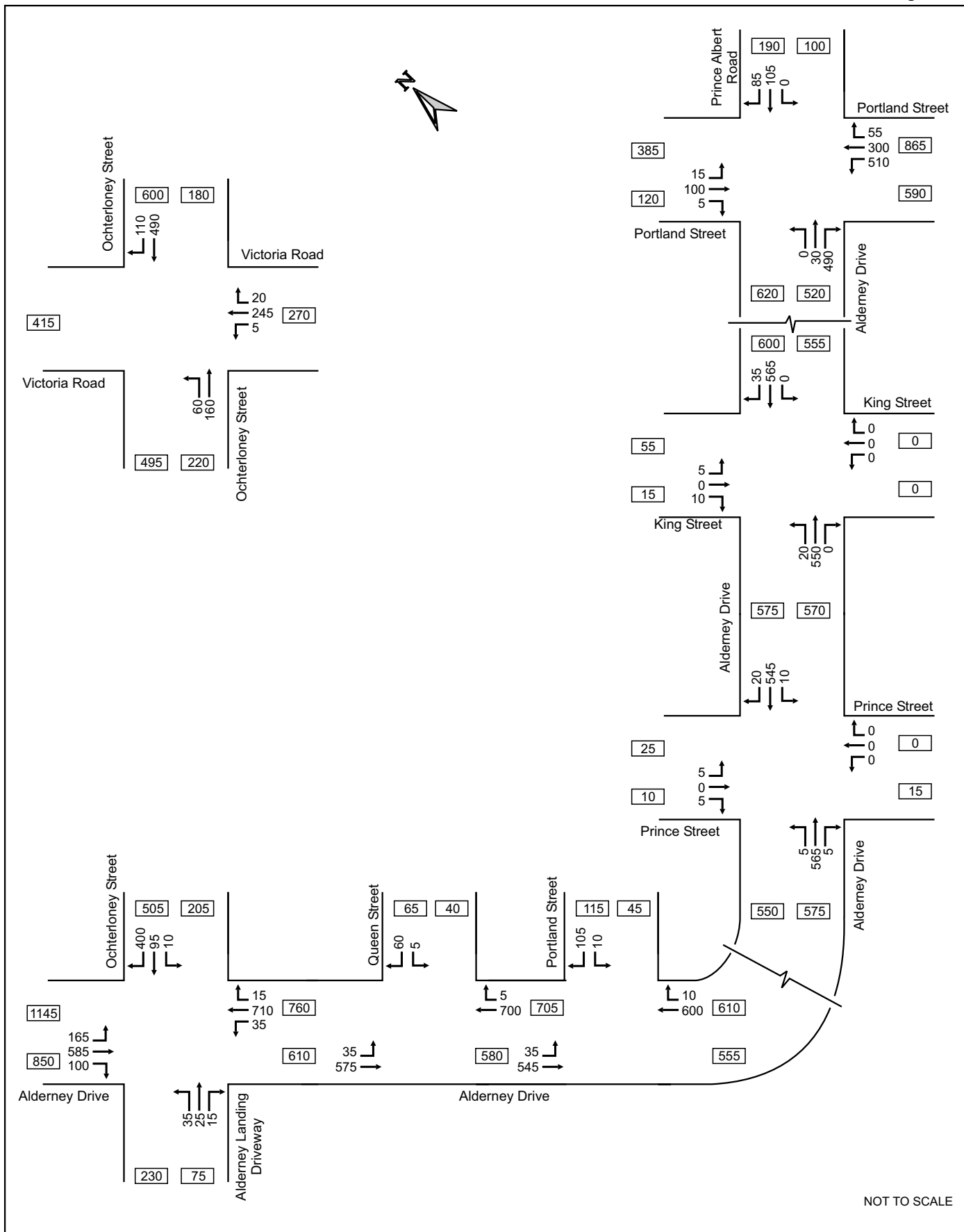




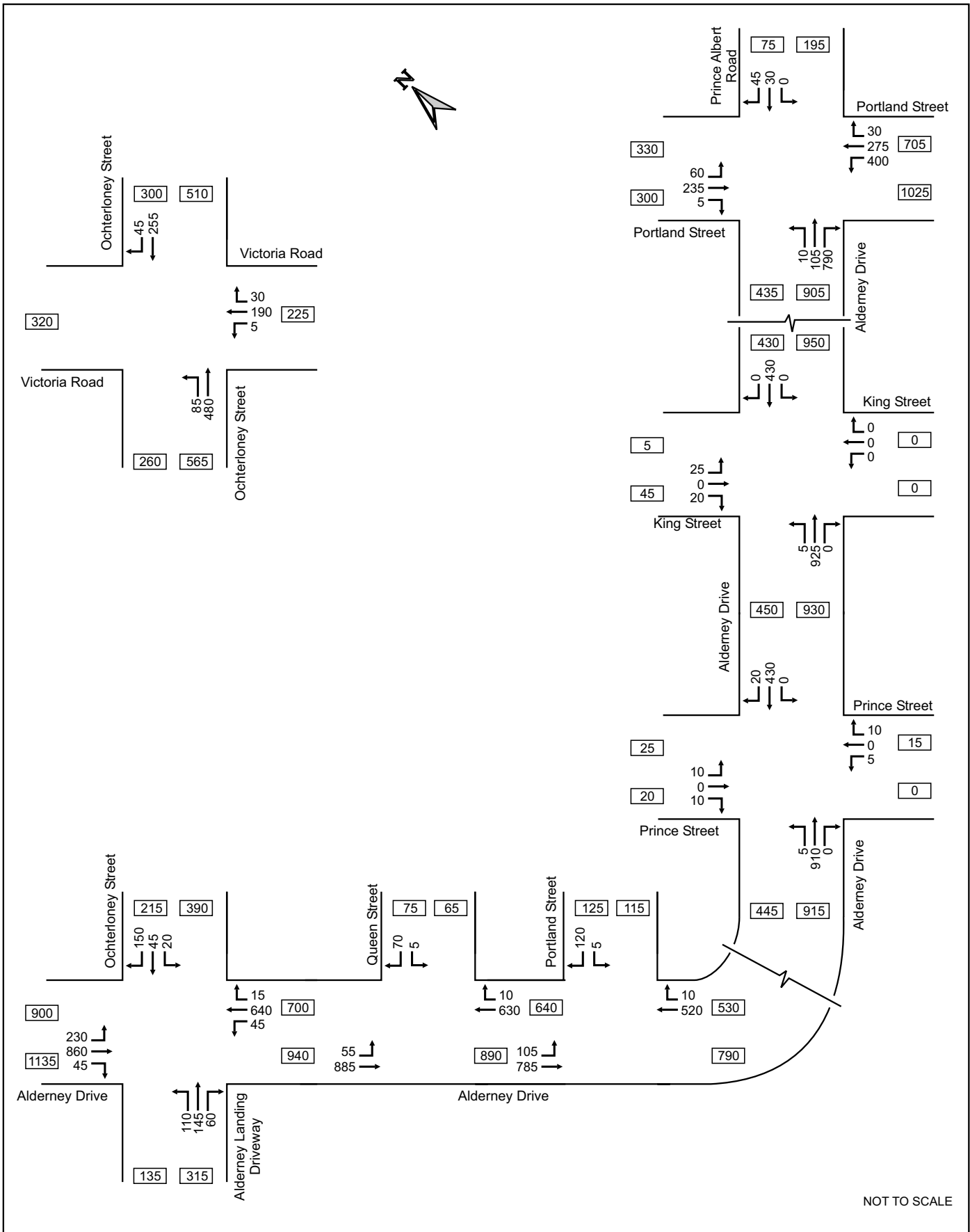


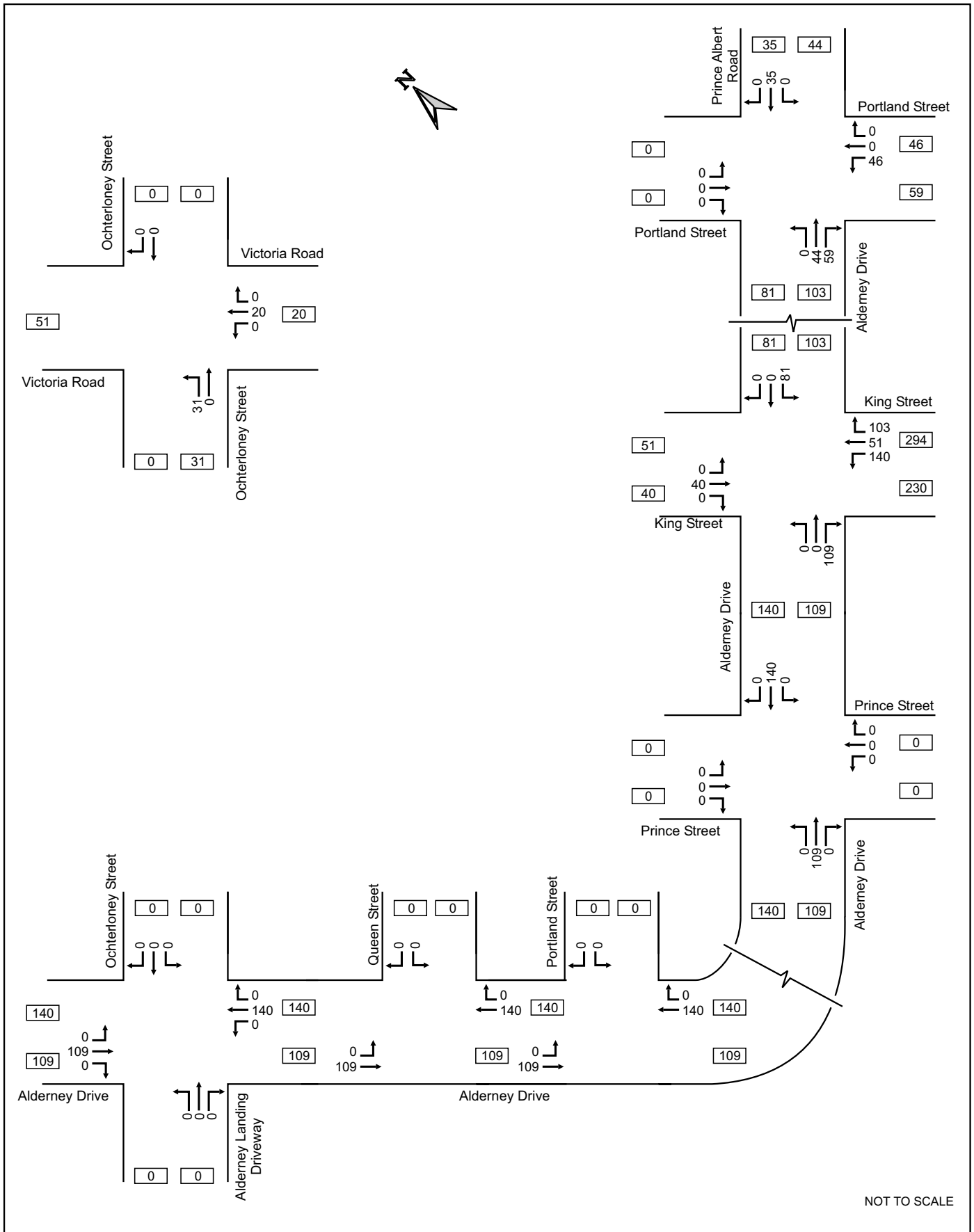
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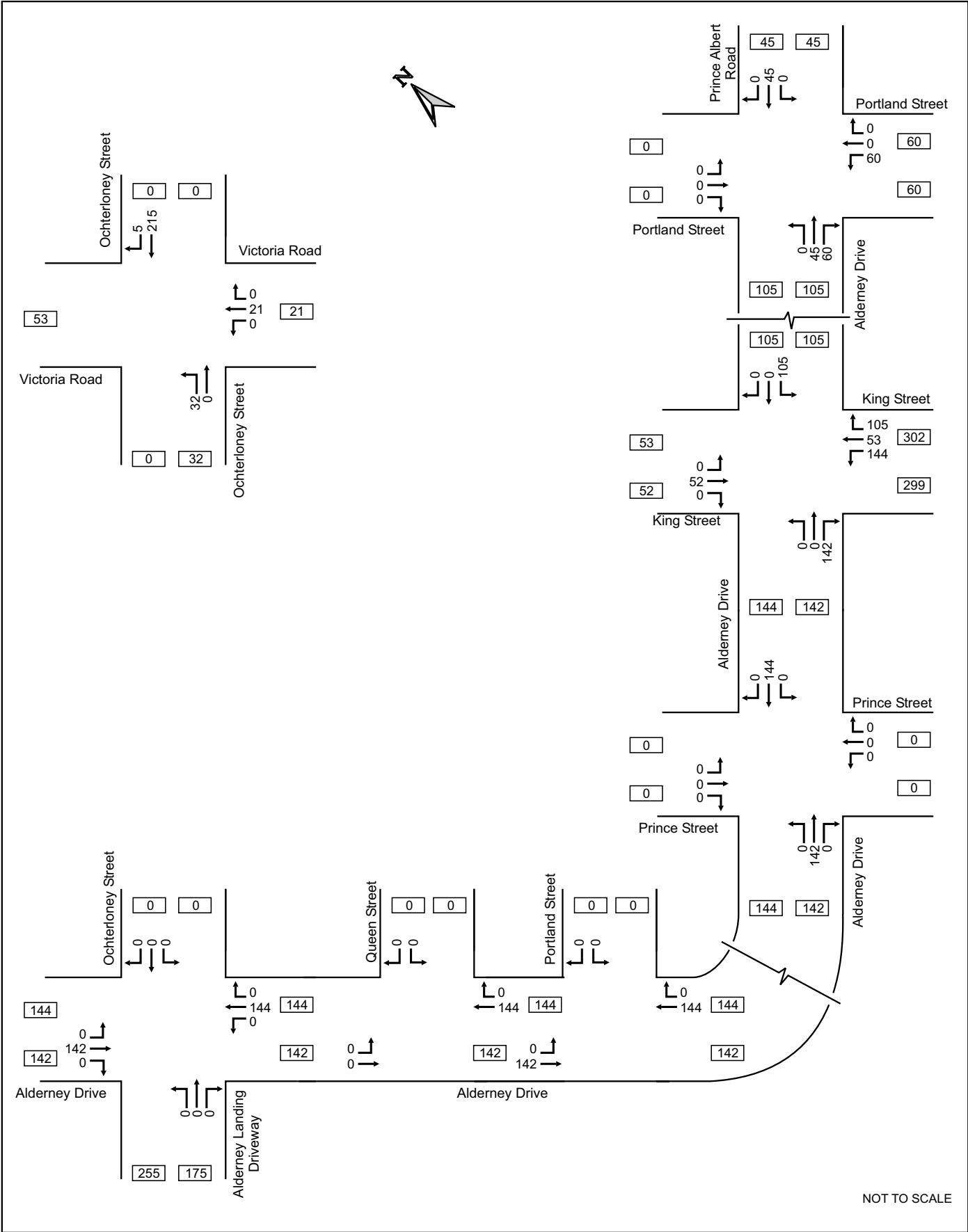


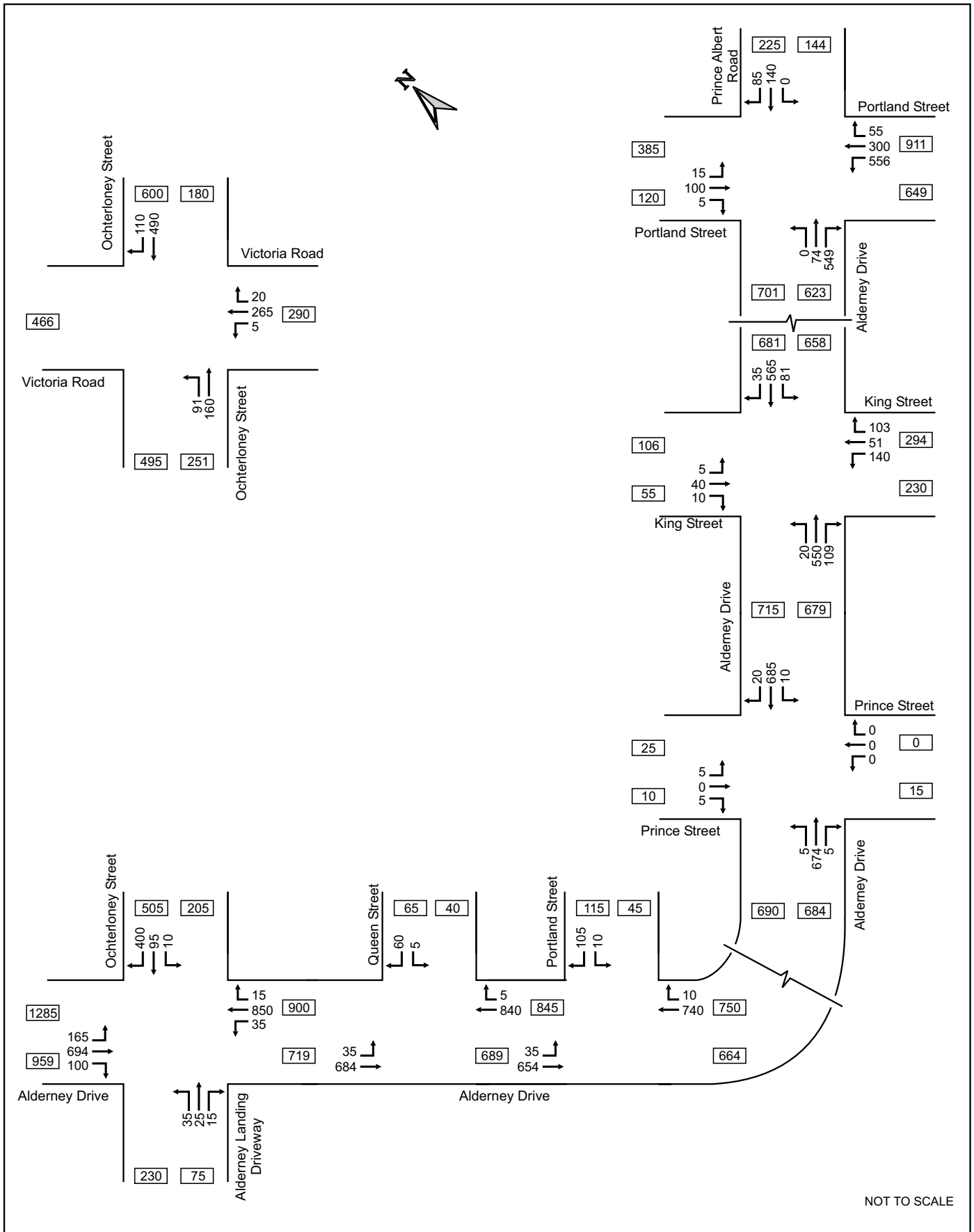


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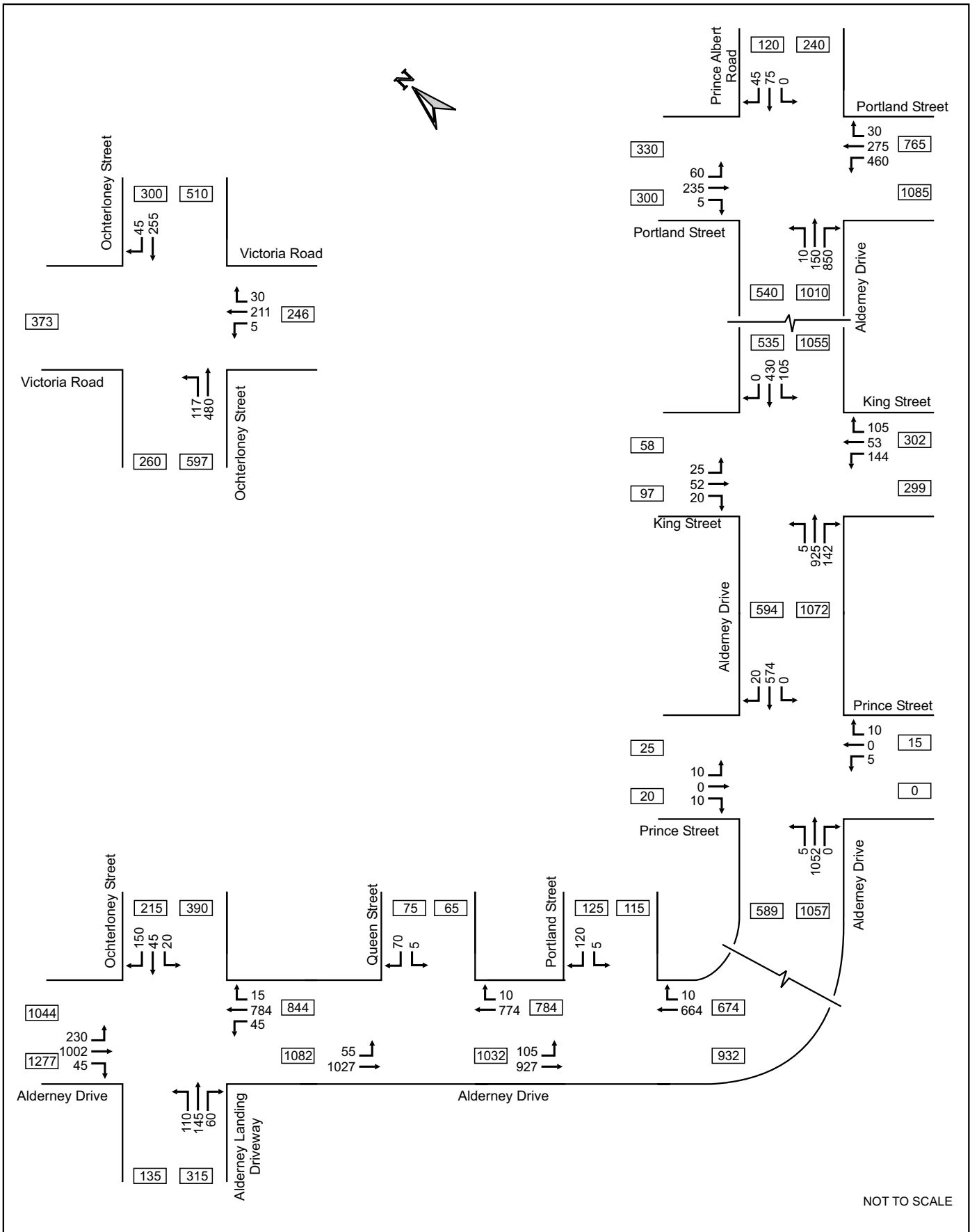


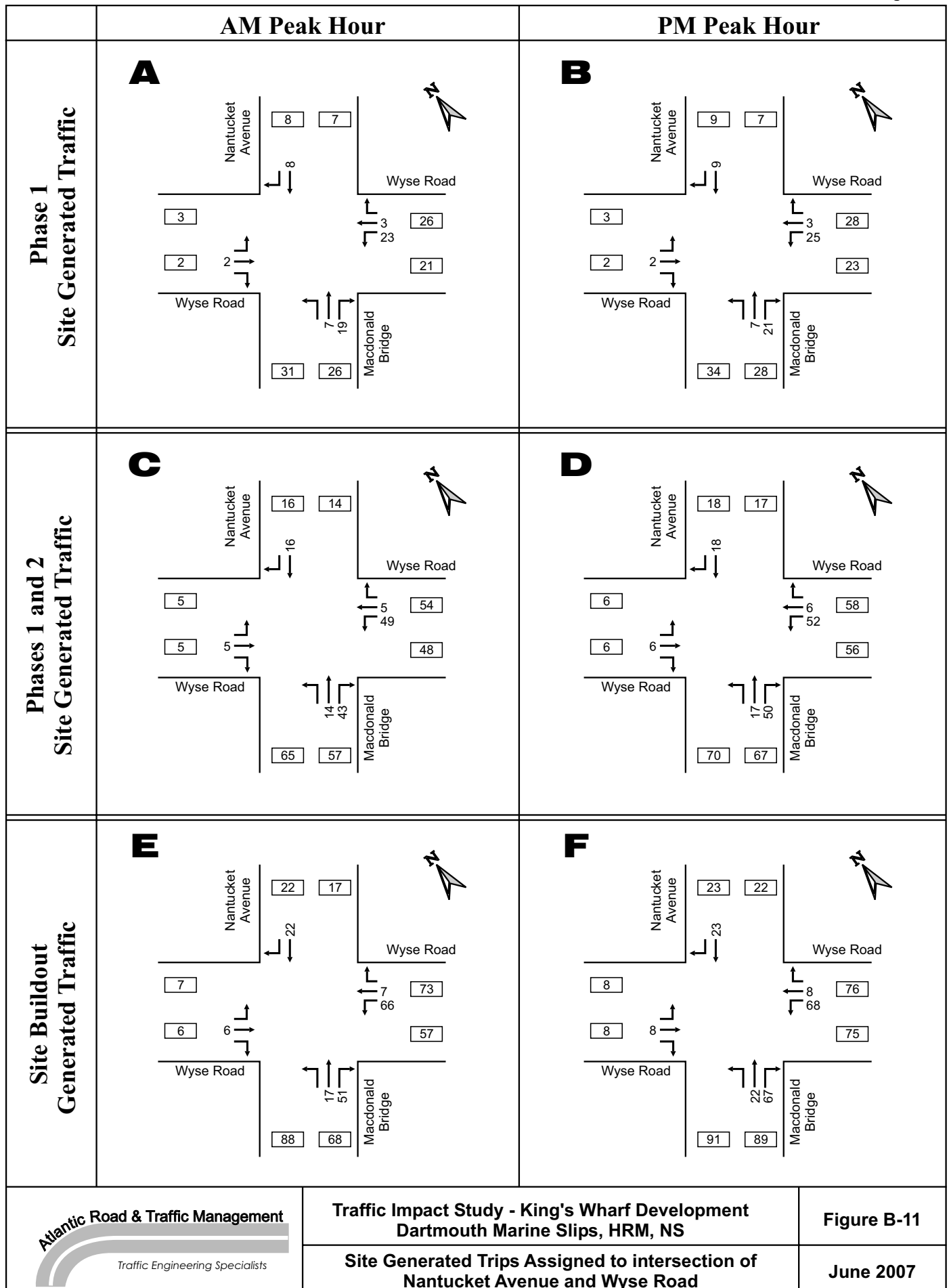






NOT TO SCALE







2005 Canadian Traffic Signal Warrant Matrix Analysis

Scenario: Table B-1 Ochterloney and Victoria - Existing 2007 Volumes

Main Street (name)	Ochterloney Street		Direction (EW or NS)		NS		Date:		June 28, 2007	
Side Street (name)	Victoria Road		Direction (EW or NS)		EW		City:		Dartmouth	
Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes		
Ochterloney Street	NB		1				450	1		
Ochterloney Street	SB				1		300	1		
Victoria Road	WB			1						
Victoria Road	EB									

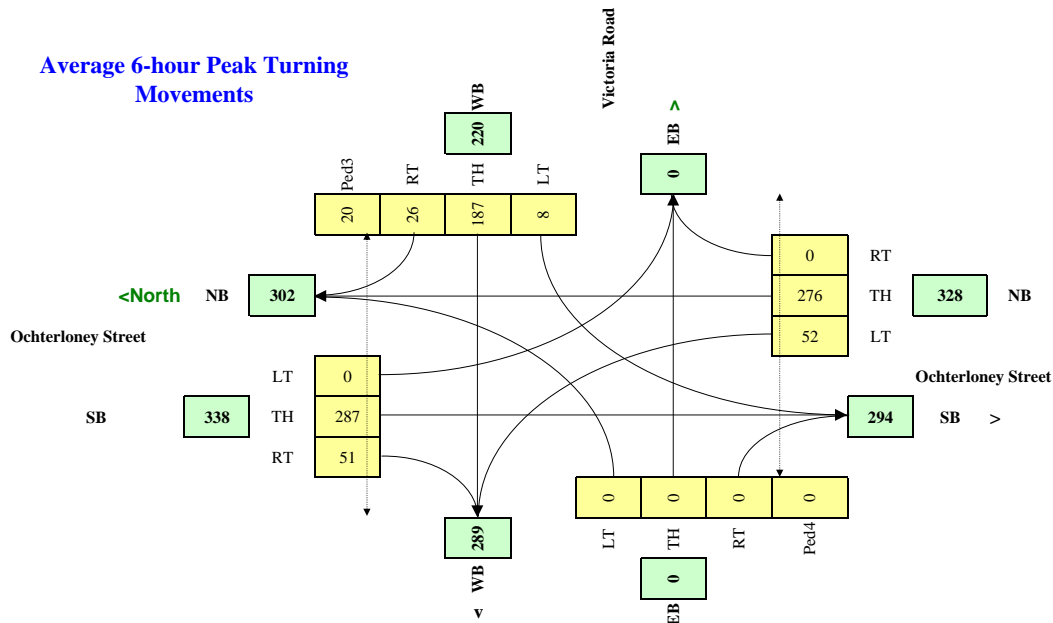
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Ochterloney Street	NS	50	2.0%	y	0.0
Victoria Road	EW		2.0%	n	

	Ped1	Ped2	Ped3	Ped4
	NS	NS	EW	EW
	W Side	E Side	N Side	S side
7:30 - 8:30	49	31	16	0
8:30 - 9:30	37	17	9	0
11:00 - 12:00	39	60	7	0
12:00 - 13:00	84	69	23	0
16:00 - 17:00	36	31	30	0
17:00 - 18:00	44	46	33	0
Total (6-hour peak)	289	254	118	0
Average (6-hour peak)	48	42	20	0

Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	370,000
Central Business District	(y/n)	n

Pedestrian volumes are from Table A-8.7

Traffic Input	NB			SB			WB			EB		
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
7:30 - 8:30	60	155	0	0	475	105	5	235	15	0	0	0
8:30 - 9:30	35	185	0	0	340	50	5	200	15	0	0	0
11:00 - 12:00	30	220	0	0	220	25	10	155	40	0	0	0
12:00 - 13:00	55	250	0	0	225	45	15	160	30	0	0	0
16:00 - 17:00	50	380	0	0	215	35	5	190	25	0	0	0
17:00 - 18:00	80	465	0	0	245	45	5	180	30	0	0	0
Total (6-hour peak)	310	1,655	0	0	1,720	305	45	1,120	155	0	0	0
Average (6-hour peak)	52	276	0	0	287	51	8	187	26	0	0	0



$$W = [C_{bt}(X_{v,v}) / K_1 + (F(X_{v,p}) L) / K_2] \times C_i$$

W =	91	80	11
		Veh	Ped
NOT Warranted			



2005 Canadian Traffic Signal Warrant Matrix Analysis

Scenario: Table B-2 Ochterloney and Victoria - 2010 Volumes - Phase 1

Main Street (name)	Ochterloney Street		Direction (EW or NS)		NS	Date:	June 28, 2007	
Side Street (name)	Victoria Road		Direction (EW or NS)		EW		City:	Dartmouth
Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Ochterloney Street	NB		1				450	1
Ochterloney Street	SB				1		300	1
Victoria Road	WB			1				
Victoria Road	EB							

Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Ochterloney Street	NS	50	2.0%	y	0.0
Victoria Road	EW		2.0%	n	

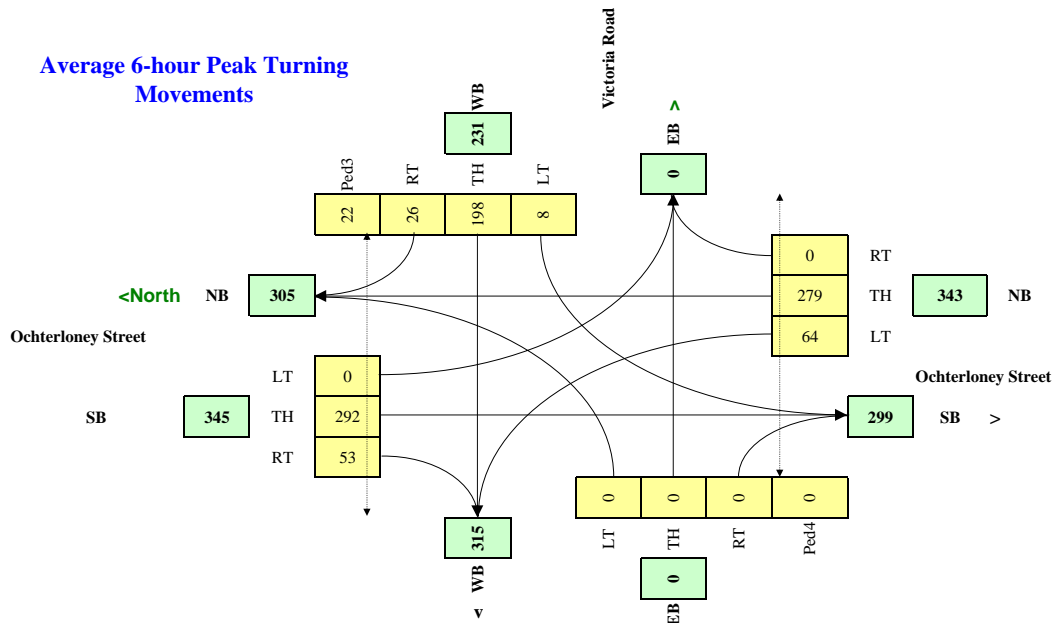
	Ped1	Ped2	Ped3	Ped4
	NS	NS	EW	EW
	W Side	E Side	N Side	S side
7:30 - 8:30	50	35	20	0
8:30 - 9:30	40	20	10	0
11:00 - 12:00	40	60	10	0
12:00 - 13:00	85	70	25	0
16:00 - 17:00	40	35	30	0
17:00 - 18:00	45	50	35	0
Total (6-hour peak)	300	270	130	0
Average (6-hour peak)	50	45	22	0

Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	370,000
Central Business District	(y/n)	n

Pedestrian volumes are from Table A-8.7

Traffic Input	NB			SB			WB			EB		
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
7:30 - 8:30	70	160	0	0	480	110	5	245	15	0	0	0
8:30 - 9:30	45	185	0	0	345	50	5	210	15	0	0	0
11:00 - 12:00	45	220	0	0	225	25	10	165	40	0	0	0
12:00 - 13:00	70	255	0	0	230	50	15	170	30	0	0	0
16:00 - 17:00	60	385	0	0	220	40	5	200	25	0	0	0
17:00 - 18:00	95	470	0	0	250	45	5	195	30	0	0	0
Total (6-hour peak)	385	1,675	0	0	1,750	320	45	1,185	155	0	0	0
Average (6-hour peak)	64	279	0	0	292	53	8	198	26	0	0	0

Average 6-hour Peak Turning Movements



$$W = [C_{bt}(X_{v,v}) / K_1 + (F(X_{v,p}) L) / K_2] \times C_i$$

W =	102	89	13
		Veh	Ped
Warranted			



2005 Canadian Traffic Signal Warrant Matrix Analysis

Scenario: Table B-3 Alderney and King - 2010 Volumes - Phase 1

Main Street (name)	Alderney Drive			Direction (EW or NS)		NS	Date:	June 28, 2007	
Side Street (name)	King Street			Direction (EW or NS)		EW		City:	Dartmouth

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Alderney Drive	NB		1		1		305	2	
Alderney Drive	SB	1		1	1		350	2	
King Street	WB		1			1			
King Street	EB			1					

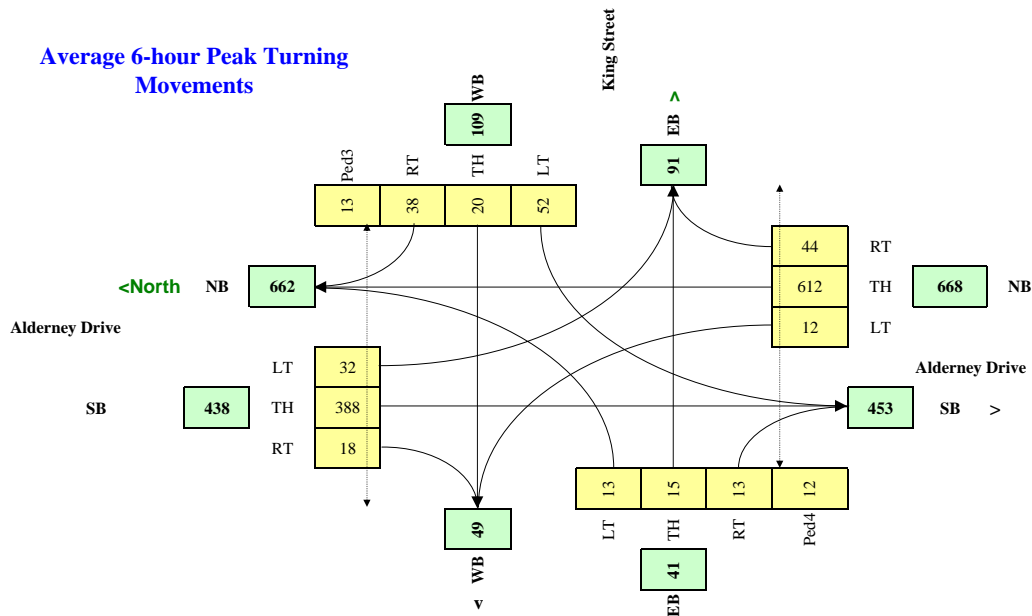
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Alderney Drive	NS	50	2.0%	y	0.0
King Street	EW		2.0%	n	

	Ped1	Ped2	Ped3	Ped4
	NS	NS	EW	EW
	W Side	E Side	N Side	S side
7:30 - 8:30	5	25	10	10
8:30 - 9:30	5	25	10	14
11:00 - 12:00	5	30	23	11
12:00 - 13:00	5	50	11	11
16:00 - 17:00	5	20	11	14
17:00 - 18:00	5	20	10	12
Total (6-hour peak)	30	170	75	72
Average (6-hour peak)	5	28	13	12

Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	370,000
Central Business District	(y/n)	y

Existing pedestrian volumes (Table A-8.7) have been adjusted for assumed conditions with Phase 1.

Traffic Input	NB			SB			WB			EB		
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT
7:30 - 8:30	10	490	45	30	475	30	50	20	35	5	15	10
8:30 - 9:30	20	470	40	30	430	25	50	20	35	5	15	10
11:00 - 12:00	10	440	45	30	305	10	50	20	40	10	15	10
12:00 - 13:00	10	495	45	35	315	10	50	20	35	10	15	10
16:00 - 17:00	10	865	45	30	435	15	55	20	40	20	15	20
17:00 - 18:00	10	910	45	35	370	15	55	20	40	25	15	20
Total (6-hour peak)	70	3,670	265	190	2,330	105	310	120	225	75	90	80
Average (6-hour peak)	12	612	44	32	388	18	52	20	38	13	15	13



$$W = [C_{bt}(X_{v,v}) / K_1 + (F(X_{v,p}) L) / K_2] \times C_i$$





















W =	92	64	28
		Veh	Ped
NOT Warranted			

Appendix C

Level of Service Analysis

1: Portland Street & Prince Albert Road

2007 AM Peak without Site Development (Fig B1-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1842	0	1770	1822	0	0	1863	1583	0	1863	1583
Flt Permitted	0.542			0.950								
Satd. Flow (perm)	1010	1842	0	1770	1822	0	0	1863	1448	0	1863	1583
Satd. Flow (RTOR)		2			12							87
Volume (vph)	15	95	5	495	290	50	0	30	475	0	100	80
Lane Group Flow (vph)	16	108	0	538	369	0	0	33	516	0	109	87
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.07	0.25		0.67	0.44			0.10	0.52		0.32	0.24
Control Delay	29.7	31.2		25.9	19.6			33.7	10.4		37.1	9.5
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	29.7	31.2		25.9	19.6			33.7	10.4		37.1	9.5
LOS	C	C		C	B			C	B		D	A
Approach Delay		31.0			23.3			11.8			24.9	
Approach LOS		C			C			B			C	
Queue Length 50th (m)	2.5	17.0		80.8	46.6			5.5	42.5		18.8	0.0
Queue Length 95th (m)	8.0	31.8		119.1	71.2			13.9	64.7		34.9	12.8
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	239	438		803	833			346	987		346	365
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	0.07	0.25		0.67	0.44			0.10	0.52		0.32	0.24

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 20.5

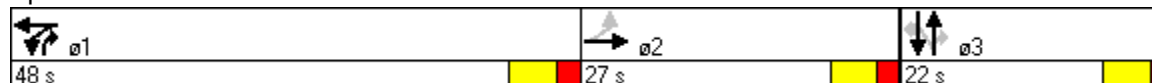
Intersection LOS: C

Intersection Capacity Utilization 54.1%

ICU Level of Service A


















Analysis Period (min) 15

Splits and Phases: 1: Portland Street & Prince Albert Road



















2: King Street & Alderney Drive

2007 AM Peak without Site Development (Fig B1-A Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		-3%			3%			2%			-2%	
Volume (veh/h)	5	0	10	0	0	1	20	530	0	0	545	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	11	0	0	1	22	576	0	0	592	38
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)								307			355	
pX, platoon unblocked												
vC, conflicting volume	944	1231	315	927	1250	288	630			576		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	944	1231	315	927	1250	288	630			576		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	97	100	98	100	100	100	98			100		
cM capacity (veh/h)	213	172	681	216	167	708	948			993		
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2					
Volume Total	16	0	1	310	288	296	334					
Volume Left	5	0	0	22	0	0	0					
Volume Right	11	0	1	0	0	0	38					
cSH	393	1700	708	948	1700	993	1700					
Volume to Capacity	0.04	0.00	0.00	0.02	0.17	0.00	0.20					
Queue Length 95th (m)	1.0	0.0	0.0	0.6	0.0	0.0	0.0					
Control Delay (s)	14.6	0.0	10.1	0.9	0.0	0.0	0.0					
Lane LOS	B	A	B	A								
Approach Delay (s)	14.6	10.1		0.4		0.0						
Approach LOS	B	B										
Intersection Summary												
Average Delay			0.4									
Intersection Capacity Utilization			42.5%		ICU Level of Service					A		
Analysis Period (min)			15									













3: Prince Street & Alderney Drive

2007 AM Peak without Site Development (Fig B1-A Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	0	5	0	0	0	5	545	5	10	525	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	5	0	0	0	5	592	5	11	571	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)								214				
pX, platoon unblocked	0.97	0.97		0.97	0.97	0.97				0.97		
vC, conflicting volume	910	1212	296	918	1220	299	592			598		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	871	1184	296	880	1192	238	592			547		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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	100	100	100	99			99		
cM capacity (veh/h)	234	178	700	229	176	737	979			983		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	11	0	302	302	296	307						
Volume Left	5	0	5	0	11	0						
Volume Right	5	0	0	5	0	22						
cSH	350	1700	979	1700	983	1700						
Volume to Capacity	0.03	0.00	0.01	0.18	0.01	0.18						
Queue Length 95th (m)	0.8	0.0	0.1	0.0	0.3	0.0						
Control Delay (s)	15.6	0.0	0.2	0.0	0.4	0.0						
Lane LOS	C	A	A		A							
Approach Delay (s)	15.6	0.0	0.1		0.2							
Approach LOS	C	A										
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			32.3%		ICU Level of Service					A		
Analysis Period (min)			15									

4: Alderney Drive & Portland Street

2007 AM Peak without Site Development (Fig B1-A Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	3176	3174	0	1215	0
Flt Permitted		0.886			0.996	
Satd. Flow (perm)	0	2822	3174	0	1215	0
Satd. Flow (RTOR)			4		114	
Volume (vph)	35	525	585	10	10	105
Lane Group Flow (vph)	0	609	647	0	125	0
Turn Type	Perm					
Protected Phases		1	1		2	
Permitted Phases	1					
Total Split (s)	50.0	50.0	50.0	0.0	30.0	0.0
Act Effct Green (s)		46.0	46.0		26.0	
Actuated g/C Ratio		0.58	0.58		0.32	
v/c Ratio		0.38	0.35		0.26	
Control Delay		10.1	9.7		6.7	
Queue Delay		0.6	0.0		0.0	
Total Delay		10.7	9.7		6.7	
LOS		B	A		A	
Approach Delay		10.7	9.7		6.7	
Approach LOS		B	A		A	
Queue Length 50th (m)		25.4	26.4		1.2	
Queue Length 95th (m)		36.1	36.8		12.8	
Internal Link Dist (m)		73.7	190.0		76.2	
Turn Bay Length (m)						
Base Capacity (vph)		1623	1827		472	
Starvation Cap Reductn		615	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.60	0.35		0.26	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 20 (25%), Referenced to phase 1:EBWB, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.38

Intersection Signal Delay: 9.8

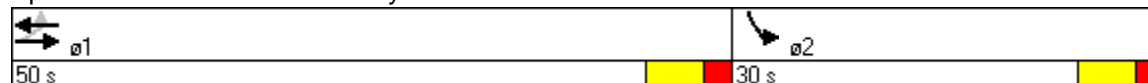
Intersection LOS: A

Intersection Capacity Utilization 59.3%

ICU Level of Service B














Analysis Period (min) 15

Splits and Phases: 4: Alderney Drive & Portland Street



5: Alderney Drive & Queen Street

2007 AM Peak without Site Development (Fig B1-A Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3185	3181	0	1249	0
Flt Permitted	0.319				0.996	
Satd. Flow (perm)	535	3185	3181	0	1249	0
Satd. Flow (RTOR)			1		60	
Volume (vph)	35	555	685	5	5	55
Lane Group Flow (vph)	38	603	750	0	65	0
Turn Type	Perm					
Protected Phases		2	2		3	
Permitted Phases	2					
Total Split (s)	49.0	49.0	49.0	0.0	31.0	0.0
Act Effct Green (s)	80.0	80.0	80.0		9.8	
Actuated g/C Ratio	0.86	0.86	0.86		0.10	
v/c Ratio	0.08	0.22	0.27		0.36	
Control Delay	2.8	2.1	2.3		13.4	
Queue Delay	0.0	0.3	0.3		0.1	
Total Delay	2.8	2.5	2.6		13.4	
LOS	A	A	A		B	
Approach Delay		2.5	2.6		13.4	
Approach LOS		A	A		B	
Queue Length 50th (m)	0.9	8.4	11.1		0.8	
Queue Length 95th (m)	3.8	17.5	22.5		10.6	
Internal Link Dist (m)		58.4	73.7		70.3	
Turn Bay Length (m)	20.0					
Base Capacity (vph)	461	2744	2740		352	
Starvation Cap Reductn	0	1484	1258		0	
Spillback Cap Reductn	0	0	313		32	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.08	0.48	0.51		0.20	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 92.9

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.36

Intersection Signal Delay: 3.0

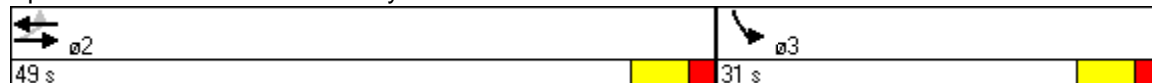
Intersection Capacity Utilization 47.8%






















Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 5: Alderney Drive & Queen Street



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3089	0	1593	3166	0	1577	1660	1411	0	1685	1439
Flt Permitted	0.210			0.377			0.684				0.980	
Satd. Flow (perm)	352	3089	0	632	3166	0	1135	1660	1238	0	1659	1386
Satd. Flow (RTOR)		42			3				16			418
Volume (vph)	160	565	100	35	690	15	35	25	15	10	95	385
Lane Group Flow (vph)	174	723	0	38	766	0	38	27	16	0	114	418
Turn Type	D.P+P			Perm			Perm		Perm	Perm		Perm
Protected Phases	1	1 2			2			3			3	
Permitted Phases	2			2			3		3	3		3
Total Split (s)	19.0	50.0	0.0	31.0	31.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0
Act Effct Green (s)	42.0	46.0		27.0	27.0		26.0	26.0	26.0		26.0	26.0
Actuated g/C Ratio	0.52	0.58		0.34	0.34		0.32	0.32	0.32		0.32	0.32
v/c Ratio	0.42	0.40		0.18	0.72		0.10	0.05	0.04		0.21	0.57
Control Delay	11.7	9.6		21.5	27.6		19.9	19.0	9.3		20.9	5.8
Queue Delay	0.0	0.0		0.0	22.8		0.0	0.0	0.0		0.0	0.0
Total Delay	11.7	9.6		21.5	50.3		19.9	19.0	9.3		20.9	5.8
LOS	B	A		C	D		B	B	A		C	A
Approach Delay		10.0			49.0			17.5			9.0	
Approach LOS		B			D			B			A	
Queue Length 50th (m)	12.2	28.7		4.2	55.3		4.2	2.9	0.0		13.1	0.0
Queue Length 95th (m)	21.9	40.4		11.7	76.0		11.1	8.5	4.2		25.5	20.3
Internal Link Dist (m)		209.1			58.4			55.3			90.0	
Turn Bay Length (m)	65.0			25.0								
Base Capacity (vph)	417	1794		213	1071		369	540	413		539	733
Starvation Cap Reductn	0	0		0	322		0	0	0		0	0
Spillback Cap Reductn	0	2		0	0		0	0	0		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.42	0.40		0.18	1.02		0.10	0.05	0.04		0.21	0.57

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
 Control Type: Pretimed
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 23.6
 Intersection Capacity Utilization 73.3%
 Analysis Period (min) 15
















Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 6: Alderney Drive & Ochterloney Street























7: Victoria Road & Ochterloney Street

2007 AM Peak without Site Development (Fig B1-A Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	5	235	15	60	155	0	0	475	105
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	5	255	16	65	168	0	0	516	114
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	1016	872	573	872	929	168	630			168		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1016	872	573	872	929	168	630			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 %	0	100	100	98	0	98	93			100		
cM capacity (veh/h)	0	269	519	257	249	876	952			1409		
Direction, Lane #	WB 1	NB 1	SB 1									
Volume Total	277	234	630									
Volume Left	5	65	0									
Volume Right	16	0	114									
cSH	260	952	1700									
Volume to Capacity	1.07	0.07	0.37									
Queue Length 95th (m)	90.5	1.8	0.0									
Control Delay (s)	116.2	3.0	0.0									
Lane LOS	F	A										
Approach Delay (s)	116.2	3.0	0.0									
Approach LOS	F											
Intersection Summary												
Average Delay			28.8									
Intersection Capacity Utilization			66.4%			ICU Level of Service				C		
Analysis Period (min)			15									

1: Portland Street & Prince Albert Road

2007 PM Peak without Site Development (Fig B1-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1853	0	1770	1839	0	0	1853	1583	0	1863	1583
Flt Permitted	0.569			0.950				0.978				
Satd. Flow (perm)	1060	1853	0	1770	1839	0	0	1822	1443	0	1863	1523
Satd. Flow (RTOR)		1			6							49
Volume (vph)	60	225	5	390	265	25	10	100	760	0	30	45
Lane Group Flow (vph)	65	250	0	424	315	0	0	120	826	0	33	49
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.26	0.57		0.53	0.38			0.36	0.84		0.10	0.15
Control Delay	33.5	38.4		22.0	18.8			37.9	22.6		33.7	11.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	33.5	38.4		22.0	18.8			37.9	22.6		33.7	11.2
LOS	C	D		C	B			D	C		C	B
Approach Delay		37.4			20.6			24.6			20.2	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	10.5	43.5		58.2	38.9			20.8	96.1		5.5	0.0
Queue Length 95th (m)	22.6	69.0		87.1	60.2			37.9	#160.2		13.9	9.8
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	251	440		803	837			338	986		346	323
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	0.26	0.57		0.53	0.38			0.36	0.84		0.10	0.15

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 24.9

Intersection LOS: C

Intersection Capacity Utilization 69.2%

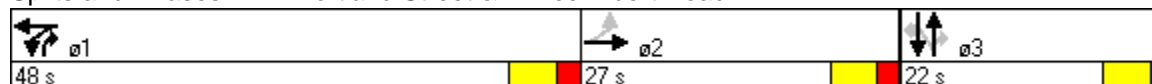
ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.


















Queue shown is maximum after two cycles.

Splits and Phases: 1: Portland Street & Prince Albert Road



















2: King Street & Alderney Drive

2007 PM Peak without Site Development (Fig B1-B Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		-3%			3%			2%			-2%	
Volume (veh/h)	25	0	20	0	0	1	5	895	0	0	415	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
Hourly flow rate (vph)	27	0	22	0	0	1	5	973	0	0	451	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)								307			355	
pX, platoon unblocked	0.92	0.92		0.92	0.92	0.92				0.92		
vC, conflicting volume	950	1435	226	1231	1436	486	452			973		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	857	1385	226	1163	1386	352	452			882		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	88	100	97	100	100	100	100			100		
cM capacity (veh/h)	230	130	777	133	129	591	1105			701		
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2					
Volume Total	49	0	1	492	486	226	227					
Volume Left	27	0	0	5	0	0	0					
Volume Right	22	0	1	0	0	0	1					
cSH	334	1700	591	1105	1700	701	1700					
Volume to Capacity	0.15	0.00	0.00	0.00	0.29	0.00	0.13					
Queue Length 95th (m)	4.1	0.0	0.0	0.1	0.0	0.0	0.0					
Control Delay (s)	17.6	0.0	11.1	0.1	0.0	0.0	0.0					
Lane LOS	C	A	B	A								
Approach Delay (s)	17.6	11.1		0.1		0.0						
Approach LOS	C	B										
Intersection Summary												
Average Delay			0.6									
Intersection Capacity Utilization			44.3%		ICU Level of Service				A			
Analysis Period (min)			15									













3: Prince Street & Alderney Drive

2007 PM Peak without Site Development (Fig B1-B Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	0	10	5	0	10	5	880	1	0	415	20
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	0	11	5	0	11	5	957	1	0	451	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)								214				
pX, platoon unblocked	0.88	0.88		0.88	0.88	0.88				0.88		
vC, conflicting volume	962	1430	236	1204	1441	479	473			958		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	818	1351	236	1094	1363	267	473			813		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	95	100	99	96	100	98	99			100		
cM capacity (veh/h)	230	130	765	145	128	641	1085			711		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	22	16	484	479	226	247						
Volume Left	11	5	5	0	0	0						
Volume Right	11	11	0	1	0	22						
cSH	354	300	1085	1700	711	1700						
Volume to Capacity	0.06	0.05	0.01	0.28	0.00	0.15						
Queue Length 95th (m)	1.6	1.4	0.1	0.0	0.0	0.0						
Control Delay (s)	15.8	17.7	0.2	0.0	0.0	0.0						
Lane LOS	C	C	A									
Approach Delay (s)	15.8	17.7	0.1		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			37.8%		ICU Level of Service					A		
Analysis Period (min)			15									

4: Alderney Drive & Portland Street

2007 PM Peak without Site Development (Fig B1-B Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	3166	3171	0	1186	0
Flt Permitted		0.807			0.998	
Satd. Flow (perm)	0	2571	3171	0	1186	0
Satd. Flow (RTOR)			4		125	
Volume (vph)	100	770	500	10	5	115
Lane Group Flow (vph)	0	946	554	0	130	0
Turn Type	Perm					
Protected Phases		1	1		2	
Permitted Phases	1					
Total Split (s)	50.0	50.0	50.0	0.0	30.0	0.0
Act Effct Green (s)		46.0	46.0		26.0	
Actuated g/C Ratio		0.58	0.58		0.32	
v/c Ratio		0.64	0.30		0.28	
Control Delay		14.0	9.2		6.1	
Queue Delay		2.7	0.0		0.0	
Total Delay		16.7	9.2		6.1	
LOS		B	A		A	
Approach Delay		16.7	9.2		6.1	
Approach LOS		B	A		A	
Queue Length 50th (m)		49.0	21.7		0.5	
Queue Length 95th (m)		69.1	31.0		12.3	
Internal Link Dist (m)		73.7	190.0		76.2	
Turn Bay Length (m)						
Base Capacity (vph)		1478	1825		470	
Starvation Cap Reductn		399	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.88	0.30		0.28	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 20 (25%), Referenced to phase 1:EBWB, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 13.3

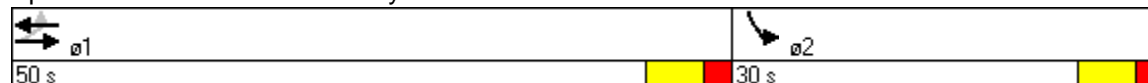
Intersection LOS: B

Intersection Capacity Utilization 67.1%

ICU Level of Service C














Analysis Period (min) 15

Splits and Phases: 4: Alderney Drive & Portland Street



5: Alderney Drive & Queen Street

2007 PM Peak without Site Development (Fig B1-B Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3185	3171	0	1260	0
Flt Permitted	0.358				0.997	
Satd. Flow (perm)	600	3185	3171	0	1260	0
Satd. Flow (RTOR)			3		76	
Volume (vph)	50	865	605	10	5	70
Lane Group Flow (vph)	54	940	669	0	81	0
Turn Type	Perm					
Protected Phases		2	2		3	
Permitted Phases	2					
Total Split (s)	49.0	49.0	49.0	0.0	31.0	0.0
Act Effct Green (s)	72.0	72.0	72.0		9.8	
Actuated g/C Ratio	0.82	0.82	0.82		0.11	
v/c Ratio	0.11	0.36	0.26		0.40	
Control Delay	3.2	3.1	2.6		12.6	
Queue Delay	0.0	0.7	0.3		0.1	
Total Delay	3.2	3.7	2.9		12.7	
LOS	A	A	A		B	
Approach Delay		3.7	2.9		12.7	
Approach LOS		A	A		B	
Queue Length 50th (m)	1.3	15.2	9.5		0.7	
Queue Length 95th (m)	5.2	31.5	20.4		11.1	
Internal Link Dist (m)		58.4	73.7		70.3	
Turn Bay Length (m)	20.0					
Base Capacity (vph)	492	2613	2602		386	
Starvation Cap Reductn	0	1208	1211		0	
Spillback Cap Reductn	0	108	159		24	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.11	0.67	0.48		0.22	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 87.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.40

Intersection Signal Delay: 3.8

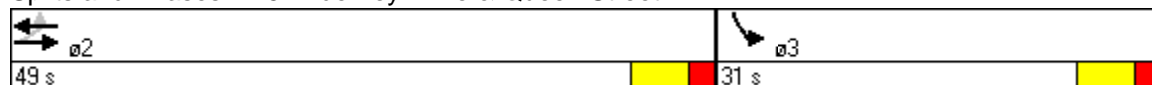
Intersection Capacity Utilization 46.4%






















Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 5: Alderney Drive & Queen Street



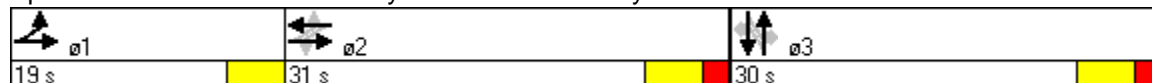
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3154	0	1593	3164	0	1577	1660	1411	0	1668	1439
Flt Permitted	0.257			0.301			0.711				0.901	
Satd. Flow (perm)	431	3154	0	505	3164	0	1180	1660	1236	0	1526	1365
Satd. Flow (RTOR)		10			3				65			158
Volume (vph)	220	835	40	45	615	15	105	140	60	20	45	145
Lane Group Flow (vph)	239	951	0	49	684	0	114	152	65	0	71	158
Turn Type	D.P+P			Perm			Perm		Perm	Perm		Perm
Protected Phases	1	1 2			2			3			3	
Permitted Phases	2			2			3		3	3		3
Total Split (s)	19.0	50.0	0.0	31.0	31.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0
Act Effct Green (s)	42.0	46.0		27.0	27.0		26.0	26.0	26.0		26.0	26.0
Actuated g/C Ratio	0.52	0.58		0.34	0.34		0.32	0.32	0.32		0.32	0.32
v/c Ratio	0.54	0.52		0.29	0.64		0.30	0.28	0.15		0.14	0.29
Control Delay	13.8	11.5		25.1	25.6		22.9	21.9	6.3		20.2	5.1
Queue Delay	0.0	0.1		0.0	6.8		0.0	0.0	0.0		0.0	0.0
Total Delay	13.8	11.6		25.1	32.3		22.9	21.9	6.3		20.2	5.1
LOS	B	B		C	C		C	C	A		C	A
Approach Delay		12.0			31.9			19.1			9.8	
Approach LOS		B			C			B			A	
Queue Length 50th (m)	17.6	44.1		5.7	47.7		13.5	17.9	0.0		8.0	0.0
Queue Length 95th (m)	29.9	59.7		15.2	66.3		27.1	32.7	8.4		17.5	12.6
Internal Link Dist (m)		209.1			58.4			55.3			90.0	
Turn Bay Length (m)	65.0			25.0								
Base Capacity (vph)	444	1818		170	1070		384	540	446		496	550
Starvation Cap Reductn	0	0		0	333		0	0	0		0	0
Spillback Cap Reductn	0	85		0	0		0	0	1		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.54	0.55		0.29	0.93		0.30	0.28	0.15		0.14	0.29

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
 Control Type: Pretimed
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 18.6
 Intersection Capacity Utilization 65.3%
 Analysis Period (min) 15
















Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 6: Alderney Drive & Ochterloney Street























7: Victoria Road & Ochterloney Street

2007 PM Peak without Site Development (Fig B1-B Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	5	180	30	80	465	0	0	245	45
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	5	196	33	87	505	0	0	266	49
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	1101	970	291	970	995	505	315			505		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1101	970	291	970	995	505	315			505		
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	98	14	94	93			100		
cM capacity (veh/h)	47	235	748	220	228	567	1245			1059		
Direction, Lane #	WB 1	NB 1	SB 1									
Volume Total	234	592	315									
Volume Left	5	87	0									
Volume Right	33	0	49									
cSH	248	1245	1700									
Volume to Capacity	0.94	0.07	0.19									
Queue Length 95th (m)	67.9	1.8	0.0									
Control Delay (s)	85.7	1.9	0.0									
Lane LOS	F	A										
Approach Delay (s)	85.7	1.9	0.0									
Approach LOS	F											
Intersection Summary												
Average Delay			18.5									
Intersection Capacity Utilization			66.1%		ICU Level of Service					C		
Analysis Period (min)			15									

1: Portland Street & Prince Albert Road

2010 AM Peak with Phase 1 Site Development (Fig B4-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1842	0	1770	1818	0	0	1863	1583	0	1863	1583
Flt Permitted	0.539			0.950								
Satd. Flow (perm)	1004	1842	0	1770	1818	0	0	1863	1448	0	1863	1583
Satd. Flow (RTOR)		2			13							87
Volume (vph)	15	95	5	518	290	55	0	45	500	0	119	80
Lane Group Flow (vph)	16	108	0	563	375	0	0	49	543	0	129	87
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.07	0.25		0.70	0.45			0.14	0.55		0.37	0.24
Control Delay	29.8	31.2		27.0	19.7			34.4	11.0		38.2	9.5
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	29.8	31.2		27.0	19.7			34.4	11.0		38.2	9.5
LOS	C	C		C	B			C	B		D	A
Approach Delay		31.1			24.1			12.9			26.6	
Approach LOS		C			C			B			C	
Queue Length 50th (m)	2.5	17.0		86.3	47.4			8.2	45.9		22.5	0.0
Queue Length 95th (m)	8.0	31.8		127.1	72.4			18.4	69.7		40.3	12.8
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	238	438		803	832			346	987		346	365
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	0.07	0.25		0.70	0.45			0.14	0.55		0.37	0.24

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 21.3

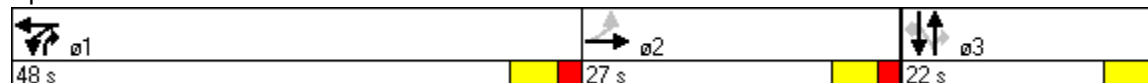
Intersection LOS: C

Intersection Capacity Utilization 55.4%

ICU Level of Service B




















Analysis Period (min) 15

Splits and Phases: 1: Portland Street & Prince Albert Road



2: King Street & Alderney Drive

2010 AM Peak with Phase 1 Site Development (Fig B4-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1597	0	0	1594	1404	1577	3108	0	1609	3183	0
Flt Permitted		0.972			0.811		0.408			0.305		
Satd. Flow (perm)	0	1565	0	0	1339	1364	677	3108	0	516	3183	0
Satd. Flow (RTOR)		11				38		12			13	
Volume (vph)	5	16	10	48	18	35	20	540	42	32	555	35
Lane Group Flow (vph)	0	33	0	0	72	38	22	633	0	35	641	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	32.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		12.5			12.6	12.6	64.5	64.5		69.0	69.4	
Actuated g/C Ratio		0.14			0.14	0.14	0.74	0.74		0.74	0.79	
v/c Ratio		0.15			0.39	0.17	0.04	0.28		0.08	0.25	
Control Delay		21.3			33.6	11.1	6.8	5.9		4.1	3.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		21.3			33.6	11.1	6.8	5.9		4.1	3.3	
LOS		C			C	B	A	A		A	A	
Approach Delay		21.3			25.8			5.9			3.4	
Approach LOS		C			C			A			A	
Queue Length 50th (m)		2.9			10.0	0.0	0.7	12.0		1.1	12.1	
Queue Length 95th (m)		10.0			21.1	7.6	4.8	36.6		3.8	22.7	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		436			367	401	499	2293		482	2523	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.08			0.20	0.09	0.04	0.28		0.07	0.25	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 87.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.39

Intersection Signal Delay: 6.6






Intersection Capacity Utilization 43.1%

Analysis Period (min) 15

Intersection LOS: A

















ICU Level of Service A

Splits and Phases: 2: King Street & Alderney Drive

 ø1	 ø2	 ø4
14 s	44 s	32 s
 ø6		 ø8
58 s		32 s













3: Prince Street & Alderney Drive

2010 AM Peak with Phase 1 Site Development (Fig B4-A Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	0	5	0	0	0	5	597	5	10	583	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	5	0	0	0	5	649	5	11	634	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)								214			93	
pX, platoon unblocked	0.96	0.96	0.97	0.96	0.96	0.95	0.97			0.95		
vC, conflicting volume	1002	1332	328	1007	1340	327	655			654		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	868	1211	275	873	1219	234	613			579		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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	100	100	100	99			99		
cM capacity (veh/h)	234	171	700	230	169	727	933			938		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	11	0	330	330	328	339						
Volume Left	5	0	5	0	11	0						
Volume Right	5	0	0	5	0	22						
cSH	351	1700	933	1700	938	1700						
Volume to Capacity	0.03	0.00	0.01	0.19	0.01	0.20						
Queue Length 95th (m)	0.8	0.0	0.1	0.0	0.3	0.0						
Control Delay (s)	15.6	0.0	0.2	0.0	0.4	0.0						
Lane LOS	C	A	A		A							
Approach Delay (s)	15.6	0.0	0.1		0.2							
Approach LOS	C	A										
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			33.9%		ICU Level of Service				A			
Analysis Period (min)			15									

4: Alderney Drive & Portland Street

2010 AM Peak with Phase 1 Site Development (Fig B4-A Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	3176	3177	0	1215	0
Flt Permitted		0.885			0.996	
Satd. Flow (perm)	0	2819	3177	0	1215	0
Satd. Flow (RTOR)			3		114	
Volume (vph)	35	577	643	10	10	105
Lane Group Flow (vph)	0	665	710	0	125	0
Turn Type	Perm					
Protected Phases		1	1		2	
Permitted Phases	1					
Total Split (s)	50.0	50.0	50.0	0.0	30.0	0.0
Act Effct Green (s)		46.0	46.0		26.0	
Actuated g/C Ratio		0.58	0.58		0.32	
v/c Ratio		0.41	0.39		0.26	
Control Delay		10.4	10.0		6.7	
Queue Delay		0.7	0.0		0.0	
Total Delay		11.2	10.0		6.7	
LOS		B	B		A	
Approach Delay		11.2	10.0		6.7	
Approach LOS		B	B		A	
Queue Length 50th (m)		28.5	29.8		1.2	
Queue Length 95th (m)		40.2	41.1		12.8	
Internal Link Dist (m)		73.7	190.0		76.2	
Turn Bay Length (m)						
Base Capacity (vph)		1621	1828		472	
Starvation Cap Reductn		597	0		0	
Spillback Cap Reductn		0	6		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.65	0.39		0.26	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 20 (25%), Referenced to phase 1:EBWB, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.41

Intersection Signal Delay: 10.3

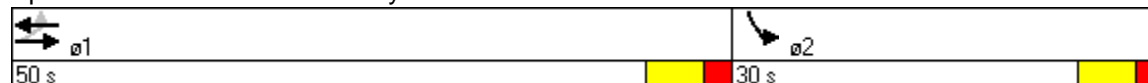
Intersection LOS: B

Intersection Capacity Utilization 62.7%

ICU Level of Service B














Analysis Period (min) 15

Splits and Phases: 4: Alderney Drive & Portland Street



5: Alderney Drive & Queen Street

2010 AM Peak with Phase 1 Site Development (Fig B4-A Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3185	3181	0	1249	0
Flt Permitted	0.292				0.996	
Satd. Flow (perm)	490	3185	3181	0	1249	0
Satd. Flow (RTOR)			1		60	
Volume (vph)	35	607	743	5	5	55
Lane Group Flow (vph)	38	660	813	0	65	0
Turn Type	Perm					
Protected Phases		2	2		3	
Permitted Phases	2					
Total Split (s)	49.0	49.0	49.0	0.0	31.0	0.0
Act Effct Green (s)	80.0	80.0	80.0		9.8	
Actuated g/C Ratio	0.86	0.86	0.86		0.10	
v/c Ratio	0.09	0.24	0.30		0.36	
Control Delay	2.9	2.2	2.4		13.4	
Queue Delay	0.0	0.4	0.3		0.1	
Total Delay	2.9	2.6	2.7		13.5	
LOS	A	A	A		B	
Approach Delay		2.6	2.7		13.5	
Approach LOS		A	A		B	
Queue Length 50th (m)	0.9	9.4	12.4		0.8	
Queue Length 95th (m)	3.9	19.5	25.1		10.6	
Internal Link Dist (m)		58.4	73.7		70.3	
Turn Bay Length (m)	20.0					
Base Capacity (vph)	422	2744	2740		352	
Starvation Cap Reductn	0	1449	1223		0	
Spillback Cap Reductn	0	0	358		37	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.09	0.51	0.54		0.21	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 92.9

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.36

Intersection Signal Delay: 3.1

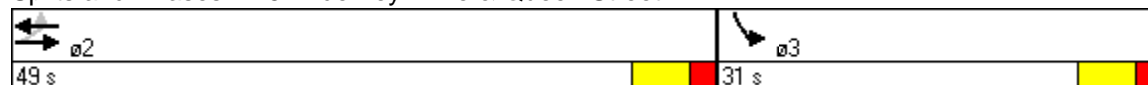
Intersection Capacity Utilization 49.5%






















Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 5: Alderney Drive & Queen Street



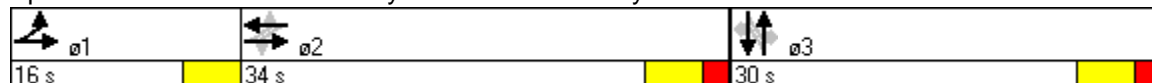
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3097	0	1593	3167	0	1577	1660	1411	0	1685	1439
Flt Permitted	0.204			0.356			0.684				0.980	
Satd. Flow (perm)	342	3097	0	597	3167	0	1135	1660	1238	0	1659	1386
Satd. Flow (RTOR)		38			3				16			355
Volume (vph)	160	617	100	35	748	15	35	25	15	10	95	390
Lane Group Flow (vph)	174	780	0	38	829	0	38	27	16	0	114	424
Turn Type	D.P+P			Perm			Perm		Perm	Perm		Perm
Protected Phases	1	1 2			2			3			3	
Permitted Phases	2			2			3		3	3		3
Total Split (s)	16.0	50.0	0.0	34.0	34.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0
Act Effct Green (s)	42.0	46.0		30.0	30.0		26.0	26.0	26.0		26.0	26.0
Actuated g/C Ratio	0.52	0.58		0.38	0.38		0.32	0.32	0.32		0.32	0.32
v/c Ratio	0.47	0.43		0.17	0.70		0.10	0.05	0.04		0.21	0.61
Control Delay	13.0	10.0		19.2	24.9		19.9	19.0	9.3		20.9	8.9
Queue Delay	0.0	0.0		0.0	29.8		0.0	0.0	0.0		0.0	0.0
Total Delay	13.0	10.0		19.2	54.7		19.9	19.0	9.3		20.9	8.9
LOS	B	B		B	D		B	B	A		C	A
Approach Delay		10.6			53.1			17.5			11.4	
Approach LOS		B			D			B			B	
Queue Length 50th (m)	12.2	32.1		4.0	57.5		4.2	2.9	0.0		13.1	7.8
Queue Length 95th (m)	21.9	44.7		11.1	78.5		11.1	8.5	4.2		25.5	34.4
Internal Link Dist (m)		209.1			58.4			55.3			90.0	
Turn Bay Length (m)	65.0			25.0								
Base Capacity (vph)	367	1797		224	1190		369	540	413		539	690
Starvation Cap Reductn	0	0		0	397		0	0	0		0	0
Spillback Cap Reductn	0	11		0	0		0	0	0		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.47	0.44		0.17	1.05		0.10	0.05	0.04		0.21	0.61

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green
 Control Type: Pretimed
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 26.1
 Intersection Capacity Utilization 75.4%
 Analysis Period (min) 15
















Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 6: Alderney Drive & Ochterloney Street



7: Victoria Road & Ochterloney Street

2010 AM Peak with Phase 1 Site Development (Fig B4-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	0	0	0	1848	0	0	1835	0	0	1816	0
Flt Permitted					0.999			0.678				
Satd. Flow (perm)	0	0	0	0	1848	0	0	1263	0	0	1816	0
Satd. Flow (RTOR)					4						26	
Volume (vph)	0	0	0	5	247	15	71	160	0	0	480	110
Lane Group Flow (vph)	0	0	0	0	289	0	0	251	0	0	642	0
Turn Type				Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases				8			2					
Total Split (s)	0.0	0.0	0.0	28.0	28.0	0.0	52.0	52.0	0.0	0.0	52.0	0.0
Act Effct Green (s)					24.0			48.0			48.0	
Actuated g/C Ratio					0.30			0.60			0.60	
v/c Ratio					0.52			0.33			0.58	
Control Delay					26.9			9.5			12.1	
Queue Delay					0.0			0.0			0.0	
Total Delay					26.9			9.5			12.1	
LOS					C			A			B	
Approach Delay					26.9			9.5			12.1	
Approach LOS					C			A			B	
Queue Length 50th (m)					37.5			18.1			54.6	
Queue Length 95th (m)					61.4			31.8			85.0	
Internal Link Dist (m)		66.5			48.6			85.8			52.0	
Turn Bay Length (m)												
Base Capacity (vph)					557			758			1100	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.52			0.33			0.58	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 15.1

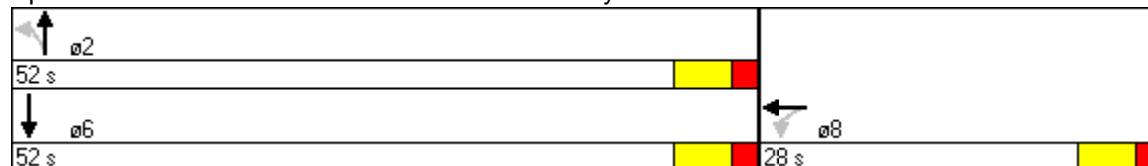
Intersection LOS: B

Intersection Capacity Utilization 68.5%

ICU Level of Service C





















Analysis Period (min) 15

Splits and Phases: 7: Victoria Road & Ochterloney Street



1: Portland Street & Prince Albert Road

2010 PM Peak with Phase 1 Site Development (Fig B4-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1853	0	1770	1839	0	0	1855	1583	0	1863	1583
Flt Permitted	0.567			0.950				0.980				
Satd. Flow (perm)	1056	1853	0	1770	1839	0	0	1825	1443	0	1863	1523
Satd. Flow (RTOR)		1			6							49
Volume (vph)	60	230	5	414	270	25	10	117	793	0	44	45
Lane Group Flow (vph)	65	255	0	450	320	0	0	138	862	0	48	49
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.26	0.58		0.56	0.38			0.41	0.87		0.14	0.15
Control Delay	33.5	38.7		22.8	18.9			39.0	25.8		34.3	11.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	33.5	38.7		22.8	18.9			39.0	25.8		34.3	11.2
LOS	C	D		C	B			D	C		C	B
Approach Delay		37.7			21.2			27.6			22.6	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	10.5	44.5		63.1	39.7			24.2	105.3		8.0	0.0
Queue Length 95th (m)	22.6	70.6		94.1	61.1			42.7	#197.3		18.1	9.8
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	250	440		803	837			339	986		346	323
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	0.26	0.58		0.56	0.38			0.41	0.87		0.14	0.15

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 26.6

Intersection LOS: C

Intersection Capacity Utilization 71.3%

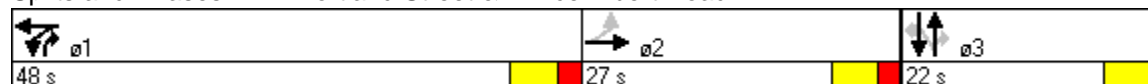
ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.




















Queue shown is maximum after two cycles.

Splits and Phases: 1: Portland Street & Prince Albert Road



2: King Street & Alderney Drive

2010 PM Peak with Phase 1 Site Development (Fig B4-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1577	0	0	1594	1404	1577	3120	0	1609	3217	0
Flt Permitted		0.887			0.786		0.486			0.140		
Satd. Flow (perm)	0	1428	0	0	1298	1364	807	3120	0	237	3217	0
Satd. Flow (RTOR)		22				43		7				
Volume (vph)	25	16	20	54	20	40	5	910	44	33	425	1
Lane Group Flow (vph)	0	66	0	0	81	43	5	1037	0	36	463	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	32.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		13.1			13.3	13.3	62.4	62.4		66.7	67.1	
Actuated g/C Ratio		0.15			0.15	0.15	0.73	0.73		0.73	0.78	
v/c Ratio		0.29			0.42	0.18	0.01	0.46		0.13	0.18	
Control Delay		22.1			34.1	10.6	7.2	7.8		5.2	3.4	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		22.1			34.1	10.6	7.2	7.8		5.2	3.4	
LOS		C			C	B	A	A		A	A	
Approach Delay		22.1			26.0			7.8			3.5	
Approach LOS		C			C			A			A	
Queue Length 50th (m)		5.7			10.8	0.0	0.2	25.1		1.2	8.7	
Queue Length 95th (m)		16.0			23.2	8.0	1.9	72.3		4.1	17.2	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		415			364	413	586	2266		313	2511	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.16			0.22	0.10	0.01	0.46		0.12	0.18	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 86

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.46

Intersection Signal Delay: 8.4






Intersection Capacity Utilization 52.9%

Analysis Period (min) 15

Intersection LOS: A

















ICU Level of Service A

Splits and Phases: 2: King Street & Alderney Drive

		
ø1	ø2	ø4
14 s	44 s	32 s
		
ø6	ø8	
58 s	32 s	













3: Prince Street & Alderney Drive

2010 PM Peak with Phase 1 Site Development (Fig B4-B Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	0	10	5	0	10	5	939	1	0	479	20
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	0	11	5	0	11	5	1021	1	0	521	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)								214			93	
pX, platoon unblocked	0.87	0.87	0.99	0.87	0.87	0.86	0.99			0.86		
vC, conflicting volume	1064	1564	271	1303	1574	511	542			1022		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	871	1450	248	1148	1462	266	523			861		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	95	100	99	96	100	98	99			100		
cM capacity (veh/h)	207	112	742	130	110	629	1026			667		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	22	16	516	511	260	282						
Volume Left	11	5	5	0	0	0						
Volume Right	11	11	0	1	0	22						
cSH	324	277	1026	1700	667	1700						
Volume to Capacity	0.07	0.06	0.01	0.30	0.00	0.17						
Queue Length 95th (m)	1.7	1.5	0.1	0.0	0.0	0.0						
Control Delay (s)	16.9	18.8	0.2	0.0	0.0	0.0						
Lane LOS	C	C	A									
Approach Delay (s)	16.9	18.8	0.1		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			39.5%		ICU Level of Service					A		
Analysis Period (min)			15									

4: Alderney Drive & Portland Street

2010 PM Peak with Phase 1 Site Development (Fig B4-B Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	3169	3172	0	1185	0
Flt Permitted		0.798			0.998	
Satd. Flow (perm)	0	2542	3172	0	1185	0
Satd. Flow (RTOR)			4		130	
Volume (vph)	100	819	559	10	5	120
Lane Group Flow (vph)	0	999	619	0	135	0
Turn Type	Perm					
Protected Phases		1	1		2	
Permitted Phases	1					
Total Split (s)	50.0	50.0	50.0	0.0	30.0	0.0
Act Effct Green (s)		46.0	46.0		26.0	
Actuated g/C Ratio		0.58	0.58		0.32	
v/c Ratio		0.68	0.34		0.29	
Control Delay		15.0	9.5		6.1	
Queue Delay		4.0	0.0		0.0	
Total Delay		18.9	9.5		6.1	
LOS		B	A		A	
Approach Delay		18.9	9.5		6.1	
Approach LOS		B	A		A	
Queue Length 50th (m)		53.9	25.0		0.5	
Queue Length 95th (m)		76.1	35.2		12.6	
Internal Link Dist (m)		73.7	190.0		76.2	
Turn Bay Length (m)						
Base Capacity (vph)		1462	1826		473	
Starvation Cap Reductn		371	0		0	
Spillback Cap Reductn		0	0		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.92	0.34		0.29	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 20 (25%), Referenced to phase 1:EBWB, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 14.6

Intersection LOS: B

Intersection Capacity Utilization 70.8%

ICU Level of Service C











Analysis Period (min) 15

Splits and Phases: 4: Alderney Drive & Portland Street



5: Alderney Drive & Queen Street

2010 PM Peak with Phase 1 Site Development (Fig B4-B Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3185	3172	0	1260	0
Flt Permitted	0.325				0.997	
Satd. Flow (perm)	545	3185	3172	0	1260	0
Satd. Flow (RTOR)			3		76	
Volume (vph)	55	914	669	10	5	70
Lane Group Flow (vph)	60	993	738	0	81	0
Turn Type	Perm					
Protected Phases		2	2		3	
Permitted Phases	2					
Total Split (s)	49.0	49.0	49.0	0.0	31.0	0.0
Act Effct Green (s)	72.0	72.0	72.0		9.8	
Actuated g/C Ratio	0.82	0.82	0.82		0.11	
v/c Ratio	0.13	0.38	0.28		0.40	
Control Delay	3.5	3.2	2.7		12.6	
Queue Delay	0.0	0.7	0.3		0.1	
Total Delay	3.5	3.9	3.1		12.7	
LOS	A	A	A		B	
Approach Delay		3.9	3.1		12.7	
Approach LOS		A	A		B	
Queue Length 50th (m)	1.5	16.4	10.8		0.7	
Queue Length 95th (m)	5.9	33.7	23.0		11.1	
Internal Link Dist (m)		58.4	73.7		70.3	
Turn Bay Length (m)	20.0					
Base Capacity (vph)	447	2613	2603		386	
Starvation Cap Reductn	0	1177	1176		0	
Spillback Cap Reductn	0	148	268		38	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.13	0.69	0.52		0.23	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 87.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.40

Intersection Signal Delay: 3.9

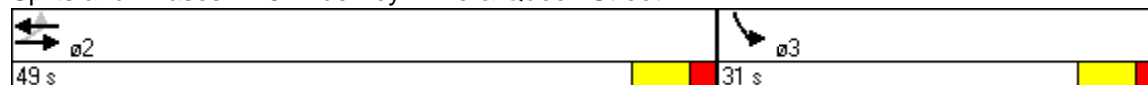
Intersection Capacity Utilization 47.9%






















Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 5: Alderney Drive & Queen Street



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3154	0	1593	3168	0	1577	1660	1411	0	1668	1439
Flt Permitted	0.242			0.282			0.711				0.899	
Satd. Flow (perm)	406	3154	0	473	3168	0	1180	1660	1236	0	1522	1365
Satd. Flow (RTOR)		11			3				65			158
Volume (vph)	225	889	45	45	679	15	110	145	60	20	45	145
Lane Group Flow (vph)	245	1015	0	49	754	0	120	158	65	0	71	158
Turn Type	D.P+P			Perm			Perm		Perm	Perm		Perm
Protected Phases	1	1 2			2			3			3	
Permitted Phases	2			2			3		3	3		3
Total Split (s)	16.0	50.0	0.0	34.0	34.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0
Act Effct Green (s)	42.0	46.0		30.0	30.0		26.0	26.0	26.0		26.0	26.0
Actuated g/C Ratio	0.52	0.58		0.38	0.38		0.32	0.32	0.32		0.32	0.32
v/c Ratio	0.63	0.56		0.28	0.63		0.31	0.29	0.15		0.14	0.29
Control Delay	17.1	12.0		22.7	23.4		23.1	22.0	6.3		20.2	5.1
Queue Delay	0.0	0.1		0.0	10.8		0.0	0.0	0.0		0.0	0.0
Total Delay	17.1	12.1		22.7	34.2		23.1	22.0	6.3		20.2	5.1
LOS	B	B		C	C		C	C	A		C	A
Approach Delay		13.0			33.5			19.4			9.8	
Approach LOS		B			C			B			A	
Queue Length 50th (m)	18.0	48.4		5.4	50.7		14.3	18.6	0.0		8.0	0.0
Queue Length 95th (m)	32.2	65.3		14.5	69.7		28.4	34.0	8.4		17.5	12.6
Internal Link Dist (m)		209.1			58.4			55.3			90.0	
Turn Bay Length (m)	65.0			25.0								
Base Capacity (vph)	391	1818		177	1190		384	540	446		495	550
Starvation Cap Reductn	0	0		0	411		0	0	0		0	0
Spillback Cap Reductn	0	106		0	0		0	0	2		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.63	0.59		0.28	0.97		0.31	0.29	0.15		0.14	0.29

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 19.8

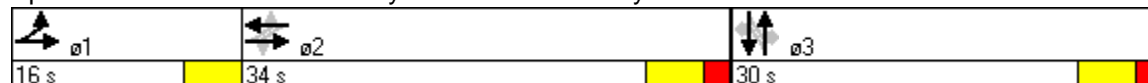
Intersection LOS: B

Intersection Capacity Utilization 67.5%

ICU Level of Service C
















Analysis Period (min) 15

Splits and Phases: 6: Alderney Drive & Ochterloney Street



7: Victoria Road & Ochterloney Street

2010 PM Peak with Phase 1 Site Development (Fig B4-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	0	0	0	1827	0	0	1848	0	0	1824	0
Flt Permitted					0.999			0.888				
Satd. Flow (perm)	0	0	0	0	1827	0	0	1654	0	0	1824	0
Satd. Flow (RTOR)					10						20	
Volume (vph)	0	0	0	5	193	30	92	470	0	0	250	45
Lane Group Flow (vph)	0	0	0	0	248	0	0	611	0	0	321	0
Turn Type				Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases				8			2					
Total Split (s)	0.0	0.0	0.0	28.0	28.0	0.0	52.0	52.0	0.0	0.0	52.0	0.0
Act Effct Green (s)					24.0			48.0			48.0	
Actuated g/C Ratio					0.30			0.60			0.60	
v/c Ratio					0.45			0.62			0.29	
Control Delay					24.8			13.6			8.1	
Queue Delay					0.0			0.0			0.0	
Total Delay					24.8			13.6			8.1	
LOS					C			B			A	
Approach Delay					24.8			13.6			8.1	
Approach LOS					C			B			A	
Queue Length 50th (m)					30.5			56.0			20.9	
Queue Length 95th (m)					51.8			88.7			34.3	
Internal Link Dist (m)		66.5			48.6			85.8			52.0	
Turn Bay Length (m)												
Base Capacity (vph)					555			992			1102	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.45			0.62			0.29	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 14.4

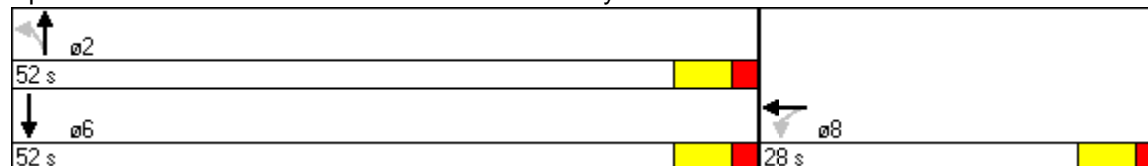
Intersection LOS: B

Intersection Capacity Utilization 68.0%

ICU Level of Service C





















Analysis Period (min) 15

Splits and Phases: 7: Victoria Road & Ochterloney Street



1: Portland Street & Prince Albert Road

2012 AM Peak with Phases 1 & 2 Site Development (Fig B7-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1842	0	1770	1818	0	0	1863	1583	0	1863	1583
Flt Permitted	0.536			0.950								
Satd. Flow (perm)	998	1842	0	1770	1818	0	0	1863	1448	0	1863	1583
Satd. Flow (RTOR)		2			13							92
Volume (vph)	15	100	5	543	295	55	0	62	528	0	133	85
Lane Group Flow (vph)	16	114	0	590	381	0	0	67	574	0	145	92
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.07	0.26		0.73	0.46			0.19	0.58		0.42	0.25
Control Delay	29.8	31.5		28.4	19.8			35.1	11.7		39.2	9.3
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	29.8	31.5		28.4	19.8			35.1	11.7		39.2	9.3
LOS	C	C		C	B			D	B		D	A
Approach Delay		31.3			25.1			14.2			27.6	
Approach LOS		C			C			B			C	
Queue Length 50th (m)	2.5	18.0		92.5	48.4			11.3	50.1		25.5	0.0
Queue Length 95th (m)	8.0	33.4		136.1	73.7			23.4	76.0		44.5	13.2
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	237	438		803	832			346	987		346	369
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	0.07	0.26		0.73	0.46			0.19	0.58		0.42	0.25

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 22.2

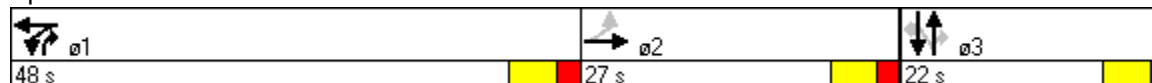
Intersection LOS: C

Intersection Capacity Utilization 56.7%

ICU Level of Service B




















Analysis Period (min) 15

Splits and Phases: 1: Portland Street & Prince Albert Road



2: King Street & Alderney Drive

2012 AM Peak with Phases 1 & 2 Site Development (Fig B7-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1628	0	0	1594	1404	1577	3066	0	1609	3183	0
Flt Permitted		0.977			0.760		0.406			0.277		
Satd. Flow (perm)	0	1599	0	0	1255	1340	674	3066	0	469	3183	0
Satd. Flow (RTOR)		11				82		27			13	
Volume (vph)	5	33	10	103	38	75	20	545	90	66	560	35
Lane Group Flow (vph)	0	52	0	0	153	82	22	690	0	72	647	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	32.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		17.4			17.4	17.4	49.1	49.1		58.4	58.3	
Actuated g/C Ratio		0.21			0.21	0.21	0.59	0.59		0.68	0.70	
v/c Ratio		0.15			0.59	0.24	0.06	0.38		0.17	0.29	
Control Delay		21.3			37.2	7.8	11.2	11.1		6.2	5.7	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		21.3			37.2	7.8	11.2	11.1		6.2	5.7	
LOS		C			D	A	B	B		A	A	
Approach Delay		21.3			26.9			11.1			5.8	
Approach LOS		C			C			B			A	
Queue Length 50th (m)		5.3			21.7	0.0	1.5	29.1		3.1	17.3	
Queue Length 95th (m)		14.0			40.0	10.3	6.3	53.6		9.4	33.7	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		485			374	457	395	1808		438	2220	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.11			0.41	0.18	0.06	0.38		0.16	0.29	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 83.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 11.3






Intersection Capacity Utilization 49.4%

Analysis Period (min) 15

Intersection LOS: B

















ICU Level of Service A

Splits and Phases: 2: King Street & Alderney Drive

 ø1	 ø2	 ø4
14 s	44 s	32 s
 ø6		 ø8
58 s		32 s













3: Prince Street & Alderney Drive

2012 AM Peak with Phases 1 & 2 Site Development (Fig B7-A Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	0	5	0	0	0	5	650	5	10	643	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	5	0	0	0	5	707	5	11	699	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)								214			93	
pX, platoon unblocked	0.96	0.96	0.95	0.96	0.96	0.93	0.95			0.93		
vC, conflicting volume	1096	1454	360	1097	1462	356	721			712		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	882	1257	265	883	1266	230	646			613		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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	100	100	100	99			99		
cM capacity (veh/h)	227	159	693	225	158	718	884			894		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	11	0	359	359	360	371						
Volume Left	5	0	5	0	11	0						
Volume Right	5	0	0	5	0	22						
cSH	342	1700	884	1700	894	1700						
Volume to Capacity	0.03	0.00	0.01	0.21	0.01	0.22						
Queue Length 95th (m)	0.8	0.0	0.1	0.0	0.3	0.0						
Control Delay (s)	15.9	0.0	0.2	0.0	0.4	0.0						
Lane LOS	C	A	A		A							
Approach Delay (s)	15.9	0.0	0.1		0.2							
Approach LOS	C	A										
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			35.5%		ICU Level of Service				A			
Analysis Period (min)			15									

4: Alderney Drive & Portland Street

2012 AM Peak with Phases 1 & 2 Site Development (Fig B7-A Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	3176	3177	0	1215	0
Flt Permitted		0.883			0.996	
Satd. Flow (perm)	0	2813	3177	0	1215	0
Satd. Flow (RTOR)			3		114	
Volume (vph)	35	630	703	10	10	105
Lane Group Flow (vph)	0	723	775	0	125	0
Turn Type	Perm					
Protected Phases		1	1		2	
Permitted Phases	1					
Total Split (s)	50.0	50.0	50.0	0.0	30.0	0.0
Act Effct Green (s)		46.0	46.0		26.0	
Actuated g/C Ratio		0.58	0.58		0.32	
v/c Ratio		0.45	0.42		0.26	
Control Delay		10.8	10.4		6.7	
Queue Delay		0.9	0.0		0.0	
Total Delay		11.7	10.4		6.7	
LOS		B	B		A	
Approach Delay		11.7	10.4		6.7	
Approach LOS		B	B		A	
Queue Length 50th (m)		31.8	33.4		1.2	
Queue Length 95th (m)		44.6	45.8		12.8	
Internal Link Dist (m)		73.7	190.0		76.2	
Turn Bay Length (m)						
Base Capacity (vph)		1617	1828		472	
Starvation Cap Reductn		579	0		0	
Spillback Cap Reductn		0	17		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.70	0.43		0.26	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 20 (25%), Referenced to phase 1:EBWB, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 10.7

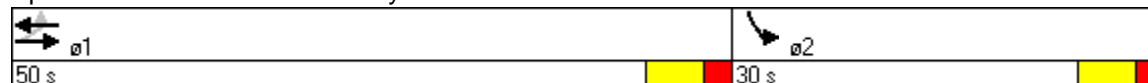
Intersection LOS: B

Intersection Capacity Utilization 66.2%

ICU Level of Service C











Analysis Period (min) 15

Splits and Phases: 4: Alderney Drive & Portland Street



5: Alderney Drive & Queen Street

2012 AM Peak with Phases 1 & 2 Site Development (Fig B7-A Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3185	3181	0	1249	0
Flt Permitted	0.265				0.996	
Satd. Flow (perm)	444	3185	3181	0	1249	0
Satd. Flow (RTOR)			1		60	
Volume (vph)	35	660	803	5	5	55
Lane Group Flow (vph)	38	717	878	0	65	0
Turn Type	Perm					
Protected Phases		2	2		3	
Permitted Phases	2					
Total Split (s)	49.0	49.0	49.0	0.0	31.0	0.0
Act Effct Green (s)	80.0	80.0	80.0		9.8	
Actuated g/C Ratio	0.86	0.86	0.86		0.10	
v/c Ratio	0.10	0.26	0.32		0.36	
Control Delay	3.1	2.3	2.5		13.4	
Queue Delay	0.0	0.4	0.4		0.1	
Total Delay	3.1	2.7	2.8		13.5	
LOS	A	A	A		B	
Approach Delay		2.7	2.8		13.5	
Approach LOS		A	A		B	
Queue Length 50th (m)	0.9	10.5	13.7		0.8	
Queue Length 95th (m)	4.0	21.5	27.7		10.6	
Internal Link Dist (m)		58.4	73.7		70.3	
Turn Bay Length (m)	20.0					
Base Capacity (vph)	382	2744	2740		352	
Starvation Cap Reductn	0	1413	1187		0	
Spillback Cap Reductn	0	5	480		50	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.10	0.54	0.57		0.22	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 92.9

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.36

Intersection Signal Delay: 3.2

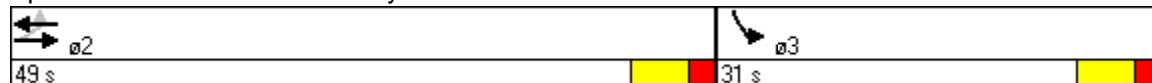
Intersection Capacity Utilization 51.4%

Analysis Period (min) 15

Intersection LOS: A






















ICU Level of Service A

Splits and Phases: 5: Alderney Drive & Queen Street



6: Alderney Drive & Ochterloney Street

2012 AM Peak with Phases 1 & 2 Site Development (Fig B7-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3079	0	1593	3167	0	1577	1660	1411	0	1685	1439
Flt Permitted	0.153			0.337			0.684				0.980	
Satd. Flow (perm)	257	3079	0	565	3167	0	1135	1660	1238	0	1659	1386
Satd. Flow (RTOR)		35			3				16			349
Volume (vph)	165	670	100	35	808	15	35	25	15	10	95	395
Lane Group Flow (vph)	179	837	0	38	894	0	38	27	16	0	114	429
Turn Type	pm+pt			Perm			Perm		Perm	Perm		Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4		4	4		4
Total Split (s)	16.0	50.0	0.0	34.0	34.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0
Act Effct Green (s)	46.4	46.4		33.9	33.9		14.7	14.7	14.7		14.7	14.7
Actuated g/C Ratio	0.67	0.67		0.49	0.49		0.21	0.21	0.21		0.21	0.21
v/c Ratio	0.53	0.40		0.14	0.58		0.16	0.08	0.06		0.32	0.75
Control Delay	12.8	6.7		15.3	16.4		22.3	20.6	10.1		24.5	14.5
Queue Delay	0.0	0.0		0.0	2.8		0.0	0.0	0.0		0.0	0.0
Total Delay	12.8	6.7		15.3	19.3		22.3	20.6	10.1		24.5	14.5
LOS	B	A		B	B		C	C	B		C	B
Approach Delay		7.7			19.1			19.3			16.6	
Approach LOS		A			B			B			B	
Queue Length 50th (m)	6.9	19.4		2.5	39.7		4.2	2.9	0.0		13.1	9.1
Queue Length 95th (m)	25.9	49.4		11.2	86.7		11.1	8.5	4.2		25.5	37.3
Internal Link Dist (m)		209.1			58.4			55.3			90.0	
Turn Bay Length (m)	65.0			25.0								
Base Capacity (vph)	385	2075		277	1552		369	540	413		539	686
Starvation Cap Reductn	0	0		0	523		0	0	0		0	0
Spillback Cap Reductn	0	26		0	0		0	0	0		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.46	0.41		0.14	0.87		0.10	0.05	0.04		0.21	0.63

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 69.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 14.1

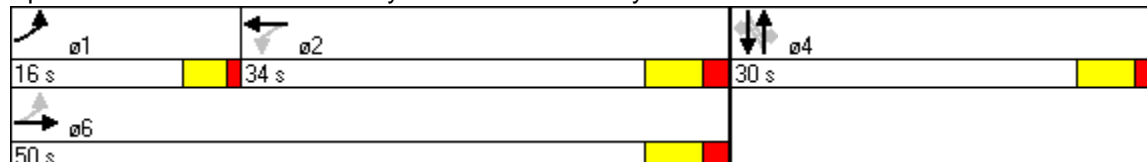
Intersection Capacity Utilization 76.8%

Analysis Period (min) 15

Intersection LOS: B
















ICU Level of Service D

Splits and Phases: 6: Alderney Drive & Ochterloney Street



7: Victoria Road & Ochterloney Street

2012 AM Peak with Phases 1 & 2 Site Development (Fig B7-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	0	0	0	1848	0	0	1831	0	0	1816	0
Flt Permitted					0.999			0.623				
Satd. Flow (perm)	0	0	0	0	1848	0	0	1160	0	0	1816	0
Satd. Flow (RTOR)					4						26	
Volume (vph)	0	0	0	5	255	15	83	160	0	0	485	110
Lane Group Flow (vph)	0	0	0	0	298	0	0	264	0	0	647	0
Turn Type				Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases				8			2					
Total Split (s)	0.0	0.0	0.0	28.0	28.0	0.0	52.0	52.0	0.0	0.0	52.0	0.0
Act Effct Green (s)					24.0			48.0			48.0	
Actuated g/C Ratio					0.30			0.60			0.60	
v/c Ratio					0.54			0.38			0.59	
Control Delay					27.3			10.3			12.2	
Queue Delay					0.0			0.0			0.0	
Total Delay					27.3			10.3			12.2	
LOS					C			B			B	
Approach Delay					27.3			10.3			12.2	
Approach LOS					C			B			B	
Queue Length 50th (m)					38.9			19.8			55.2	
Queue Length 95th (m)					63.4			35.2			85.8	
Internal Link Dist (m)		66.5			48.6			85.8			52.0	
Turn Bay Length (m)												
Base Capacity (vph)					557			696			1100	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.54			0.38			0.59	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 15.5

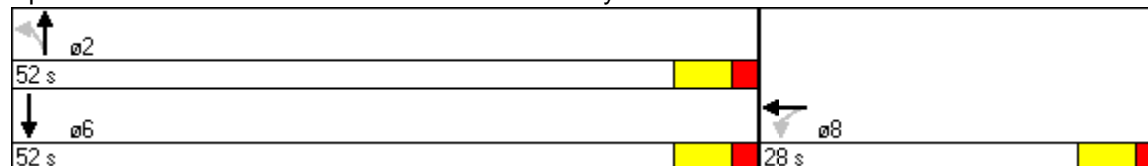
Intersection LOS: B

Intersection Capacity Utilization 69.8%

ICU Level of Service C





















Analysis Period (min) 15

Splits and Phases: 7: Victoria Road & Ochterloney Street



1: Portland Street & Prince Albert Road

2012 PM Peak with Phases 1 & 2 Site Development (Fig B7-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1853	0	1770	1835	0	0	1857	1583	0	1863	1583
Flt Permitted	0.563			0.950				0.981				
Satd. Flow (perm)	1049	1853	0	1770	1835	0	0	1827	1443	0	1863	1523
Satd. Flow (RTOR)		1			8							49
Volume (vph)	60	235	5	445	270	30	10	135	827	0	64	45
Lane Group Flow (vph)	65	260	0	484	326	0	0	158	899	0	70	49
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.26	0.59		0.60	0.39			0.47	0.91		0.20	0.15
Control Delay	33.5	39.1		23.9	18.9			40.4	30.1		35.3	11.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	33.5	39.1		23.9	18.9			40.4	30.1		35.3	11.2
LOS	C	D		C	B			D	C		D	B
Approach Delay		38.0			21.9			31.6			25.3	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	10.5	45.5		69.7	40.2			28.0	115.8		11.8	0.0
Queue Length 95th (m)	22.6	72.1		103.2	62.1			48.3	#242.4		24.4	9.8
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	249	440		803	837			339	986		346	323
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	0.26	0.59		0.60	0.39			0.47	0.91		0.20	0.15

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 28.8

Intersection LOS: C

Intersection Capacity Utilization 73.4%

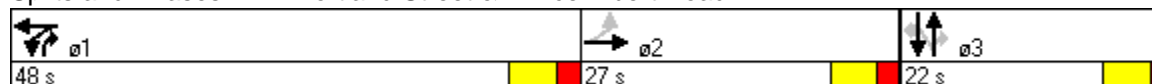
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.




















Queue shown is maximum after two cycles.

Splits and Phases: 1: Portland Street & Prince Albert Road



2: King Street & Alderney Drive

2012 PM Peak with Phases 1 & 2 Site Development (Fig B7-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1607	0	0	1594	1404	1577	3082	0	1609	3217	0
Flt Permitted		0.894			0.757		0.486			0.115		
Satd. Flow (perm)	0	1457	0	0	1250	1340	807	3082	0	195	3217	0
Satd. Flow (RTOR)		18				89		18				
Volume (vph)	25	40	20	111	42	82	5	920	106	79	425	1
Lane Group Flow (vph)	0	92	0	0	167	89	5	1115	0	86	463	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	32.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		18.2			18.2	18.2	47.7	47.7		57.0	57.0	
Actuated g/C Ratio		0.22			0.22	0.22	0.57	0.57		0.67	0.69	
v/c Ratio		0.28			0.61	0.25	0.01	0.63		0.34	0.21	
Control Delay		22.3			37.7	7.4	11.6	15.7		9.4	5.8	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		22.3			37.7	7.4	11.6	15.7		9.4	5.8	
LOS		C			D	A	B	B		A	A	
Approach Delay		22.3			27.2			15.7			6.3	
Approach LOS		C			C			B			A	
Queue Length 50th (m)		9.7			24.0	0.0	0.4	61.3		4.0	12.4	
Queue Length 95th (m)		21.8			43.5	10.6	2.5	109.5		11.5	25.2	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		453			378	467	462	1774		288	2205	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.20			0.44	0.19	0.01	0.63		0.30	0.21	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 83.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 14.9






Intersection Capacity Utilization 63.0%

Analysis Period (min) 15

Intersection LOS: B

















ICU Level of Service B

Splits and Phases: 2: King Street & Alderney Drive

 ø1	 ø2	 ø4
14 s	44 s	32 s
 ø6		 ø8
58 s		32 s










3: Prince Street & Alderney Drive

2012 PM Peak with Phases 1 & 2 Site Development (Fig B7-B Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	0	10	5	0	10	5	1011	1	0	536	20
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	0	11	5	0	11	5	1099	1	0	583	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)								214			93	
pX, platoon unblocked	0.84	0.84	0.97	0.84	0.84	0.83	0.97			0.83		
vC, conflicting volume	1165	1704	302	1412	1715	550	604			1100		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	900	1539	248	1194	1552	251	560			914		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	94	100	99	95	100	98	99			100		
cM capacity (veh/h)	193	96	729	118	94	621	976			615		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	22	16	555	551	291	313						
Volume Left	11	5	5	0	0	0						
Volume Right	11	11	0	1	0	22						
cSH	305	256	976	1700	615	1700						
Volume to Capacity	0.07	0.06	0.01	0.32	0.00	0.18						
Queue Length 95th (m)	1.8	1.6	0.1	0.0	0.0	0.0						
Control Delay (s)	17.7	20.0	0.2	0.0	0.0	0.0						
Lane LOS	C	C	A									
Approach Delay (s)	17.7	20.0	0.1		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			41.5%		ICU Level of Service					A		
Analysis Period (min)			15									

4: Alderney Drive & Portland Street

2012 PM Peak with Phases 1 & 2 Site Development (Fig B7-B Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	3169	3175	0	1185	0
Flt Permitted		0.791			0.998	
Satd. Flow (perm)	0	2520	3175	0	1185	0
Satd. Flow (RTOR)			3		130	
Volume (vph)	100	891	621	10	5	120
Lane Group Flow (vph)	0	1077	686	0	135	0
Turn Type	Perm					
Protected Phases		1	1		2	
Permitted Phases	1					
Total Split (s)	50.0	50.0	50.0	0.0	30.0	0.0
Act Effct Green (s)		46.0	46.0		26.0	
Actuated g/C Ratio		0.58	0.58		0.32	
v/c Ratio		0.74	0.38		0.29	
Control Delay		16.6	9.9		6.1	
Queue Delay		8.7	0.0		0.0	
Total Delay		25.3	9.9		6.1	
LOS		C	A		A	
Approach Delay		25.3	9.9		6.1	
Approach LOS		C	A		A	
Queue Length 50th (m)		61.6	28.5		0.5	
Queue Length 95th (m)		87.3	39.5		12.6	
Internal Link Dist (m)		73.7	190.0		76.2	
Turn Bay Length (m)						
Base Capacity (vph)		1449	1827		473	
Starvation Cap Reductn		342	0		0	
Spillback Cap Reductn		0	4		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.97	0.38		0.29	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 20 (25%), Referenced to phase 1:EBWB, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 18.4

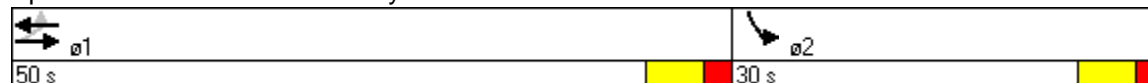
Intersection LOS: B

Intersection Capacity Utilization 74.9%

ICU Level of Service D














Analysis Period (min) 15

Splits and Phases: 4: Alderney Drive & Portland Street



5: Alderney Drive & Queen Street

2012 PM Peak with Phases 1 & 2 Site Development (Fig B7-B Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3185	3173	0	1260	0
Flt Permitted	0.295				0.997	
Satd. Flow (perm)	495	3185	3173	0	1260	0
Satd. Flow (RTOR)			3		76	
Volume (vph)	55	986	731	10	5	70
Lane Group Flow (vph)	60	1072	806	0	81	0
Turn Type	Perm					
Protected Phases		2	2		3	
Permitted Phases	2					
Total Split (s)	49.0	49.0	49.0	0.0	31.0	0.0
Act Effct Green (s)	72.0	72.0	72.0		9.8	
Actuated g/C Ratio	0.82	0.82	0.82		0.11	
v/c Ratio	0.15	0.41	0.31		0.40	
Control Delay	3.7	3.4	2.8		12.6	
Queue Delay	0.0	0.8	0.4		0.1	
Total Delay	3.7	4.2	3.2		12.8	
LOS	A	A	A		B	
Approach Delay		4.1	3.2		12.8	
Approach LOS		A	A		B	
Queue Length 50th (m)	1.5	18.3	12.2		0.7	
Queue Length 95th (m)	6.1	38.0	25.6		11.1	
Internal Link Dist (m)		58.4	73.7		70.3	
Turn Bay Length (m)	20.0					
Base Capacity (vph)	406	2613	2604		386	
Starvation Cap Reductn	0	1131	1140		0	
Spillback Cap Reductn	0	216	422		53	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.15	0.72	0.55		0.24	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 87.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.41

Intersection Signal Delay: 4.1

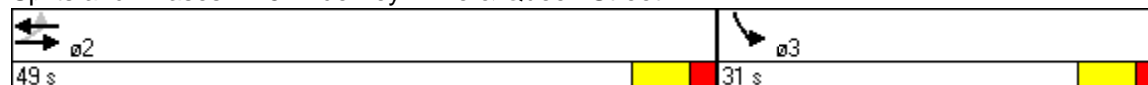
Intersection LOS: A

Intersection Capacity Utilization 50.1%

ICU Level of Service A






















Analysis Period (min) 15

Splits and Phases: 5: Alderney Drive & Queen Street



6: Alderney Drive & Ochterloney Street

2012 PM Peak with Phases 1 & 2 Site Development (Fig B7-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3144	0	1593	3168	0	1577	1660	1411	0	1668	1439
Flt Permitted	0.183			0.261			0.711				0.899	
Satd. Flow (perm)	307	3144	0	438	3168	0	1180	1660	1236	0	1522	1365
Satd. Flow (RTOR)		10			3				65			158
Volume (vph)	230	961	45	45	741	15	110	145	60	20	45	145
Lane Group Flow (vph)	250	1094	0	49	821	0	120	158	65	0	71	158
Turn Type	pm+pt			Perm			Perm		Perm	Perm		Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4		4	4		4
Total Split (s)	16.0	50.0	0.0	34.0	34.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0
Act Effct Green (s)	46.2	46.2		32.5	32.5		14.8	14.8	14.8		14.8	14.8
Actuated g/C Ratio	0.67	0.67		0.47	0.47		0.21	0.21	0.21		0.21	0.21
v/c Ratio	0.65	0.52		0.24	0.55		0.47	0.44	0.21		0.22	0.38
Control Delay	15.7	7.7		18.1	16.4		29.6	27.1	7.6		23.1	6.8
Queue Delay	0.0	0.0		0.0	2.1		0.0	0.0	0.0		0.0	0.0
Total Delay	15.7	7.8		18.1	18.5		29.6	27.1	7.6		23.1	6.8
LOS	B	A		B	B		C	C	A		C	A
Approach Delay		9.2			18.4			24.3			11.9	
Approach LOS		A			B			C			B	
Queue Length 50th (m)	10.6	31.1		3.7	38.6		14.3	18.6	0.0		8.0	0.0
Queue Length 95th (m)	#37.2	67.4		14.3	73.8		28.7	34.3	8.5		17.6	12.9
Internal Link Dist (m)		209.1			58.4			55.3			90.0	
Turn Bay Length (m)	65.0			25.0								
Base Capacity (vph)	415	2107		206	1493		384	540	446		495	550
Starvation Cap Reductn	0	0		0	501		0	0	0		0	0
Spillback Cap Reductn	0	85		0	0		0	0	1		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.60	0.54		0.24	0.83		0.31	0.29	0.15		0.14	0.29

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 69.1

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 14.2

Intersection LOS: B

Intersection Capacity Utilization 69.7%

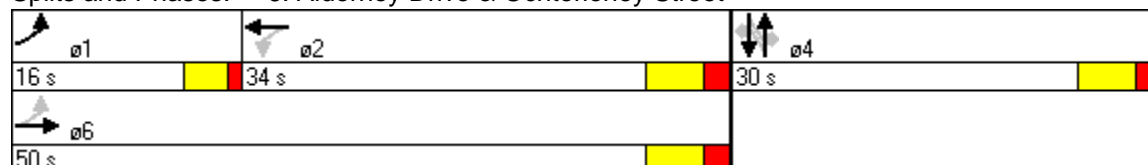
ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
















Queue shown is maximum after two cycles.

Splits and Phases: 6: Alderney Drive & Ochterloney Street



7: Victoria Road & Ochterloney Street

2012 PM Peak with Phases 1 & 2 Site Development (Fig B7-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	0	0	0	1829	0	0	1846	0	0	1824	0
Flt Permitted					0.999			0.874				
Satd. Flow (perm)	0	0	0	0	1829	0	0	1628	0	0	1824	0
Satd. Flow (RTOR)					9						20	
Volume (vph)	0	0	0	5	202	30	105	475	0	0	250	45
Lane Group Flow (vph)	0	0	0	0	258	0	0	630	0	0	321	0
Turn Type				Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases				8			2					
Total Split (s)	0.0	0.0	0.0	28.0	28.0	0.0	52.0	52.0	0.0	0.0	52.0	0.0
Act Effct Green (s)					24.0			48.0			48.0	
Actuated g/C Ratio					0.30			0.60			0.60	
v/c Ratio					0.46			0.64			0.29	
Control Delay					25.3			14.3			8.1	
Queue Delay					0.0			0.0			0.0	
Total Delay					25.3			14.3			8.1	
LOS					C			B			A	
Approach Delay					25.3			14.3			8.1	
Approach LOS					C			B			A	
Queue Length 50th (m)					32.1			59.6			20.9	
Queue Length 95th (m)					54.1			94.6			34.3	
Internal Link Dist (m)		66.5			48.6			85.8			52.0	
Turn Bay Length (m)												
Base Capacity (vph)					555			977			1102	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.46			0.64			0.29	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.0

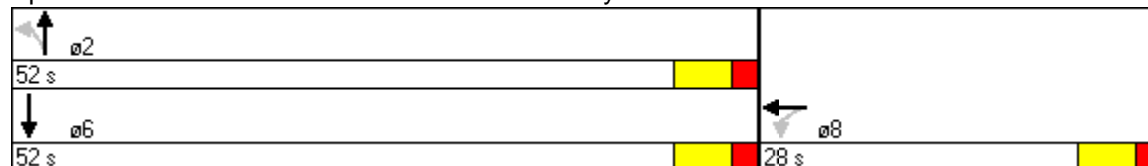
Intersection LOS: B

Intersection Capacity Utilization 69.4%

ICU Level of Service C





















Analysis Period (min) 15

Splits and Phases: 7: Victoria Road & Ochterloney Street



1: Portland Street & Prince Albert Road

2014 AM Peak with Buildout Site Development (Fig B10-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1842	0	1770	1820	0	0	1863	1583	0	1863	1583
Flt Permitted	0.533			0.950								
Satd. Flow (perm)	993	1842	0	1770	1820	0	0	1863	1448	0	1863	1583
Satd. Flow (RTOR)		2			13							92
Volume (vph)	15	100	5	556	300	55	0	74	549	0	140	85
Lane Group Flow (vph)	16	114	0	604	386	0	0	80	597	0	152	92
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.07	0.26		0.75	0.46			0.23	0.60		0.44	0.25
Control Delay	29.8	31.5		29.2	19.9			35.7	12.3		39.7	9.3
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	29.8	31.5		29.2	19.9			35.7	12.3		39.7	9.3
LOS	C	C		C	B			D	B		D	A
Approach Delay		31.3			25.6			15.1			28.2	
Approach LOS		C			C			B			C	
Queue Length 50th (m)	2.5	18.0		95.8	49.2			13.6	53.4		26.9	0.0
Queue Length 95th (m)	8.0	33.4		140.9	75.0			27.1	80.9		46.4	13.2
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	235	438		803	833			346	987		346	369
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	0.07	0.26		0.75	0.46			0.23	0.60		0.44	0.25

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 22.8

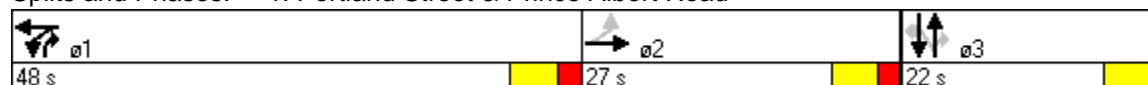
Intersection LOS: C

Intersection Capacity Utilization 57.5%

ICU Level of Service B




















Analysis Period (min) 15

Splits and Phases: 1: Portland Street & Prince Albert Road



2: King Street & Alderney Drive

2014 AM Peak with Buildout Site Development (Fig B10-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1633	0	0	1594	1404	1577	3051	0	1609	3183	0
Flt Permitted		0.977			0.771		0.404			0.265		
Satd. Flow (perm)	0	1602	0	0	1273	1317	671	3051	0	449	3183	0
Satd. Flow (RTOR)		11				112		33			12	
Volume (vph)	5	40	10	140	51	103	20	550	109	81	565	35
Lane Group Flow (vph)	0	59	0	0	207	112	22	716	0	88	652	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	32.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		20.3			20.3	20.3	46.7	46.7		56.0	56.1	
Actuated g/C Ratio		0.24			0.24	0.24	0.55	0.55		0.65	0.66	
v/c Ratio		0.15			0.68	0.28	0.06	0.42		0.23	0.31	
Control Delay		20.8			39.5	6.8	13.2	13.3		7.8	7.1	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		20.8			39.5	6.8	13.2	13.3		7.8	7.1	
LOS		C			D	A	B	B		A	A	
Approach Delay		20.8			28.0			13.3			7.1	
Approach LOS		C			C			B			A	
Queue Length 50th (m)		6.2			30.8	0.0	1.7	34.6		4.7	21.0	
Queue Length 95th (m)		15.3			53.5	11.7	6.9	61.6		12.4	38.4	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		496			388	480	371	1703		413	2119	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.12			0.53	0.23	0.06	0.42		0.21	0.31	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 84.4

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 13.6






Intersection Capacity Utilization 54.2%

Analysis Period (min) 15

Intersection LOS: B

















ICU Level of Service A

Splits and Phases: 2: King Street & Alderney Drive

		
ø1	ø2	ø4
14 s	44 s	32 s
		
ø6	ø8	
58 s	32 s	













3: Prince Street & Alderney Drive

2014 AM Peak with Buildout Site Development (Fig B10-A Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	0	5	0	0	0	5	674	5	10	685	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	5	0	0	0	5	733	5	11	745	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)								214			93	
pX, platoon unblocked	0.95	0.95	0.93	0.95	0.95	0.92	0.93			0.92		
vC, conflicting volume	1154	1526	383	1146	1534	369	766			738		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	908	1298	271	899	1306	228	680			629		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	97	100	99	100	100	100	99			99		
cM capacity (veh/h)	216	150	680	218	148	713	849			874		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	11	0	372	372	383	394						
Volume Left	5	0	5	0	11	0						
Volume Right	5	0	0	5	0	22						
cSH	328	1700	849	1700	874	1700						
Volume to Capacity	0.03	0.00	0.01	0.22	0.01	0.23						
Queue Length 95th (m)	0.8	0.0	0.2	0.0	0.3	0.0						
Control Delay (s)	16.3	0.0	0.2	0.0	0.4	0.0						
Lane LOS	C	A	A		A							
Approach Delay (s)	16.3	0.0	0.1		0.2							
Approach LOS	C	A										
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			36.7%		ICU Level of Service				A			
Analysis Period (min)			15									

4: Alderney Drive & Portland Street

2014 AM Peak with Buildout Site Development (Fig B10-A Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	3176	3177	0	1215	0
Flt Permitted		0.881			0.996	
Satd. Flow (perm)	0	2806	3177	0	1215	0
Satd. Flow (RTOR)			3		114	
Volume (vph)	35	654	740	10	10	105
Lane Group Flow (vph)	0	749	815	0	125	0
Turn Type	Perm					
Protected Phases		1	1		2	
Permitted Phases	1					
Total Split (s)	50.0	50.0	50.0	0.0	30.0	0.0
Act Effct Green (s)		46.0	46.0		26.0	
Actuated g/C Ratio		0.58	0.58		0.32	
v/c Ratio		0.46	0.45		0.26	
Control Delay		11.0	10.6		6.7	
Queue Delay		1.0	0.0		0.0	
Total Delay		12.0	10.7		6.7	
LOS		B	B		A	
Approach Delay		12.0	10.7		6.7	
Approach LOS		B	B		A	
Queue Length 50th (m)		33.5	35.7		1.2	
Queue Length 95th (m)		46.7	48.8		12.8	
Internal Link Dist (m)		73.7	190.0		76.2	
Turn Bay Length (m)						
Base Capacity (vph)		1613	1828		472	
Starvation Cap Reductn		566	0		0	
Spillback Cap Reductn		0	29		1	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		0.72	0.45		0.27	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 20 (25%), Referenced to phase 1:EBWB, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.46

Intersection Signal Delay: 11.0

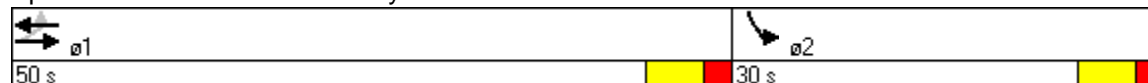
Intersection LOS: B

Intersection Capacity Utilization 68.0%

ICU Level of Service C











Analysis Period (min) 15

Splits and Phases: 4: Alderney Drive & Portland Street



5: Alderney Drive & Queen Street

2014 AM Peak with Buildout Site Development (Fig B10-A Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3185	3181	0	1247	0
Flt Permitted	0.250				0.996	
Satd. Flow (perm)	419	3185	3181	0	1247	0
Satd. Flow (RTOR)			1		65	
Volume (vph)	35	684	840	5	5	60
Lane Group Flow (vph)	38	743	918	0	70	0
Turn Type	Perm					
Protected Phases		2	2		3	
Permitted Phases	2					
Total Split (s)	49.0	49.0	49.0	0.0	31.0	0.0
Act Effct Green (s)	77.7	77.7	77.7		9.8	
Actuated g/C Ratio	0.86	0.86	0.86		0.10	
v/c Ratio	0.11	0.27	0.34		0.37	
Control Delay	3.2	2.3	2.6		13.2	
Queue Delay	0.0	0.4	0.4		0.2	
Total Delay	3.2	2.7	2.9		13.4	
LOS	A	A	A		B	
Approach Delay		2.8	2.9		13.4	
Approach LOS		A	A		B	
Queue Length 50th (m)	0.9	11.0	14.6		0.8	
Queue Length 95th (m)	4.1	22.7	29.7		10.7	
Internal Link Dist (m)		58.4	73.7		70.3	
Turn Bay Length (m)	20.0					
Base Capacity (vph)	360	2734	2730		361	
Starvation Cap Reductn	0	1372	1137		0	
Spillback Cap Reductn	0	7	543		57	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.11	0.55	0.58		0.23	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 90.5

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.37

Intersection Signal Delay: 3.3

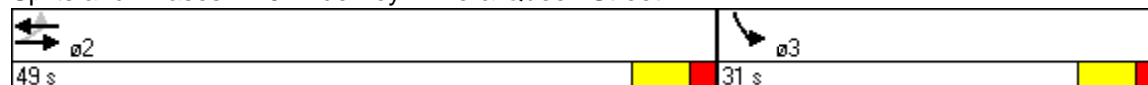
Intersection LOS: A

Intersection Capacity Utilization 52.2%

ICU Level of Service A






















Analysis Period (min) 15

Splits and Phases: 5: Alderney Drive & Queen Street



6: Alderney Drive & Ochterloney Street

2014 AM Peak with Buildout Site Development (Fig B10-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3083	0	1593	3168	0	1577	1660	1411	0	1685	1439
Flt Permitted	0.135			0.328			0.684				0.980	
Satd. Flow (perm)	226	3083	0	550	3168	0	1135	1660	1238	0	1659	1386
Satd. Flow (RTOR)		33			2				16			345
Volume (vph)	165	694	100	35	850	15	35	25	15	10	95	400
Lane Group Flow (vph)	179	863	0	38	940	0	38	27	16	0	114	435
Turn Type	pm+pt			Perm			Perm		Perm	Perm		Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4		4	4		4
Total Split (s)	16.0	50.0	0.0	34.0	34.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0
Act Effct Green (s)	46.4	46.4		33.8	33.8		15.0	15.0	15.0		15.0	15.0
Actuated g/C Ratio	0.67	0.67		0.49	0.49		0.22	0.22	0.22		0.22	0.22
v/c Ratio	0.56	0.42		0.14	0.61		0.16	0.08	0.06		0.32	0.76
Control Delay	14.9	6.9		15.6	17.3		22.1	20.5	10.1		24.3	15.4
Queue Delay	0.0	0.0		0.0	4.1		0.0	0.0	0.0		0.0	0.0
Total Delay	14.9	6.9		15.6	21.3		22.1	20.5	10.1		24.3	15.4
LOS	B	A		B	C		C	C	B		C	B
Approach Delay		8.3			21.1			19.2			17.2	
Approach LOS		A			C			B			B	
Queue Length 50th (m)	7.2	21.3		2.6	43.9		4.2	2.9	0.0		13.1	10.3
Queue Length 95th (m)	28.8	51.5		11.3	92.7		11.1	8.5	4.2		25.5	39.8
Internal Link Dist (m)		209.1			58.4			55.3			90.0	
Turn Bay Length (m)	65.0			25.0								
Base Capacity (vph)	369	2069		267	1543		369	540	413		539	683
Starvation Cap Reductn	0	0		0	507		0	0	0		0	0
Spillback Cap Reductn	0	36		0	0		0	0	0		0	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.49	0.42		0.14	0.91		0.10	0.05	0.04		0.21	0.64

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 69.5

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 15.2





Intersection LOS: B

Intersection Capacity Utilization 78.4%

ICU Level of Service D
















Analysis Period (min) 15

Splits and Phases: 6: Alderney Drive & Ochterloney Street

		
ø1	ø2	ø4
16 s	34 s	30 s
		
ø6		
50 s		

7: Victoria Road & Ochterloney Street

2014 AM Peak with Buildout Site Development (Fig B10-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	0	0	0	1844	0	0	1829	0	0	1816	0
Flt Permitted					0.999			0.588				
Satd. Flow (perm)	0	0	0	0	1844	0	0	1095	0	0	1816	0
Satd. Flow (RTOR)					5						25	
Volume (vph)	0	0	0	5	265	20	91	160	0	0	490	110
Lane Group Flow (vph)	0	0	0	0	315	0	0	273	0	0	653	0
Turn Type				Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases				8			2					
Total Split (s)	0.0	0.0	0.0	28.0	28.0	0.0	52.0	52.0	0.0	0.0	52.0	0.0
Act Effct Green (s)					24.0			48.0			48.0	
Actuated g/C Ratio					0.30			0.60			0.60	
v/c Ratio					0.57			0.42			0.59	
Control Delay					28.0			10.9			12.3	
Queue Delay					0.0			0.0			0.0	
Total Delay					28.0			10.9			12.3	
LOS					C			B			B	
Approach Delay					28.0			10.9			12.3	
Approach LOS					C			B			B	
Queue Length 50th (m)					41.5			21.0			56.2	
Queue Length 95th (m)					67.3			37.9			87.6	
Internal Link Dist (m)		66.5			48.6			85.8			52.0	
Turn Bay Length (m)												
Base Capacity (vph)					557			657			1100	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.57			0.42			0.59	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 16.0

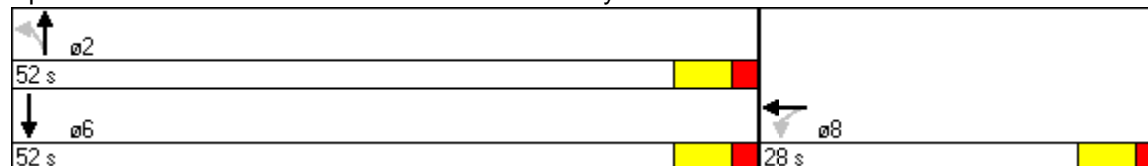
Intersection LOS: B

Intersection Capacity Utilization 71.4%

ICU Level of Service C





















Analysis Period (min) 15

Splits and Phases: 7: Victoria Road & Ochterloney Street



1: Portland Street & Prince Albert Road

2014 PM Peak with Buildout Site Development (Fig B10-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1853	0	1770	1835	0	0	1857	1583	0	1863	1583
Flt Permitted	0.560			0.950				0.982				
Satd. Flow (perm)	1043	1853	0	1770	1835	0	0	1829	1443	0	1863	1523
Satd. Flow (RTOR)		1			7							49
Volume (vph)	60	235	5	460	275	30	10	150	850	0	75	45
Lane Group Flow (vph)	65	260	0	500	332	0	0	174	924	0	82	49
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.26	0.59		0.62	0.40			0.51	0.94		0.24	0.15
Control Delay	33.6	39.1		24.4	19.0			41.7	33.9		35.8	11.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	33.6	39.1		24.4	19.0			41.7	33.9		35.8	11.2
LOS	C	D		C	B			D	C		D	B
Approach Delay		38.0			22.3			35.1			26.6	
Approach LOS		D			C			D			C	
Queue Length 50th (m)	10.5	45.5		72.8	41.4			31.2	123.5		13.9	0.0
Queue Length 95th (m)	22.6	72.1		108.0	63.8			52.5	#253.6		27.7	9.8
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	247	440		803	836			339	986		346	323
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	0.26	0.59		0.62	0.40			0.51	0.94		0.24	0.15

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 30.6

Intersection LOS: C

Intersection Capacity Utilization 74.8%

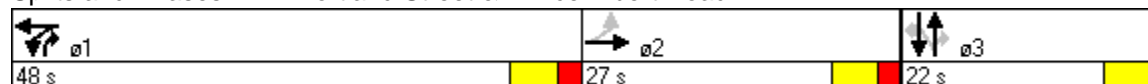
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.




















Queue shown is maximum after two cycles.

Splits and Phases: 1: Portland Street & Prince Albert Road



2: King Street & Alderney Drive

2014 PM Peak with Buildout Site Development (Fig B10-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1612	0	0	1594	1404	1577	3060	0	1609	3217	0
Flt Permitted		0.896			0.724		0.483			0.102		
Satd. Flow (perm)	0	1463	0	0	1196	1317	802	3060	0	173	3217	0
Satd. Flow (RTOR)		15				114		24				
Volume (vph)	25	52	20	144	53	105	5	925	142	105	430	1
Lane Group Flow (vph)	0	106	0	0	215	114	5	1159	0	114	468	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	32.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		21.3			21.3	21.3	45.6	45.6		55.2	55.3	
Actuated g/C Ratio		0.25			0.25	0.25	0.54	0.54		0.64	0.65	
v/c Ratio		0.28			0.72	0.27	0.01	0.70		0.47	0.22	
Control Delay		22.6			42.0	6.6	13.4	19.6		15.0	7.0	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		22.6			42.0	6.6	13.4	19.6		15.0	7.0	
LOS		C			D	A	B	B		B	A	
Approach Delay		22.6			29.8			19.6			8.6	
Approach LOS		C			C			B			A	
Queue Length 50th (m)		12.1			32.6	0.0	0.4	76.0		6.6	15.4	
Queue Length 95th (m)		25.1			57.0	11.9	2.5	123.7		18.8	27.2	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		460			368	484	432	1660		270	2104	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.23			0.58	0.24	0.01	0.70		0.42	0.22	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 84.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 18.3






Intersection Capacity Utilization 68.8%

Analysis Period (min) 15

Intersection LOS: B

















ICU Level of Service C

Splits and Phases: 2: King Street & Alderney Drive

 ø1	 ø2	 ø4
14 s	44 s	32 s
 ø6		 ø8
58 s		32 s













3: Prince Street & Alderney Drive

2014 PM Peak with Buildout Site Development (Fig B10-B Vol.)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	0	10	5	0	10	5	1052	1	0	574	20
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	0	11	5	0	11	5	1143	1	0	624	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)								214			93	
pX, platoon unblocked	0.83	0.83	0.96	0.83	0.83	0.81	0.96			0.81		
vC, conflicting volume	1228	1790	323	1478	1801	572	646			1145		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	932	1607	254	1231	1619	244	590			948		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	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 %	94	100	98	95	100	98	99			100		
cM capacity (veh/h)	180	86	716	109	85	615	943			585		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	22	16	577	573	312	334						
Volume Left	11	5	5	0	0	0						
Volume Right	11	11	0	1	0	22						
cSH	288	241	943	1700	585	1700						
Volume to Capacity	0.08	0.07	0.01	0.34	0.00	0.20						
Queue Length 95th (m)	1.9	1.7	0.1	0.0	0.0	0.0						
Control Delay (s)	18.5	21.0	0.2	0.0	0.0	0.0						
Lane LOS	C	C	A									
Approach Delay (s)	18.5	21.0	0.1		0.0							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			42.6%		ICU Level of Service					A		
Analysis Period (min)			15									

4: Alderney Drive & Portland Street

2014 PM Peak with Buildout Site Development (Fig B10-B Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	3169	3175	0	1185	0
Flt Permitted		0.768			0.998	
Satd. Flow (perm)	0	2446	3175	0	1185	0
Satd. Flow (RTOR)			3		130	
Volume (vph)	105	927	664	10	5	120
Lane Group Flow (vph)	0	1122	733	0	135	0
Turn Type	Perm					
Protected Phases		1	1		2	
Permitted Phases	1					
Total Split (s)	50.0	50.0	50.0	0.0	30.0	0.0
Act Effct Green (s)		46.0	46.0		26.0	
Actuated g/C Ratio		0.58	0.58		0.32	
v/c Ratio		0.80	0.40		0.29	
Control Delay		18.8	10.2		6.1	
Queue Delay		16.8	0.0		0.0	
Total Delay		35.6	10.2		6.1	
LOS		D	B		A	
Approach Delay		35.6	10.2		6.1	
Approach LOS		D	B		A	
Queue Length 50th (m)		68.0	31.0		0.5	
Queue Length 95th (m)		97.6	42.8		12.6	
Internal Link Dist (m)		73.7	190.0		76.2	
Turn Bay Length (m)						
Base Capacity (vph)		1406	1827		473	
Starvation Cap Reductn		299	0		0	
Spillback Cap Reductn		0	12		0	
Storage Cap Reductn		0	0		0	
Reduced v/c Ratio		1.01	0.40		0.29	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 20 (25%), Referenced to phase 1:EBWB, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 24.2

Intersection LOS: C

Intersection Capacity Utilization 77.5%

ICU Level of Service D














Analysis Period (min) 15

Splits and Phases: 4: Alderney Drive & Portland Street



5: Alderney Drive & Queen Street

2014 PM Peak with Buildout Site Development (Fig B10-B Vol.)

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3185	3173	0	1260	0
Flt Permitted	0.276				0.997	
Satd. Flow (perm)	463	3185	3173	0	1260	0
Satd. Flow (RTOR)			3		76	
Volume (vph)	55	1027	774	10	5	70
Lane Group Flow (vph)	60	1116	852	0	81	0
Turn Type	Perm					
Protected Phases		2	2		3	
Permitted Phases	2					
Total Split (s)	49.0	49.0	49.0	0.0	31.0	0.0
Act Effct Green (s)	72.0	72.0	72.0		9.8	
Actuated g/C Ratio	0.82	0.82	0.82		0.11	
v/c Ratio	0.16	0.43	0.33		0.40	
Control Delay	3.9	3.5	2.9		12.6	
Queue Delay	0.0	0.9	0.4		0.2	
Total Delay	3.9	4.3	3.3		12.8	
LOS	A	A	A		B	
Approach Delay		4.3	3.3		12.8	
Approach LOS		A	A		B	
Queue Length 50th (m)	1.5	19.5	13.1		0.7	
Queue Length 95th (m)	6.3	40.2	27.5		11.1	
Internal Link Dist (m)		58.4	73.7		70.3	
Turn Bay Length (m)	20.0					
Base Capacity (vph)	380	2613	2604		386	
Starvation Cap Reductn	0	1106	1117		0	
Spillback Cap Reductn	0	265	512		66	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.16	0.74	0.57		0.25	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 87.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.43

Intersection Signal Delay: 4.2

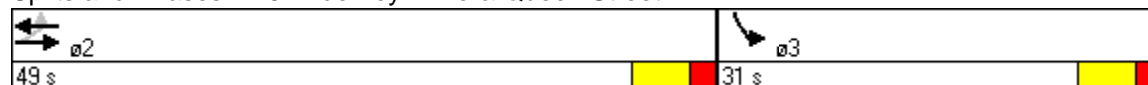
Intersection Capacity Utilization 51.4%






















Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service A

Splits and Phases: 5: Alderney Drive & Queen Street



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1593	3158	0	1593	3169	0	1577	1660	1411	0	1668	1439
Flt Permitted	0.163			0.250			0.711				0.899	
Satd. Flow (perm)	273	3158	0	419	3169	0	1180	1660	1236	0	1522	1365
Satd. Flow (RTOR)		9			3				65			163
Volume (vph)	230	1002	45	45	784	15	110	145	60	20	45	150
Lane Group Flow (vph)	250	1138	0	49	868	0	120	158	65	0	71	163
Turn Type	pm+pt			Perm			Perm		Perm	Perm		Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4		4	4		4
Total Split (s)	16.0	50.0	0.0	34.0	34.0	0.0	30.0	30.0	30.0	30.0	30.0	30.0
Act Effct Green (s)	46.2	46.2		32.4	32.4		14.8	14.8	14.8		14.8	14.8
Actuated g/C Ratio	0.67	0.67		0.47	0.47		0.21	0.21	0.21		0.21	0.21
v/c Ratio	0.68	0.54		0.25	0.58		0.47	0.44	0.21		0.22	0.39
Control Delay	18.7	7.9		18.6	17.0		29.6	27.1	7.6		23.1	6.8
Queue Delay	0.0	0.0		0.0	2.9		0.0	0.0	0.0		0.0	0.0
Total Delay	18.7	8.0		18.6	19.8		29.6	27.1	7.6		23.1	6.8
LOS	B	A		B	B		C	C	A		C	A
Approach Delay		9.9			19.8			24.3			11.7	
Approach LOS		A			B			C			B	
Queue Length 50th (m)	10.6	33.2		3.7	41.9		14.3	18.6	0.0		8.0	0.0
Queue Length 95th (m)	#45.3	71.3		14.5	79.3		28.7	34.3	8.5		17.6	13.0
Internal Link Dist (m)		209.1			58.4			55.3			90.0	
Turn Bay Length (m)	65.0			25.0								
Base Capacity (vph)	400	2115		196	1486		384	540	446		495	554
Starvation Cap Reductn	0	0		0	486		0	0	0		0	0
Spillback Cap Reductn	0	95		0	0		0	0	2		1	0
Storage Cap Reductn	0	0		0	0		0	0	0		0	0
Reduced v/c Ratio	0.63	0.56		0.25	0.87		0.31	0.29	0.15		0.14	0.29

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 69.1

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 14.9

Intersection LOS: B

Intersection Capacity Utilization 71.1%





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: 6: Alderney Drive & Ochterloney Street

		
ø1	ø2	ø4
16 s	34 s	30 s
		
ø6		
50 s		

7: Victoria Road & Ochterloney Street

2014 PM Peak with Buildout Site Development (Fig B10-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	0	0	0	1829	0	0	1844	0	0	1825	0
Flt Permitted					0.999			0.861				
Satd. Flow (perm)	0	0	0	0	1829	0	0	1604	0	0	1825	0
Satd. Flow (RTOR)					9						20	
Volume (vph)	0	0	0	5	211	30	117	480	0	0	255	45
Lane Group Flow (vph)	0	0	0	0	267	0	0	649	0	0	326	0
Turn Type				Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases				8			2					
Total Split (s)	0.0	0.0	0.0	28.0	28.0	0.0	52.0	52.0	0.0	0.0	52.0	0.0
Act Effct Green (s)					24.0			48.0			48.0	
Actuated g/C Ratio					0.30			0.60			0.60	
v/c Ratio					0.48			0.67			0.30	
Control Delay					25.6			15.2			8.1	
Queue Delay					0.0			0.0			0.0	
Total Delay					25.6			15.2			8.1	
LOS					C			B			A	
Approach Delay					25.6			15.2			8.1	
Approach LOS					C			B			A	
Queue Length 50th (m)					33.5			63.1			21.3	
Queue Length 95th (m)					55.8			101.3			35.0	
Internal Link Dist (m)		66.5			48.6			85.8			52.0	
Turn Bay Length (m)												
Base Capacity (vph)					555			962			1103	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.48			0.67			0.30	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 15.6

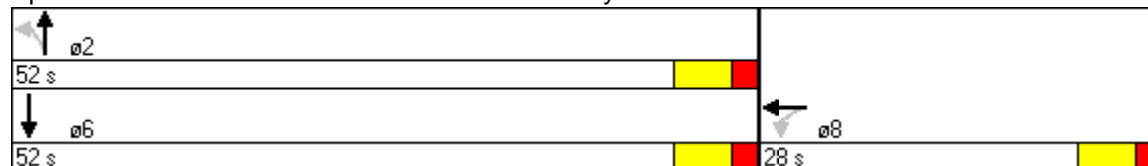
Intersection LOS: B

Intersection Capacity Utilization 71.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Victoria Road & Ochterloney Street





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December 19, 2007

Jillanna Brown, P. Eng.
EDM Limited
2085 Maitland Street
HALIFAX NS B3K 2Z8

0787

**RE: Addendum to Traffic Impact Study - King's Wharf Development
Dartmouth Marine Slips, Halifax Regional Municipality
: Prepared by ARTM June 2007**

Dear Jillanna:

Further to our recent telephone conversations, I have prepared this Addendum to the *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips* (ARTM, June 2007) to consider potential traffic impacts of alternate land uses.

Project Description (June 2007) - The King's Wharf project concept evaluated in the June 2007 Traffic Impact Study was for a mixed use development which included 1200 high rise condominium residential units, 100,000 square feet of office space, 40,000 square feet of retail space, and a 200 room hotel. Site access was initially planned to be provided at King Street by a grade crossing of the railroad and proposed traffic signal controlled intersection with Alderney Drive, while later phases of the project could have included a right-in / right-out emergency site access constructed from Alderney Drive opposite Pince Street, complete with a railroad overpass. Trip generation estimates for the fully developed project (attached) included 524 vehicles per hour (vph) during a weekday AM peak hour with 230 vph entering and 294 vph exiting the site. It was also estimated that the fully developed project would generate 601 vph during a weekday PM peak hour with 299 vph entering and 302 vph exiting the site.

Alternate Land Use Description (December 2007) - The alternate land use being considered in the Addendum to the Traffic Impact Study includes the following:

- 300,000 square feet of office space
- 100,000 square feet of marine salvage and ship repair
- 100,000 square feet of storage, warehouse, distribution or marine retail / wholesale

Trip generation estimates for the alternate land use development have been calculated using *Trip Generation* rates and equations and are included in Table 1. Trip generation estimates for the fully developed alternate land use project include 514 vehicles per hour (vph) with 447 vph entering and 67 vph exiting the site during a weekday AM peak hour. It is also estimated that the fully developed alternate land use project would generate 475 vph during a weekday PM peak hour with 82 vph entering and 393 vph exiting the site.

Table 1 - Trip Generation Estimates for Kings Wharf - Alternate Land Use									
Land Use ¹	Number Units ³	Trip Generation Rates ¹				Estimate of Trips Generated ²			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Trip Generation Estimates Calculated with Trip Generation, 7 th Edition, Rates, Equations and Directional Splits									
Office (ITE 710)	300.0 KGFA	Trip estimates have been calculated using equations and directional splits from <i>Trip Generation</i> , Pages 1159 and 1160				397	54	71	344
Warehouse ⁴ (ITE 150)	100.0 KGFA	Trip estimates have been calculated using equations and directional splits from <i>Trip Generation</i> , Pages 200 and 201				68	15	16	49
Light Industrial ⁵ (ITE 110)	100.0 KGFA	0.81	0.11	0.12	0.86	81	11	12	86
Total Estimated Trips for Full Site Development						547	80	99	479
Trip Generation Estimates Adjusted for Modal Split									
Office (ITE 710)	300.0 KGFA	A 25% vehicle trip reduction factor has been used for the Office Land Use trip generation estimates to account for the Central Business District King's Wharf location in an area with higher than average transit (ferry), walking and bicycling trips				298	41	53	258
Warehouse (ITE 150)	100.0 KGFA					68	15	16	49
Light Industrial (ITE 110)	100.0 KGFA					81	11	12	86
Adjusted Estimated Trips for Full Site Development						447	67	82	393
NOTES: 1. Trip generation rates are 'vehicles per hour per unit' for AM and PM peak hours per unit. Rates are for indicated Land Uses and Land Use Codes, <i>Trip Generation</i> , 7 th Edition, Institute of Transportation Engineers, 2003.									
2. Vehicles per hour for peak hours.									
3. Units are as indicated; KGFA '1000 square feet gross floor area'									
4. Warehouse Land Use Code 150 has been used for 'storage, warehouse, distribution or marine retail / wholesale'									
5. Light Industrial Land Use Code 110 has been used for 'marine salvage and ship repair'									

Comparison of Trip Generation Estimates - Trip generation estimates for the 'original' land uses included in the June 2007 study and those considered for the 'alternate' land use are compared in Table 2. While the enter / exit volumes for the 'alternate' land use are not as balanced as they were for the 'original' land use, the two-way peak hour volumes are comparable. Since two-way volumes are comparable, conclusions reached in *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips* for the 'original' land use are considered to be applicable to the 'alternate' land use development scenario.

Table 2 - Trip Generation Estimate Comparisons						
Land Use Scenario	AM Peak Hour (vph)			PM Peak Hour (vph)		
	Enter	Exit	Two-Way	Enter	Exit	Two-Way
Original June 2007 ¹	230	294	524	299	302	601
Alternate December 2007 ²	447	67	514	82	393	475
NOTES: 1. Trip generation estimates are from Table 3.3, page 9 of <i>Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips</i> , which is included in the Appendix. 2. Trip generation estimates are from Table 1, above.						

Consideration of Road / Railway Grade Crossing Protection - The requirement to install a grade crossing warning system is included in *RTD 10, Road / Railway Grade Crossing Technical Standards and Inspection, Testing and Maintenance Requirements* published by the Rail Safety Directorate, Transport Canada. Applicable pages of *RTD 10*, included in Appendix B, indicate the following:

- *Section 11.1 - Grade Crossing Warning Systems* of the current *RTD 10* (DRAFT October 24, 2002) indicates that
"Unrestricted grade crossings for vehicular use shall have a grade crossing warning system if: (a) (i) the forecast *cross-product* is 1000 or more"
- *Section 12.1 - Gates* indicates that
"Where grade crossing warning systems are installed, they shall include gates if . . .
(a) the forecast *cross-product* is 50,000 or more; or
(e) the maximum railway operating speed exceeds 15 mph, and the distance between the front of a vehicle in the first stopped position at a Stop Sign or traffic signal on that part of the road leading away from the grade crossing and a rail in the grade crossing is: (i) less than 30 m for a Stop Sign, or less than 60 m for traffic signals"

Section 1. of the Grade Crossing Regulations provides the following definitions:

- "average annual daily traffic" means
(a) in respect of a railway, the number of train and engine movements over a point or segment of the line of railway in any year, divided by the number of days in the year; and
(b) in respect of a road, the number of vehicles passing over a point or segment of the road in any year, divided by the number of days in the year.
- "*cross-product* ", in respect of a grade crossing, means the product of the average annual daily traffic of trains and engines on the line of railway and the average annual daily number of vehicles on the road that pass over the grade crossing.

It is understood that the railway operates at a speed of less than 15 mph with an average of about four train movements per day. The following crossing protection is required, or should be considered:

- Since a cross product of greater than 1000 will be reached early in the construction process, a grade crossing warning system will be required.
- The projected vehicle volume of about 8000 vpd in 2014, resulting in a cross-product of about 32,000, will not warrant installation of gates. However, since there is expected to be heavy pedestrian volumes, and the grade crossing is close to the proposed signalized Alderney Drive / King Street intersection, further study is required concerning the desirability of installing crossing gates even though the train operating speed is less than 15 mph.

Consideration of Clearance Requirements for a Railroad Overpass - Any structure constructed beside or over a railroad track will comply with *Standard Respecting Railway Clearance* (Transport Canada, May 1992) reproduced in (Appendix C). While side clearances must also be considered, the critical design control for an overpass of the railroad is a clearance requirement of 7.01 meters (23 feet) above the top of rail as required by Diagram 1 of *Standard Respecting Railway Clearance* (Transport Canada, May 1992) (Appendix C).

Conclusions -

1. The 'original' Kings Wharf development concept considered in *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips* (ARTM, June 2007) included a mixed use development with 1200 high rise condominium residential units, 100,000 square feet of office space, 40,000 square feet of retail space, and a 200 room hotel.
2. The alternate land use being considered in the Addendum to the Traffic Impact Study includes the following:
 - 300,000 square feet of office space
 - 100,000 square feet of marine salvage and ship repair
 - 100,000 square feet of storage, warehouse, distribution or marine retail / wholesale.
3. While the estimated enter / exit volumes generated by the 'alternate' land use are not as balanced as they were for the 'original' land use, the two-way peak hour site generated volumes are comparable.
4. Since site generated two-way volumes are comparable, conclusions reached in *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips* for the 'original' land use are considered to be applicable to the 'alternate' land use development scenario.
5. The grade crossing warning system at the proposed King Street railway crossing will be provided in accordance with *RTD 10, Road / Railway Grade Crossing Technical Standards and Inspection, Testing and Maintenance Requirements* published by the Rail Safety Directorate, Transport Canada.
6. Any structure constructed beside or over the railroad track will comply with *Standard Respecting Railway Clearance* (Transport Canada, May 1992).

If you have any questions or comments, contact me by Email at traffic@ns.sympatico.ca or telephone 443-7747.

Sincerely:



Ken O'Brien, P. Eng.

Attachments:

- Appendix A - Trip Generation Estimates for the proposed 'original' land use, June 2007.
- Appendix B - RTD 10 Road / Railway Grade Crossing, Technical Standards, Sections 11 and 12
- Appendix C - Standard Respecting Railway Clearance

Appendix A

Trip Generation Estimates

June 2007 Land Use Concept

Appendix B

RTD 10 Road / Railway Grade Crossing

Technical Standards

Sections 11 and 12

Appendix C

Standard Respecting Railway Clearance



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April 9, 2008

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0833

**RE: Addendum to Traffic Impact Study - King's Wharf Development
Dartmouth Marine Slips, Halifax Regional Municipality
: Prepared by ARTM June 2007**

Dear John:

Further to our recent telephone conversations, I have prepared this Addendum to the *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips* (ARTM, June 2007) to consider potential traffic impacts of changes in land use intensities from those used in the June 2007 Study.

Project Description - The King's Wharf project concept evaluated in the June 2007 Traffic Impact Study was for a mixed use development which included 1200 high rise condominium residential units, 100,000 square feet of office space, 40,000 square feet of retail space, and a 200 room hotel. Increased land use intensities now being considered are included in Table 1.

Table 1 - Land Uses - Proposed King's Wharf Development				
Phase	Proposed Land Use			
	Residential (Number of Units)	Office (Square Feet)	Retail (Square Feet)	Hotel (Number of Rooms)
Original Land Uses - King's Wharf Development (June 2007)				
Build-Out	1,200	100,000	40,000	200
Revised Land Uses - King's Wharf Development (April 2008)				
Build-Out	1,292	159,660	70,488	200
NOTE: Revised areas are those provided by John Heseltine, Email March 18, 2008				

Trip generation estimates for land uses used in the June 2007 Study that were reported in Table 3.3 of the *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips* are included in Appendix A. Trip generation estimates for the revised land use development intensities have been calculated using *Trip Generation* rates and equations and are included in Table 2. Trip generation estimates for the fully developed revised project include 646 vehicles per hour (vph) with 313 vph entering and 333 vph exiting the site during a weekday AM peak hour. It is also estimated that the fully developed revised project would generate 753 vph during a weekday PM peak hour with 352 vph entering and 401 vph exiting the site.

Table 2 - Revised Trip Generation Estimates for King's Wharf - Full Development									
Land Use ¹	Number Units ³	Trip Generation Rates ¹				Estimate of Trips Generated ²			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Trip Generation Estimates Calculated with <i>Trip Generation, 7th Edition</i> , Rates, Equations and Directional Splits									
Condominium (ITE 232)	1292 units	Trip estimates have been calculated using equations and directional splits from <i>Trip Generation</i> , Pages 401 and 402				77	327	282	173
Office (ITE 710)	159.7 KGFA	1.36	0.19	0.25	1.24	217	30	40	198
Retail ⁴ (ITE 814)	70.5 KGLA	0.76	0.60	1.19	1.52	54	42	84	107
Hotel (ITE 310)	200 Rooms	0.34	0.22	0.31	0.28	68	44	62	56
Total Estimated Trips for Full Site Development						416	443	468	534
Trip Generation Estimates Adjusted for On-Site Synergies and Modal Split									
Condominium (ITE 232)	1292 units	A 25% vehicle trip reduction factor has been used to account for on-site synergies and the central business district King's Wharf location in an area with higher than average transit, walking and bicycling trips.				58	245	212	130
Office (ITE 710)	159.7 KGFA					163	23	30	149
Retail ⁴ (ITE 814)	70.5 KGLA					41	32	63	80
Hotel (ITE 310)	200 Rooms					51	33	47	42
Adjusted Trip Generation Estimates for Full Site Development						313	333	352	401
NOTES: 1. Trip generation rates are 'vehicles per hour per unit' for AM and PM peak hours per unit. Rates are for indicated Land Uses and Land Use Codes, <i>Trip Generation, 7th Edition</i> , Institute of Transportation Engineers, 2003. 2. Vehicles per hour for peak hours'. 3. Units are as indicated; KGLA is '1000 square feet gross floor or leasable area' for Retail and Office land uses 4. Speciality Retail (Land Use 814) rates have been used. Since there are no published rates for the AM peak hour for this Land Use, and since AM peak hour trips to Speciality Retail are generally very low, AM trip rates have been assumed to be 50% of the PM rate with reversal of the directional split.									

Comparison of Trip Generation Estimates - Trip generation estimates for the 'original' land uses included in the June 2007 study and those considered for the 'revised' land use are compared in Table 3. AM peak hour trips have increased by about 23% while PM peak hour trips are estimated to increase by about 25%.

Table 3 - Trip Generation Estimate Comparisons						
Land Use Scenario	AM Peak Hour (vph)			PM Peak Hour (vph)		
	Enter	Exit	Two-Way	Enter	Exit	Two-Way
Original June 2007 ¹	230	294	524	299	302	601
Revised Land Uses April 2008 ²	313	333	646	352	401	753
Percent Change	36	13	23	18	33	25
NOTES: 1. Trip generation estimates are from Table 3.3, page 9 of <i>Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips</i> , which is included in the Appendix. 2. Trip generation estimates are from Table 2, above.						

Comparison of Intersection Performance - Since the Alderney Drive intersections with Kings Street (Site Entrance) and Prince Albert Road / Portland Street are considered the critical intersections in this study with regards to level of performance, only those intersections have been reviewed in this Addendum Study. The Synchro 6.0 level of service evaluation pages for full site development from the June 2007 Report which were included as Pages C-43 and C-44 for the AM peak hour and Pages C-50 and C-51 for the PM peak hour are included in Appendix A. Level of service evaluation pages for the revised land use are included as Pages B-1 to B-4, Appendix B.

Level of service results for the Alderney Drive / Prince Albert Road / Portland Street intersection for the original June 2007 AM and PM peak hour analyses, as well as analyses completed for the revised April 2008 land uses, are summarized in Table 4. Since there are no significant differences between the intersection level of performance results for the April 2008 analyses compared to the June 2007 analyses, conclusions reached for this intersection in *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips* for the June 2007 land use are considered to be applicable to the April 2008 land use concept.

Table 4 - LOS for Alderney Drive / Prince Albert Road / Portland Street									
LOS Criteria	Control Delay (sec/veh), v/c Ratio, and 95% Queue (m) by Intersection Movement								Intersection LOS
	EB-L	EB-TR	WB-L	WB-TR	NB-LT ¹	NB-R ¹	SB-T	SB-R	
AM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-43)									
Delay	29.8	31.5	29.2	19.9	35.7	12.3	39.7	9.3	22.8
v/c	0.07	0.26	0.75	0.46	0.23	0.60	0.44	0.25	-
Queue	8.0	33.4	140.9	75.0	27.1	80.9	46.4	13.2	-
AM Peak Hour - Projected 2014 Volumes With Revised Development (Page B-1)									
Delay	29.8	31.5	30.5	19.9	36.0	12.5	40.6	9.3	23.5
v/c	0.07	0.26	0.78	0.46	0.25	0.61	0.48	0.25	-
Queue	8.0	33.4	147.9	75.0	28.8	82.6	50.1	13.2	-
PM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-50)									
Delay	33.6	39.1	24.4	19.0	41.7	33.9	35.8	11.2	30.6
v/c	0.26	0.59	0.62	0.40	0.51	0.94	0.24	0.15	-
Queue	22.6	72.1	108.0	63.8	52.5	253.6	27.7	9.8	-
PM Peak Hour - Projected 2014 Volumes With Revised Development - (Page B-3)									
Delay	33.6	39.1	24.8	19.0	43.1	37.9	36.2	11.2	32.4
v/c	0.26	0.59	0.64	0.40	0.56	0.96	0.26	0.15	-
Queue	22.6	72.1	111.0	63.8	57.1	263.1	29.8	9.8	-

NOTE: 1. Alderney Drive is considered a north-south street at this intersection.

Level of service results for the Alderney Drive / King Street intersection for the original June 2007 AM and PM peak hour analyses, as well as analyses completed for the revised April 2008 land uses, are summarized in Table 5. Since there are no significant differences between the intersection level of performance results for the April 2008 analyses compared to the June 2007 analyses, conclusions reached for this intersection in *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips* for the June 2007 land use are considered to be applicable to the April 2008 land use concept.

Table 5 - LOS for Alderney Drive / King Street								
LOS Criteria	Control Delay (sec/veh), v/c Ratio, and 95% Queue (m) by Intersection Movement							Intersection LOS
	EB-LTR	WB-L ²	WB-TR ²	NB-L ¹	NB-TR ¹	SB-L	SB-TR	
AM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-44)								
Delay	20.8	39.5	6.8	13.2	13.3	7.8	7.1	13.6
v/c	0.15	0.68	0.28	0.06	0.42	0.23	0.31	-
Queue	15.3	53.5	11.7	6.9	61.6	12.4	38.4	-
AM Peak Hour - Projected 2014 Volumes With Revised Development -(Page B-2)								
Delay	22.9	38.2	14.5	12.8	12.9	8.1	6.5	13.2
v/c	0.20	0.63	0.46	0.06	0.44	0.31	0.30	-
Queue	19.1	44.8	27.1	6.8	64.8	15.8	37.3	-
PM Peak Hour - Projected 2014 Volumes With Phase 3 Development - Traffic Signal Control (Page C-51)								
Delay	22.6	42.0	6.6	13.4	19.6	15.0	7.0	18.3
v/c	0.28	0.72	0.27	0.01	0.70	0.47	0.22	-
Queue	25.1	57.0	11.9	2.5	123.7	18.8	27.2	-
PM Peak Hour - Projected 2014 Volumes With Revised Development -(Page B-4)								
Delay	23.3	43.6	16.7	13.8	21.0	20.2	7.2	19.9
v/c	0.30	0.73	0.51	0.01	0.73	0.56	0.22	-
Queue	27.4	56.4	36.0	2.5	132.7	25.8	27.2	-

NOTES: 1. Alderney Drive is considered a north-south street at this intersection.
2. The June 2007 analyses for the Kings Street westbound approach (the exit from King's Wharf) were completed with a left turn lane (WB-L) and a through-right (WB-TR) lane. The April 2008 analyses have been completed with a westbound left - through (WB-LT) lane and a right turn lane (WB-R) to achieve better lane balance for the two exit lanes.

Conclusions -

1. Trip generation estimates for the fully developed April 2008 land use concept include 646 vehicles per hour (vph) with 313 vph entering and 333 vph exiting the site during a weekday AM peak hour, and 753 vph during a PM peak hour with 352 vph entering and 401 vph exiting the site.
2. AM peak hour trip estimates for the April 2008 analysis have increased by about 23% over trip estimates prepared for the June 2007 land uses, and PM peak hour trips are estimated to increase by about 25%.
3. Level of performance analyses of the Alderney Drive / Prince Albert Road / Portland Street and Alderney Drive / King Street intersections using trip generation estimates for the April 2008 land use concept do not indicate any significant differences between the intersection level of performance results for the June 2007 land use concept included in *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips*.
4. Conclusions reached in *Traffic Impact Study - King's Wharf Development Dartmouth Marine Slips* for the June 2007 land use concept are considered to be applicable to the April 2008 land use concept.

If you have any questions or comments, contact me by Email at traffic@ns.sympatico.ca or telephone 443-7747.

Sincerely:



Ken O'Brien, P. Eng.

Attachments:

Appendix A - Trip Generation Estimates for the proposed 'original' land use, June 2007, and Level of Service Sheets from the June 2007 Study.

Appendix B - Level of Service Sheets for April 2008 analyses

Appendix A

Trip Generation Estimates

Level of Service Sheets

(June 2007 Land Use Concept)

Table 3.3 - Trip Generation Estimates for King's Wharf - Full Development									
Land Use ¹	Number Units ³	Trip Generation Rates ¹				Estimate of Trips Generated ²			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out
Trip Generation Estimates Calculated with <i>Trip Generation, 7th Edition</i> , Rates, Equations and Directional Splits									
Condominium (ITE 232)	1200 units	Trip estimates have been calculated using equations and directional splits from <i>Trip Generation</i> , Pages 401 and 402				72	305	263	161
Office (ITE 710)	100.0 KGFA	1.36	0.19	0.25	1.24	136	19	25	124
Retail ⁴ (ITE 814)	40.0 KGLA	0.76	0.60	1.19	1.52	30	24	48	61
Hotel (ITE 310)	200 Rooms	0.34	0.22	0.31	0.28	68	44	62	56
Total Estimated Trips for Full Site Development						306	392	398	402
Trip Generation Estimates Adjusted for On-Site Synergies and Modal Split									
Condominium (ITE 232)	1200 units	A 25% vehicle trip reduction factor has been used to account for on-site synergies and the central business district King's Wharf location in an area with higher than average transit, walking and bicycling trips.				54	229	197	121
Office (ITE 710)	100.0 KGFA					102	14	19	93
Retail ⁴ (ITE 814)	40.0 KGLA					23	18	36	46
Hotel (ITE 310)	200 Rooms					51	33	47	42
Adjusted Trip Generation Estimates for Full Site Development						230	294	299	302
NOTES: 1. Trip generation rates are 'vehicles per hour per unit' for AM and PM peak hours per unit. Rates are for indicated Land Uses and Land Use Codes, <i>Trip Generation, 7th Edition</i> , Institute of Transportation Engineers, 2003. 2. Vehicles per hour for peak hours'. 3. Units are as indicated; KGLA is '1000 square feet gross floor or leasable area' for Retail and Office land uses 4. Speciality Retail (Land Use 814) rates have been used. Since there are no published rates for the AM peak hour for this Land Use, and since AM peak hour trips to Speciality Retail are generally very low, AM trip rates have been assumed to be 50% of the PM rate with reversal of the directional split.									

Distribution of Site Generated External Trips





















The HRM QRS-II Regional Transportation Model has been used to provide general distribution information for trips generated (productions and attractions) by the King's Wharf development. Adjustments have been made to account for trip distribution changes caused by Dartmouth Crossing and the new access opportunities provided to Burnside Business Park by the recently completed Highway 118 interchange and the Commodore Drive and Wright Avenue connections under construction.

Site generated trips have been distributed and assigned in the following manner:

- East and northeast - 35% (20% to Portland Street and Pleasant Street; 15% to Prince Albert Road)
- North and northwest - 35% (25% Windmill Road; 10% Victoria Road)
- West - Macdonald Bridge - 30% (7.5% by Victoria Road / Nantucket Avenue and 22.5% by Alderney Drive / Wyse Road).

1: Portland Street & Prince Albert Road

2014 AM Peak with Buildout Site Development (Fig B10-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1842	0	1770	1820	0	0	1863	1583	0	1863	1583
Flt Permitted	0.533			0.950								
Satd. Flow (perm)	993	1842	0	1770	1820	0	0	1863	1448	0	1863	1583
Satd. Flow (RTOR)		2			13							92
Volume (vph)	15	100	5	556	300	55	0	74	549	0	140	85
Lane Group Flow (vph)	16	114	0	604	386	0	0	80	597	0	152	92
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.07	0.26		0.75	0.46			0.23	0.60		0.44	0.25
Control Delay	29.8	31.5		29.2	19.9			35.7	12.3		39.7	9.3
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	29.8	31.5		29.2	19.9			35.7	12.3		39.7	9.3
LOS	C	C		C	B			D	B		D	A
Approach Delay		31.3			25.6			15.1			28.2	
Approach LOS		C			C			B			C	
Queue Length 50th (m)	2.5	18.0		95.8	49.2			13.6	53.4		26.9	0.0
Queue Length 95th (m)	8.0	33.4		140.9	75.0			27.1	80.9		46.4	13.2
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	235	438		803	833			346	987		346	369
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	0.07	0.26		0.75	0.46			0.23	0.60		0.44	0.25

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 22.8

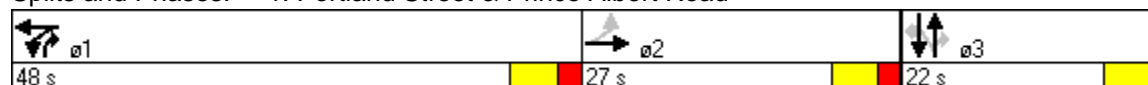
Intersection LOS: C

Intersection Capacity Utilization 57.5%

ICU Level of Service B




















Analysis Period (min) 15

Splits and Phases: 1: Portland Street & Prince Albert Road



2: King Street & Alderney Drive

2014 AM Peak with Buildout Site Development (Fig B10-A Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1633	0	0	1594	1404	1577	3051	0	1609	3183	0
Flt Permitted		0.977			0.771		0.404			0.265		
Satd. Flow (perm)	0	1602	0	0	1273	1317	671	3051	0	449	3183	0
Satd. Flow (RTOR)		11				112		33			12	
Volume (vph)	5	40	10	140	51	103	20	550	109	81	565	35
Lane Group Flow (vph)	0	59	0	0	207	112	22	716	0	88	652	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	32.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		20.3			20.3	20.3	46.7	46.7		56.0	56.1	
Actuated g/C Ratio		0.24			0.24	0.24	0.55	0.55		0.65	0.66	
v/c Ratio		0.15			0.68	0.28	0.06	0.42		0.23	0.31	
Control Delay		20.8			39.5	6.8	13.2	13.3		7.8	7.1	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		20.8			39.5	6.8	13.2	13.3		7.8	7.1	
LOS		C			D	A	B	B		A	A	
Approach Delay		20.8			28.0			13.3			7.1	
Approach LOS		C			C			B			A	
Queue Length 50th (m)		6.2			30.8	0.0	1.7	34.6		4.7	21.0	
Queue Length 95th (m)		15.3			53.5	11.7	6.9	61.6		12.4	38.4	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		496			388	480	371	1703		413	2119	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.12			0.53	0.23	0.06	0.42		0.21	0.31	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 84.4

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 13.6






Intersection Capacity Utilization 54.2%

Analysis Period (min) 15

Intersection LOS: B





















ICU Level of Service A

Splits and Phases: 2: King Street & Alderney Drive

 ø1	 ø2	 ø4
14 s	44 s	32 s
 ø6		 ø8
58 s		32 s

1: Portland Street & Prince Albert Road

2014 PM Peak with Buildout Site Development (Fig B10-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1853	0	1770	1835	0	0	1857	1583	0	1863	1583
Flt Permitted	0.560			0.950				0.982				
Satd. Flow (perm)	1043	1853	0	1770	1835	0	0	1829	1443	0	1863	1523
Satd. Flow (RTOR)		1			7							49
Volume (vph)	60	235	5	460	275	30	10	150	850	0	75	45
Lane Group Flow (vph)	65	260	0	500	332	0	0	174	924	0	82	49
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.26	0.59		0.62	0.40			0.51	0.94		0.24	0.15
Control Delay	33.6	39.1		24.4	19.0			41.7	33.9		35.8	11.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	33.6	39.1		24.4	19.0			41.7	33.9		35.8	11.2
LOS	C	D		C	B			D	C		D	B
Approach Delay		38.0			22.3			35.1			26.6	
Approach LOS		D			C			D			C	
Queue Length 50th (m)	10.5	45.5		72.8	41.4			31.2	123.5		13.9	0.0
Queue Length 95th (m)	22.6	72.1		108.0	63.8			52.5	#253.6		27.7	9.8
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	247	440		803	836			339	986		346	323
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	0.26	0.59		0.62	0.40			0.51	0.94		0.24	0.15

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 30.6

Intersection LOS: C

Intersection Capacity Utilization 74.8%

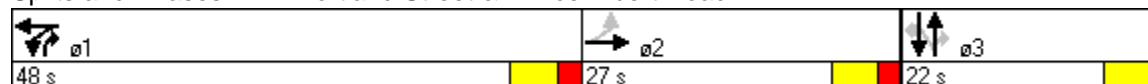
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.




















Queue shown is maximum after two cycles.

Splits and Phases: 1: Portland Street & Prince Albert Road



2: King Street & Alderney Drive

2014 PM Peak with Buildout Site Development (Fig B10-B Vol.)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1612	0	0	1594	1404	1577	3060	0	1609	3217	0
Flt Permitted		0.896			0.724		0.483			0.102		
Satd. Flow (perm)	0	1463	0	0	1196	1317	802	3060	0	173	3217	0
Satd. Flow (RTOR)		15				114		24				
Volume (vph)	25	52	20	144	53	105	5	925	142	105	430	1
Lane Group Flow (vph)	0	106	0	0	215	114	5	1159	0	114	468	0
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	32.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		21.3			21.3	21.3	45.6	45.6		55.2	55.3	
Actuated g/C Ratio		0.25			0.25	0.25	0.54	0.54		0.64	0.65	
v/c Ratio		0.28			0.72	0.27	0.01	0.70		0.47	0.22	
Control Delay		22.6			42.0	6.6	13.4	19.6		15.0	7.0	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		22.6			42.0	6.6	13.4	19.6		15.0	7.0	
LOS		C			D	A	B	B		B	A	
Approach Delay		22.6			29.8			19.6			8.6	
Approach LOS		C			C			B			A	
Queue Length 50th (m)		12.1			32.6	0.0	0.4	76.0		6.6	15.4	
Queue Length 95th (m)		25.1			57.0	11.9	2.5	123.7		18.8	27.2	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		460			368	484	432	1660		270	2104	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.23			0.58	0.24	0.01	0.70		0.42	0.22	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 84.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 18.3






Intersection Capacity Utilization 68.8%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service C

Splits and Phases: 2: King Street & Alderney Drive

 ø1	 ø2	 ø4
14 s	44 s	32 s
 ø6		 ø8
58 s		32 s





















Appendix B

Level of Service Sheets

(April 2008 Land Use Concept)

1: Portland Street & Alderney Drive

2014 AM Peak with Buildout Revised Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1842	0	1770	1820	0	0	1863	1583	0	1863	1583
Flt Permitted	0.533			0.950								
Satd. Flow (perm)	993	1842	0	1770	1820	0	0	1863	1448	0	1863	1583
Satd. Flow (RTOR)		2			13							92
Volume (vph)	15	100	5	573	300	55	0	80	557	0	152	85
Lane Group Flow (vph)	16	114	0	623	386	0	0	87	605	0	165	92
Turn Type	Perm			Split			Perm		custom			Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.07	0.26		0.78	0.46			0.25	0.61		0.48	0.25
Control Delay	29.8	31.5		30.5	19.9			36.0	12.5		40.6	9.3
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	29.8	31.5		30.5	19.9			36.0	12.5		40.6	9.3
LOS	C	C		C	B			D	B		D	A
Approach Delay		31.3			26.5			15.5			29.4	
Approach LOS		C			C			B			C	
Queue Length 50th (m)	2.5	18.0		100.4	49.2			14.8	54.5		29.4	0.0
Queue Length 95th (m)	8.0	33.4		147.9	75.0			28.8	82.6		50.1	13.2
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	235	438		803	833			346	987		346	369
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	0.07	0.26		0.78	0.46			0.25	0.61		0.48	0.25

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 23.5

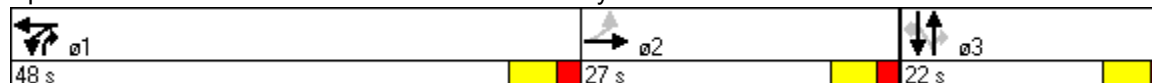
Intersection LOS: C

Intersection Capacity Utilization 58.4%

ICU Level of Service B




















Analysis Period (min) 15

Splits and Phases: 1: Portland Street & Alderney Drive



2: King Street & Alderney Drive

2014 AM Peak with Buildout Revised Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1648	0	1569	1425	0	1577	3022	0	1609	3183	0
Flt Permitted		0.983		0.742			0.404			0.246		
Satd. Flow (perm)	0	1625	0	1225	1425	0	671	3022	0	417	3183	0
Satd. Flow (RTOR)		10			117			49			12	
Volume (vph)	5	55	10	158	58	117	20	550	148	110	565	35
Lane Group Flow (vph)	0	76	0	172	190	0	22	759	0	120	652	0
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	0.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		18.3		18.3	18.3		45.8	45.8		55.3	55.5	
Actuated g/C Ratio		0.22		0.22	0.22		0.56	0.56		0.66	0.68	
v/c Ratio		0.20		0.63	0.46		0.06	0.44		0.31	0.30	
Control Delay		22.9		38.2	14.5		12.8	12.9		8.1	6.5	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		22.9		38.2	14.5		12.8	12.9		8.1	6.5	
LOS		C		D	B		B	B		A	A	
Approach Delay		22.9			25.8			12.9			6.7	
Approach LOS		C			C			B			A	
Queue Length 50th (m)		8.6		24.9	9.6		1.6	34.8		5.9	19.0	
Queue Length 95th (m)		19.1		44.8	27.1		6.8	64.8		15.8	37.3	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		506		376	519		375	1712		407	2162	
Starvation Cap Reductn		0		0	0		0	0		0	0	
Spillback Cap Reductn		0		0	0		0	0		0	0	
Storage Cap Reductn		0		0	0		0	0		0	0	
Reduced v/c Ratio		0.15		0.46	0.37		0.06	0.44		0.29	0.30	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 81.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 13.2






Intersection Capacity Utilization 55.5%

Analysis Period (min) 15

Intersection LOS: B





















ICU Level of Service B

Splits and Phases: 2: King Street & Alderney Drive

 ø1	 ø2	 ø4
14 s	44 s	32 s
 ø6		 ø8
58 s		32 s

1: Portland Street & Alderney Drive

2014 PM Peak with Buildout Revised Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1853	0	1770	1835	0	0	1857	1583	0	1863	1583
Flt Permitted	0.560			0.950				0.983				
Satd. Flow (perm)	1043	1853	0	1770	1835	0	0	1831	1443	0	1863	1523
Satd. Flow (RTOR)		1			7							49
Volume (vph)	60	235	5	470	275	30	10	165	870	0	83	45
Lane Group Flow (vph)	65	260	0	511	332	0	0	190	946	0	90	49
Turn Type	Perm			Split			Perm	custom				Perm
Protected Phases		2		1	1			3	1		3	
Permitted Phases	2						3		3 1			3
Total Split (s)	27.0	27.0	0.0	48.0	48.0	0.0	22.0	22.0	48.0	0.0	22.0	22.0
Act Effct Green (s)	23.0	23.0		44.0	44.0			18.0	62.0		18.0	18.0
Actuated g/C Ratio	0.24	0.24		0.45	0.45			0.19	0.64		0.19	0.19
v/c Ratio	0.26	0.59		0.64	0.40			0.56	0.96		0.26	0.15
Control Delay	33.6	39.1		24.8	19.0			43.1	37.9		36.2	11.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	33.6	39.1		24.8	19.0			43.1	37.9		36.2	11.2
LOS	C	D		C	B			D	D		D	B
Approach Delay		38.0			22.6			38.8			27.4	
Approach LOS		D			C			D			C	
Queue Length 50th (m)	10.5	45.5		75.1	41.4			34.4	130.9		15.4	0.0
Queue Length 95th (m)	22.6	72.1		111.0	63.8			57.1	#263.1		29.8	9.8
Internal Link Dist (m)		100.3			88.8			331.1			72.6	
Turn Bay Length (m)	20.0											
Base Capacity (vph)	247	440		803	836			340	986		346	323
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	0.26	0.59		0.64	0.40			0.56	0.96		0.26	0.15

Intersection Summary

Cycle Length: 97

Actuated Cycle Length: 97

Offset: 49 (51%), Referenced to phase 1:WBTL, Start of Green

Control Type: Pretimed

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 32.4

Intersection LOS: C

Intersection Capacity Utilization 76.0%




ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.




















Queue shown is maximum after two cycles.

Splits and Phases: 1: Portland Street & Alderney Drive

		
ø1	ø2	ø3
48 s	27 s	22 s

Appendix B - Level of Service Analysis
2: King Street & Alderney Drive

Page B-4
 2014 PM Peak with Buildout Revised Development

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1618	0	1569	1425	0	1577	3045	0	1609	3217	0
Flt Permitted		0.901		0.676			0.483			0.094		
Satd. Flow (perm)	0	1476	0	1116	1425	0	802	3045	0	159	3217	0
Satd. Flow (RTOR)		14			116			30				
Volume (vph)	25	62	20	191	70	140	5	925	167	123	430	1
Lane Group Flow (vph)	0	116	0	208	228	0	5	1187	0	134	468	0
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	0.0	44.0	44.0	0.0	14.0	58.0	0.0
Act Effct Green (s)		21.5		21.5	21.5		44.3	44.3		54.1	54.3	
Actuated g/C Ratio		0.26		0.26	0.26		0.53	0.53		0.63	0.65	
v/c Ratio		0.30		0.73	0.51		0.01	0.73		0.56	0.22	
Control Delay		23.3		43.6	16.7		13.8	21.0		20.2	7.2	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		23.3		43.6	16.7		13.8	21.0		20.2	7.2	
LOS		C		D	B		B	C		C	A	
Approach Delay		23.3			29.6			21.0			10.1	
Approach LOS		C			C			C			B	
Queue Length 50th (m)		13.6		31.8	15.1		0.4	81.5		8.0	15.8	
Queue Length 95th (m)		27.4		56.4	36.0		2.5 #	132.7		25.8	27.2	
Internal Link Dist (m)		56.3			37.8			69.1			331.1	
Turn Bay Length (m)							30.0			40.0		
Base Capacity (vph)		469		347	523		424	1625		264	2084	
Starvation Cap Reductn		0		0	0		0	0		0	0	
Spillback Cap Reductn		0		0	0		0	0		0	0	
Storage Cap Reductn		0		0	0		0	0		0	0	
Reduced v/c Ratio		0.25		0.60	0.44		0.01	0.73		0.51	0.22	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 83.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 19.9

Intersection LOS: B

Intersection Capacity Utilization 82.0%

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: 2: King Street & Alderney Drive

